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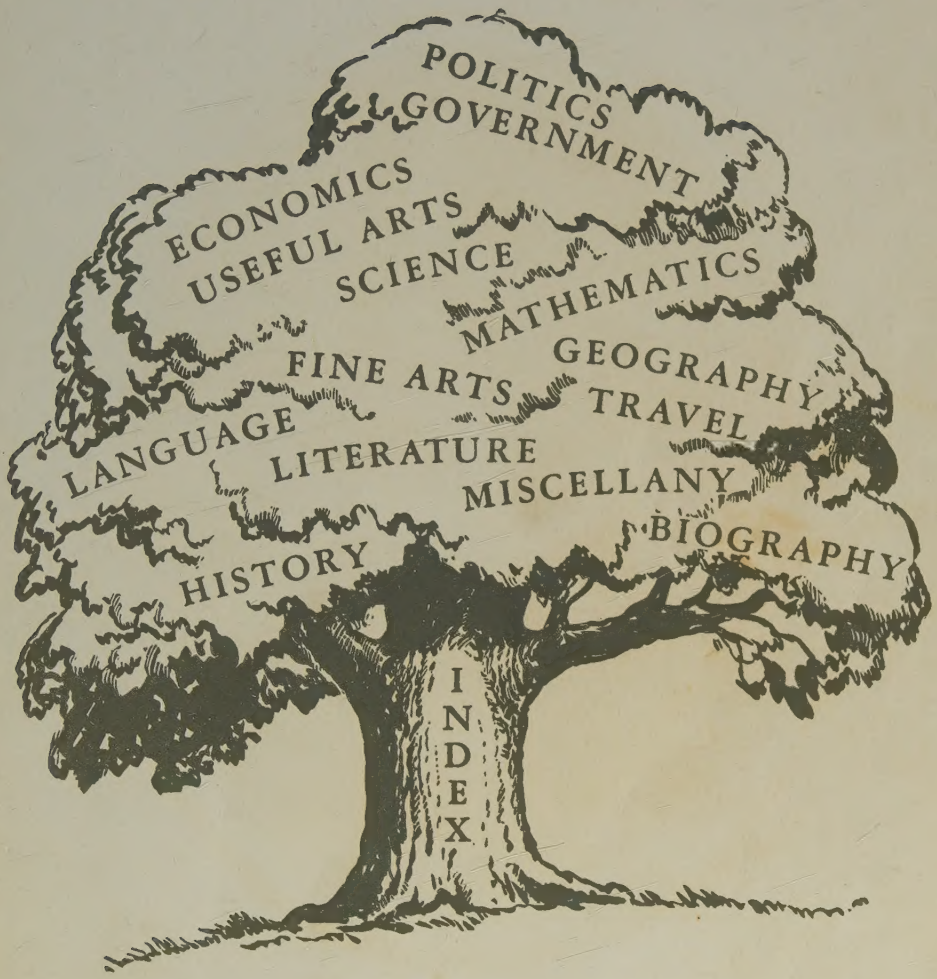
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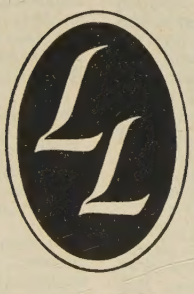

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Sea Devil (*Mobulidæ*). A family of fishes which embraces the largest and most powerful of the rays. According to Risso, some reach a width of 20 feet and a weight of 1200 pounds. The sea devils differ from all other rays in having, on the upper part of the head a pair of fins which stand up like ears or horns. It is said that a sea devil, when harpooned, will drag a boat with great swiftness. Although of terrifying appearance, all sea devils have small teeth, their tails have no spines and hence they are comparatively harmless.

The Manta (*Manta birostris*), of tropical America, is a species of sea devil greatly feared by pearl fishermen, but Jordan states that it rarely devours anything larger than the pearl oyster which it seeks in common with the fishermen. Another species of sea devil (*M. hamiltonia*) occurs in the Gulf of California.

Sea Horse (*Hippocampus hudsonius*). An interesting little pipefish, about 4 inches long, found on the Atlantic coast from Cape Cod to Florida. It has a head and neck somewhat resembling those of a horse, and a finless, prehensile tail with which it clings to seaweed and is sometimes carried far out to sea. The body is incased in a more or less spiny shell which is composed of bony rings. The brood pouch, in which the male carries the eggs until they are hatched and the young partly grown, is situated on the breast.

Seal. The true seals are marine carnivorous mammals constituting the family *Phocidæ*. They have no external ears; and this, in addition to the fact that the construction of their limbs does not permit of their using those organs on land, at once distinguishes them from the allied family of eared seals, or sea lions. The head is very round, and the eyes are large and expressive. In swimming, the true seals seldom use their forefeet, while the eared seals use them as powerful sweeps.

There are some 15 species about equally divided between the northern and the southern hemisphere. Among these are the harbor seal, the harp seal, or Greenland seal, the ringed seal, the hooded seal, the monk seal, and the ribbon seal. They inhabit the coastal waters of temperate and cold regions, feeding on fish and other marine animals.

Seals are much hunted on account of their skins, their fur, and the oil which they yield. To the inhabitants of the polar regions they afford food, clothing, and fuel. The Eskimos show great skill in harpooning seals from their kayaks, or skin-covered boats. See *Fur Seal* and *Sea Lion*.

Sea Lion. A group of marine mammals constituting the family *Otariidæ*. They differ from the true seals in having external ears and limbs adapted for locomotion on land. There are about 10 species. While mostly antarctic, three types occur in the North Pacific, including the well-known sea lions of the California coast and the valuable fur seals of Alaskan waters.

The Steller sea lion (*Eumetopias stelleri*) is the more conspicuous of the two animals which have made the seal rocks of San Francisco famous. It is found in a few widely scattered localities from Santa Cruz, California, to Bering strait. This large animal attains a length of 11 feet, stands 6 feet high, and is estimated to weigh upwards of 1400 pounds. While the fur is inferior, its skin, flesh, and oil are much used by the natives of the Aleutian islands.

The California sea lion (*Zalophus californianus*) inhabits nearly the entire coast of California, Lower California, the Farallons, Santa Catalina, and other coastal islands. It attains a length of 7 feet and a weight of 450 pounds. In the water it is very active, and it climbs rocks and cliffs with surprising agility. It never roars like the Steller sea lion, but keeps up an incessant honking bark or growl. In captivity, it thrives in fresh water, is remarkably docile and intelligent, and is capable of being trained to go through surprising performances. The hair of this species is short, coarse, and valueless as fur.

The so-called fur seal (*Callorhinus*), which yields the costly seal fur of commerce, belongs to this family. See *Fur Seal, Seal.*

Sea Serpents. Circumstantial reports of the appearance of these fictitious monsters have been made since ancient times. All accounts agree that they are of prodigious size and swim with a wavy up-and-down motion, instead of the undulating sideways motion of ordinary serpents. The earliest one reported in America was at Cape Arm, Massachusetts, in 1638.

Sea Snakes (*Hydrophinæ*). A numerous group of strictly marine serpents, with deep, flattened bodies and strongly compressed tails, inhabiting the tropical Indo-Pacific ocean. They bring forth their young alive, subsist almost entirely on small fish, and sometimes attain a length of 12 feet, or only a fraction of the length of the fabled sea serpents. While all are exceedingly poisonous, they are very shy, fleeing from danger at the least alarm, so that fatalities from their bites are rare.

Sea Turtles (*Chelonidæ* and *Sphargidæ*). The largest living turtles, distinguished from all others by their seal-like flippers. None of the sea turtles can withdraw the head inside the shell. They are wholly adapted for marine life, feeding chiefly on fish, crustaceans, and mollusks, and coming ashore only at breeding season. Their eggs are laid in the sand, sometimes in hundreds in a single excavation, and left to hatch by the heat of the sun. Only five species are known, widely distributed in warm seas.

The Leatherback, or Trunk Turtle (*Sphargis coriacea*), differs from all other turtles in having seven lengthwise ridges on the carapace, which is covered with a soft, leathery integument saturated with oil. It is the largest known turtle, sometimes reaching 8 feet in length and weighing 800 to 1200 pounds. Its flesh, which has an unpleasant taste and is reputed to cause sickness, is but rarely eaten for food. The leatherback occurs in Atlantic waters, and breeds on the Dry Tortugas, the Bahamas, and other warm coasts.

The Loggerhead (*Thalassochelys caretta*), which sometimes weighs 450 pounds, breeds upon the Florida coast and wanders northward to Massachusetts. The female sometimes lays 1000 eggs. While taken chiefly for oil, its flesh is sometimes sold in the markets.

The Green Turtle (*Chelone mydas*) is the most highly prized food turtle, especially for making soups. It occurs in warm seas throughout the world. It is sometimes 4 feet long and weighs 500 pounds, but most market specimens range from 50 to 70 pounds. Unlike other sea turtles, the green turtle is herbivorous, living almost entirely on the roots of the eelgrass or turtle grass, which grows in shallow waters.

The Hawksbill (*Chelone imbricata*), the smallest of the sea turtles, rarely 2½ feet long, is distinguished by its sharply curved beak. It occurs from North Carolina to Brazil and furnishes the valuable tortoise shell of commerce, used in making combs and various ornaments. See *Turtle.*

Secretary Bird (*Serpentarius secretarius*). A large, somewhat cranelike bird of prey, closely allied to the vultures, native of South Africa. It stands about 4 feet high and has bluish gray plumage, with various black markings above and below. From a fancied resemblance of its erectile crest to the pen behind the ear of a clerk, it received the name secretary bird. It feeds on reptiles of all kinds, boldly attacking and dispatching the most venomous, either by stunning them by vigorous blows of its knobbed wings or by seizing them in its powerful feet and flying so high that they are killed when let fall. While protected by law as a destroyer of noxious vermin and often tamed as a

protector of poultry, the secretary bird, if not well fed, will help itself to chickens and other young fowls.

Shad (*Alosa sapidissima*). The finest food fish of the herring family, ranking next to the cod and the salmon in economic importance. It is an ocean fish found from Florida to Newfoundland, going up rivers in early spring to spawn. It attains a length of 25 to 30 inches, and a weight of 4 pounds. Many streams are annually restocked by the bureau of fisheries. The shad has been successfully introduced on the Pacific coast, where it is now found in the markets. See *Herring*.

Shark (*Squali*). A group of large, powerful fishes, chiefly marine, with a more or less cylindrical body and a cartilaginous skeleton. The gill slits open on the sides of the neck, and the mouth is on the underside of the head at some distance behind the end of the snout. Consequently, sharks often turn upon their backs to seize their prey. Most sharks have very numerous and exceedingly sharp teeth, often with sawlike edges. The teeth of others are mill-like, tubercular plates for crushing shells. Many sharks bring forth their young alive, the eggs hatching within the body. Others lay leathery eggs of various unusual shapes, some being spirally twisted or coiled.

There are about 150 species, found in all seas, but most abundant in the tropics, varying in size from small dogfish, barely a foot long, to the great basking sharks, sometimes 50 feet long, of enormous girth and weight. Many are very destructive to other fishes, and several of the larger forms are dangerous to man. Among the most important types are the cow sharks, bullhead sharks, dog sharks, tiger sharks, mackerel sharks, threshers, basking sharks, cat sharks, hammerhead sharks, and dogfishes.

Few sharks are of economic value, though some yield an inferior oil, and the rough skin of others, called shagreen, is used in polishing wood. Dried shark fins are commercially important in India and China. The flesh of various species is wholesome and edible, and is increasingly used for food. See *Basking Shark*, *Hammerhead Shark*, *Whale Shark*.

Sheatfish (*Siluris glanis*). A huge, Old World catfish, sometimes weighing 300 to 400 pounds, abundant in the Danube. Next to the sturgeon it is the largest river fish in Europe. See *Catfish*.

Sheep (*Ovis*). Hollow-horned ruminants of the ox family, closely related to the goats. All wild sheep inhabit mountains or high table-lands of the northern hemisphere. There are about 12 species, among which are the European mouflon, the African aoudad, the Asian argali, the Punjab wild sheep, and the North American bighorn.

The original wild species, from which the domesticated sheep has been derived, is unknown. However, the domestic sheep is most closely related to the mouflon (*O. musimon*) of Sardinia, to the Armenian wild sheep (*O. gmelini*), and to the oorial (*O. vignei*), of central Asia.

Since prehistoric times the domestic sheep has been reared in Asia and Europe for its flesh, milk, wool, and skin. The ancient Lake Dwellers of Switzerland used the sheep; it is mentioned throughout the Bible, and in the earliest Greek and Roman writings. The Latin word *pecus*, meaning cattle, whence the word *pecunia*, meaning wealth, was applied especially to sheep. Now widely diffused throughout both hemispheres, the sheep has become the world's chief fiber-producing animal. Of the various domesticated animals of the ox family, the sheep is the least intelligent, although it is remarkably mild, gentle, and inoffensive in disposition. The sheep is a thrifty feeder, subsisting where cattle and horses cannot obtain sufficient pasturage. The male sheep is called a ram, the female, a ewe, and the young, a lamb. A group or herd of sheep is most commonly called a flock.

Centuries of breeding have produced numerous breeds of sheep which are grouped as short-wooled, medium-wooled, and long-wooled. The Spanish Merinos are typical of the first class, the Southdown and Shropshire of the second, and the Leicester, Lincoln, and Cotswold of the last. While some breeds are successfully grown in moist climates, such as that of England, sheep are best adapted to dry, cool regions. They thrive upon the scanty vegetation of semideserts, where they often pasture for days without water. The chief wool-growing countries are Australia, Russia, the United States, and Argentina. In the United States, California, Texas, Wyoming, Utah, and Montana usually lead in production.

Besides wool, meat, and leather, which are the principal sheep products, the entrails, when dried and twisted, form the so-called catgut used for violin strings, the fat yields tallow, and the milk, in some countries, is made into cheese. In the mountain regions of India, sheep are employed to a limited extent as beasts of burden.

Shrews (*Soricidæ*). Very small, mouselike, insectivorous mammals, with long, pointed muzzles, soft fur, and ratlike feet. They constitute the most numerous family belonging to the order *Insectivora*. There are more than 125 species, widely distributed throughout the world, some of which are the smallest known mammals. Nearly all are nocturnal and burrowing in habit, living chiefly upon insects, worms, and small mollusks. The common shrew (*Sorex personatus*), found from Massachusetts to Alaska and south to North Carolina, is one of the smallest of American shrews. It is only 2¾ inches long, chestnut brown in color, with a short tail and large ears. Some 35 other species occur in various parts of North America. See *Insectivora*, *Moles*.

Shrike. The shrikes belong to a numerous family of perching birds (*Laniidæ*). Although displaying some powers of song, they have strong hooked beaks and predacious habits like those of the true birds of prey. There are about 200 species, mostly confined to the Old World, only 2 of which occur in the United States and Canada.

The northern shrike, or butcher bird (*Lanius borealis*), 10 inches long, with gray, black, and white plumage, breeds in the far North and winters in the northern United States. Like other shrikes, it is noted for its habit of impaling insects, mice, and small birds upon thorns, leaving them to be eaten later. It feeds chiefly upon mice, noxious insects, and, in winter, upon English sparrows. The slightly smaller loggerhead shrike (*L. ludovicianus*), of the southeastern United States, and its western varieties, the white-rumped, California, and island shrikes, are very similar in color and habits.

Shrimp (*Crangon*). A small, slender, long-tailed crustacean, closely allied to the crawfish and prawns. The common shrimp (*C. vulgaris*), about 2 inches long, greenish gray, spotted with brown, is found in shallow bays from Labrador to South Carolina. The annual catch of shrimp in the United States is about 70 million pounds, most of which is taken along the southern coast from North Carolina to Texas. Louisiana, Florida, Georgia, and Mississippi lead in production. In San Francisco bay the catch of the California shrimp (*C. franciscorum*) amounts to about $250,000 yearly.

Silkworm. A name applied to the larvæ, or caterpillars, of several species of moths. The common silkworm moth (*Bombyx mori*) is the most important silk-producing species. It is a native of China, where it has been cultivated from a remote period. The mature moth is of a cream color with faint brownish markings. The caterpillar (silkworm) when first hatched is black or dark gray, becoming cream-colored after the last molt. It feeds upon the white mulberry, and will also eat the black mulberry and the Osage orange.

The silk is produced in a pair of specially constructed vessels which contain a gelatinous substance and become much enlarged at the time when the animal is about to spin. These silk organs unite at the mouth to form a common duct termed the spinneret. Through this tube the semifluid substance is ejected. On coming in contact with the air, it hardens into the soft fiber so highly prized for textile fabrics.

The caterpillar employs the silk in constructing a cocoon in which it assumes the pupa state. The pupa is usually killed by heating gently in an oven, because the natural exit of the moth is injurious to the silk. After soaking in warm water, the fibers composing the cocoon are unwound and reeled into hanks or skeins, known as the raw silk of commerce.

Sirenia (*sī-rē′nĭ-à*). An order of aquatic mammals, with thick, naked or slightly hairy skin, finlike fore limbs, and the hind limbs lacking. While somewhat resembling the whales in appearance, they are quite different in structure. The order comprises only the dugongs of the Indian Ocean and the manatees of tropical America and Africa. See *Dugong*, *Manatee.*

Skate (*Raja*). A numerous group of fishes closely related to the sharks, represented by about 40 living species, inhabiting the colder seas. The angular, much flattened body, sometimes broader than long, is usually armed with spines. Their eggs, which are "wheelbarrow-shaped" with a tube projecting from each of the four corners, are from 3 to 8 inches long. Most species are edible and some are largely used for food.

The common skate (*R. erinacea*), of the North Atlantic, called also tobacco-box from its shape, is about 18 inches in length. The light-brown body is variegated with dark spots and covered with spines. The barn-door skate (*R. lævis*), of Atlantic shores, so named on account of its size, is about 4 feet long, and nearly spineless. A similar skate (*R. binoculata*) occurs in California waters.

Skunk. A fur bearing animal of the marten family, closely allied to the badger, found only in the New World, sometimes incorrectly called polecat. There are many species, distributed from northern Canada to Patagonia. They are somewhat smaller than a cat in size, with long hair, bushy tails, and black and white markings. All are noted for the possession of large anal glands from which a powerfully acrid fluid with an exceedingly offensive odor may be projected to a distance of several feet.

The North American skunk (*Mephitis*), of which 9 forms or species are recognized, occurs from Hudson bay to Guatemala. They live in dens or burrows, are chiefly nocturnal, and prey upon small rodents, birds, reptiles, and insects, destroying many noxious kinds. Except for their depredations on poultry, skunks are in the main beneficial to the farmer. Since early colonial times, skunks have been trapped and sometimes reared for their valuable fur. See *Polecat.*

Sloth (*Bradypodidæ*). An edentate mammal, found only in Central and South America, so named because of the extreme sluggishness of its movements. All sloths are arboreal, living in an inverted position, suspended by their long curved claws from branches in tree tops. They feed on leaves and twigs. Sloths are clothed with thick shaggy hair, which often so closely resembles the lichen-covered bark of the trees upon which they are suspended that it is difficult to see them. Their heads are round, the short ears are nearly concealed in the heavy fur, the forelegs are much longer than the hind legs, and the toes are provided with very long claws. See *Edentata.*

Smelt (*Argentinidæ*). A family of excellent food fishes, all marine and closely allied to the salmon. The American smelt (*Osmerus mordax*), seldom exceeding 10 inches in length, occurs on the Atlantic coast from Virginia to the Gulf of St. Lawrence. In the winter it enters the mouths of rivers and bays to spawn, and is taken in great numbers for the markets. Its flesh is delicate, tender, and oily, with a distinct odor and taste. The surf smelt (*Mesopus pretiosus*), of the California coast, is prized as a pan fish.

Snail. The common name for the air-breathing gastropod mollusks constituting the numerous order *Pulmonata*, which embraces about 19,000 known species of land and fresh-water snails. With the exception of the slugs, in which the shell is rudimentary or absent, snails have a well-developed, external spiral shell, which encloses the whole body as a protective covering. The part of the snail protruding from the shell is the foot, upon the forward end of which is the head, bearing one or two pairs of tentacles or feelers. The eyes are either at the base of the tentacles or, as in the land snail, on the ends of the upper pair. The mouth has a hard, horny upper jaw and lip for biting, and contains a long, rasplike tongue, the radula, for tearing or rasping food.

While a few are carnivorous, most snails feed upon vegetable matter and some are destructive to vegetation. They lay round, semitransparent eggs, which are either deposited on the surface of the ground or buried beneath it. Some species are edible and highly prized for food. The garden snail (*Helix pomatia*) was considered a great luxury by the ancient Romans, and in southern Europe and in France is still grown in large numbers as an article of food. It has been introduced at New Orleans and other places in the United States.

Snake Bird (*Anhinga*). A small group of web-footed birds, closely related to the cormorants; called also anhingas or darters. They have elongated bodies, long, snakelike necks, small, narrow heads, and slender, sharp pointed bills. There are four species, natives of warm regions, ranging in length from 28 to 36 inches. They usually live in pairs around bodies of fresh water, are expert swimmers and divers, and feed upon fish. The American snake bird, or water turkey (*A. anhinga*), of tropical America, is also common in the Gulf states and breeds as far north as southern Illinois. Its plumage is glossy black with greenish reflections.

Snakes (Suborder *Ophidia*). A numerous group of reptiles, which, together with the lizards (Suborder *Lacertilia*), makes up the order *Squamata.* Snakes have greatly elongated, scaly bodies, without limbs or with only tiny vestiges of hind limbs, and without eyelids or external ear openings. They have a bifid tongue; the teeth are consolidated with their supporting bones, and usually the right and left halves of the lower jaw are connected by an elastic band. The vertebræ are very numerous, sometimes nearly 300, and, excepting the atlas and those of the tail, all bear ribs. There is usually only one lung, which is much elongated.

Most snakes are timid and harmless, but numerous species have highly developed poison glands and powerful fangs, so that their bite is dangerous and often fatal to man and to many animals. Snakes are oviparous, usually depositing from 10 to 80 leathery-shelled eggs, which are hatched by the heat of the sun. The most venomous, however, as well as many common, harmless species, retain their eggs in the oviducts until the embryos are developed, and then bring forth living young.

Snakes are usually carnivorous, feeding upon small rodents, frogs, reptiles, and insects, and, on the whole, are of great service to agriculture. Their flesh, which is white, chicken-like, and wholesome, is often eaten by savage peoples.

There are about 2000 existing species of snakes, comprising about half of all living reptiles. They occur throughout the world, except in latitudes where the subsoil is permanently frozen, or in

isolated islands, such as New Zealand, Hawaii, and the Azores. In Scandinavia, snakes pass north of the Arctic circle. They vary greatly in habits, the chief distinctive groups being burrowing snakes, ground snakes, tree snakes, fresh-water snakes, and sea snakes.

Many entirely different snakes are remarkably similar in general appearance. Hence it is difficult to make distinctions between them in nontechnical language. In consequence, many entirely harmless species are popularly regarded as venomous and there is great confusion of names.

Some 600 species, or more than a fourth of all the existing snakes in the world, are more or less venomous. About half of these are only mildly poisonous and a much smaller fraction are regarded as fatally poisonous to man. North America is remarkably free from poisonous snakes, only 24 out of about 110 native species being considered dangerous. Of these, the poisons of only the larger rattlesnakes and their allies are fatal to man.

Snipe (*Gallinago*). A small game bird, closely related to the woodcock and the sandpiper, with short legs and tail, medium wings, and a long, straight, slender bill. Snipes inhabit marshy places, feeding upon worms, insects, and larvæ, which they obtain by probing in the mud. They nest in shallow hollows in the ground, usually laying 4 eggs. There are about 23 widely distributed species, only one of which is native to North America. Wilson's snipe (*G. delicata*), called also English snipe and jack-snipe, is about 11 inches long, mottled brown and buff above and white below. It breeds from Connecticut to Utah, northward to beyond the Arctic circle, and winters far southward. Its flesh is considered a great delicacy.

Snowbird (*Junco hyemalis*). A small bird of the finch family, about 6 inches long, slaty gray above, with a darker head, and white below. It breeds from northern Minnesota and New York northward, migrating southward, upon the approach of snow, as far as the Gulf states. It nests on the ground, laying 4 or 5 whitish, finely speckled eggs, and feeds upon insects and weed seeds. In winter, snowbirds often fly about barns or approach the doors of houses in search of food. Several varieties occur in the Western and the Southern states.

Sole (*Soleidæ*). The soles constitute a family of flatfishes related to the flounders. They differ from the flounders, however, in having small eyes, placed close together, and a small, much twisted mouth, with few teeth. There are about 150 species. The common sole (*Solea vulgaris*), found from Norway to Italy, is the most valued representative of the true soles. It is from 1 to 2 feet long, usually weighing about a pound, though sometimes reaching a weight of 9 pounds. When properly cooked, it is esteemed as one of the most delicate of European table fish.

Sparrow. A small bird of the finch family, usually with dull plumage, conical bill, and feeble song, living on or near the ground, and nesting in bushes or on the ground. The name was first given to the common house or English sparrow (*Passer domesticus*), but it is now extended over a large number of closely related species. Some 75 or more North American birds are known as sparrows. Among these are the black-throated, chipping, field, fox, lark, sage, savanna, seashore, song, swamp, tree, vesper, white-crowned, white-throated, and wood sparrows.

In strong contrast to the pestiferous English sparrow, the native American species are highly useful birds. They consume tons of noxious weed seeds in winter and myriads of injurious insects in summer, but destroy very little grain or cultivated fruit.

Spider. The spiders are insect-like arthropods forming the order *Araneida* or *Araneæ*, of the class *Arachnida*. They differ from insects in having the head and thorax united in one piece, called the cephalothorax; by having four pairs of legs; and by the absence of wings and antennæ. The abdomen, which is joined to the cephalothorax by a short, narrow stalk, is provided at the end with organs for spinning silk. This is used in weaving webs to entangle prey, for making abodes, and for various other purposes.

Spiders are carnivorous, feeding chiefly on insects. Some powerful tropical species, with bodies 3 inches long, are able to kill small birds, fish, and even rats. All spiders have poison glands, connected with their hooked, biting jaws, and use the venom from them in capturing their prey. In nearly all species the jaws are far too weak to pierce the human skin and the amount of poison they can eject is too small to produce any serious injurious effect. Some of the larger forms, called tarantulas, produce painful wounds, but, so far as accurate records go, these never prove fatal.

Spiders lay spherical eggs which the female winds with silk into a roundish mass called the cocoon. This she fastens in her web, to a grass stalk, or hides in her nest. The young are born in the form of their parents but differ from them at first in appearance. When grown, the males are much smaller than the females.

There are more than 10,000 known species of spiders, some 1300 of which are found in the United States. Among the chief families are the orb-web, trapdoor, funnel-web, crab, wolf, and jumping spiders. See *Tarantula*.

Sponge. A group of low water animals, forming the branch *Porifera*. The body is penetrated by numerous channels of pores, some of which are inlet tubes, others outlet tubes, and others form a third set connecting the two. The outside of the sponge is covered with a thin, leathery membrane, the *ectoderm*; the pores are lined with a softer membrane, the *endoderm*, and between these is a third membrane, the *mesoderm*, which is strengthened by fibrous, limy, or glassy material.

In the connecting tubes are chambers lined with ciliated cells. The water enters through the inlet tubes, passes through the connecting tubes, and is expelled through the outlet tubes. In passing through the chambers lined with ciliated cells, the cells capture and digest minute vegetable and animal organisms in the water, and by movement of the cilia create currents which keep the water moving through the sponge.

Sponges are almost exclusively marine. They are generally found attached to the underside of projecting rocks, or clinging to the roofs of submarine caverns. Common bath sponge is the siliceous skeleton of a certain kind of sponge with the living animal tissue entirely removed. Commercial sponges are mostly obtained from the Grecian archipelago, Florida, and the Bahamas.

Squid. A cephalopod mollusk, closely related to the cuttlefish and the octopus. It differs from the cuttlefish in having a narrow, horny pen or shell beneath the skin of its back, and from the octopus in having ten arms, two of which are much longer than the others. When pursued, it ejects an inky fluid to conceal its movements. There are many species, frequenting all seas and feeding largely upon fish. Some are used for human food.

The common squid (*Loligo pealei*), about 8 inches long, is abundant from Maine to South Carolina. The flying squid (*Ommastrephes illecebrosus*), about a foot long, common from Long Island northward, is much used for bait in the cod fishery. The California squid (*O. tryoni*), 8 inches long, is caught in great numbers on the Pacific coast, and dried for export to China.

The giant squid (*Architeuthis princeps*), of the North Atlantic, is the largest known invertebrate animal. Its body is sometimes 19 feet long, with tentacular arms 35 feet long, so that its total length

when outstretched exceeds 50 feet. Its huge eyes are 14 inches in diameter. See *Cuttlefish, Octopus.*

Squirrel. A small rodent mammal with a bushy, hairy tail. There are more than 250 species, occurring nearly everywhere except in Australia. In America the squirrel family (*Sciuridæ*) is divided into three groups—the marmots, the flying squirrels, and the true squirrels. The true squirrels are divided into the tree squirrels, the rock squirrels, and the ground squirrels, according to their mode of living.

The tree squirrels are mostly arboreal, living either in hollow trees or building spherical nests on the branches. The gray squirrel (*Sciurus carolinensis*) is typical of this group. As the name indicates, it is grayish or iron grayish on the back, and the tail is fringed with white. From tip of nose to tip of tail its length is 18 inches.

The rock squirrels live in rocks, stone piles, and fence corners. The chipmunk (*Tamias*) is the type of this group. It has cheek pouches, and uses them to gather and store up grain and nuts for the winter.

The ground squirrels burrow in the earth and store their food in their burrows. They live mostly on grain, and from this fact are known as spermophiles, or "seed lovers." They are most numerous west of the Mississippi river.

The largest squirrel in the world is the Malabar squirrel (*Sciurus malabaricus*) of India, over 30 inches long and weighing 4 pounds. The most beautiful squirrel is Prevost's squirrel (*Sciurus prevosti*) of the Malay peninsula, with a handsome color pattern of brown, black, white, and buff. Nearly all squirrels are eaten as food, and the skins of various species have some commercial importance as fur. See *Flying Squirrel.*

Starfish. The starfishes proper (*Asterias*) are echinoderms covered with a tough, leathery skin beset with prickles. They have the form of a star, with five or more rays radiating from a central disk. In the middle of the undersurface of the disk is situated the mouth, opening into a digestive system which sends prolongations into each ray. If the prickly skin be removed, it will be seen to be supported by a series of plates beautifully jointed together. On the undersurface of each ray the plates exhibit a series of perforations, through which, in the living state, the ambulacra, or tubular feet, can be protruded so as to effect locomotion.

Starfishes are found in almost all tropical, European, and American seas, and some species occur as far north as Greenland. They are very destructive to oysters, clams, mussels, barnacles, snails, worms, and small crustaceans.

Starling. The starlings compose a large family of birds (*Sturnidæ*) intermediate between the crows and the blackbirds. There are about 200 species, mostly natives of tropical Asia and Africa. The common starling (*Sturnus vulgaris*) is a European bird noted for its song and powers of mimicry. It is about 8 inches long, with glossy black-brown plumage and a buff tip to each feather. Its food consists of insects, worms, snails, seeds, and fruits. When numerous, starlings sometimes inflict great damage on orchards. They nest in holes in trees or in old buildings, laying from 4 to 6 pale blue eggs. The starling was well known to the ancients and is now often kept as a cage bird. In 1890 it was introduced into Central park, New York, and has since become naturalized in several northeastern states.

Sting Ray (*Dasyatidæ*). A family of rays which have a slender, whiplike tail armed with a long spine having backwardly projecting teeth; called also "stingaree." In many species this tail spine serves as a very effective weapon, making a lacerated wound which, in man, is attended with much danger of blood poisoning. Sting rays inhabit nearly all seas, lying flat on sandy bottoms, and feeding upon crabs, oysters, and other shellfish. All hatch their eggs within the body. The common sting ray (*Dasyatis centrurus*), found on Atlantic shores from Cape Cod southward, attains a length of 12 feet. A similar species of the Pacific coast (*D. dipterura*) abounds in the vicinity of San Diego bay. See *Ray.*

Stork (*Ciconia alba*). A large, voiceless, Old World wading bird, closely related to the herons. It is common in summer over most of Europe and Central Asia, migrating southward in winter to Africa and India. It is about 3½ feet long, stands fully 3 feet high, and, excepting the black wing coverts, its plumage is pure white throughout. The long bill and the legs are red, the neck long and usually arched, and the breast feathers long and pendulous. The stork frequents marshes, feeding upon eels, frogs, lizards, snakes, small mammals, young birds, and insects. It also eats offal and scraps of food refuse around villages and towns. Long associated with man, it seeks rather than avoids human habitations. It usually selects a chimney or a roof for a nesting site, to which it returns year after year, although it sometimes builds its nest in trees or on high rocks. The eggs, 3 to 5 in number, are pure white.

In various European countries, particularly in Holland and in Germany, storks are welcomed and protected on account of their value as scavengers and also for their fidelity to their young, which is proverbial. It is a common belief among many peoples that good luck will attend the house to which a stork attaches itself, and when a new baby comes to a family it is customary to say "the stork has arrived."

The smaller black stork (*C. nigra*), of range similar to the white stork, lives in secluded swamps, nesting in tall trees. The wood ibis and jabiru are closely related American species.

Sturgeon (*Acipenseridæ*). The sturgeons compose an important family of ganoid fishes. They have cartilaginous skeletons; the body is armed with five rows of large, bony, and usually spiny bucklers, and the upper lobe of the tail is much larger than the lower. All are sluggish, bottom feeding fish; the mouth, which is situated beneath the snout, is sucker-like and devoid of teeth. There are about 30 species, abounding in rivers and seas. Some live exclusively in fresh waters; others are marine, ascending streams only to spawn. They range in length from 2½ to 30 feet, and include some of the largest living fishes, some attaining a weight of 2000 pounds.

All kinds of sturgeon are used for food, and, from their abundance, are of great economic value. Their flesh is marketed in vast quantities, both fresh and smoked, the roe forms the caviar of commerce, and their air bladders are made into isinglass. The common sturgeon (*Acipenser sturio*), of both shores of the Atlantic, is the largest and most valuable species in American waters. It sometimes attains a length of 10 feet and a weight of 500 pounds.

Sucker (*Catostomidæ*). A group of fishes closely related to the carp and minnows, but differing chiefly in the structure of the mouth, which is placed underneath the head and provided with fleshy, tubular lips for sucking food from the bottom of streams. There are about 60 species, all except two of which are found in the rivers of North America.

The white sucker (*Catostomus commersoni*), abundant in streams and lakes from Quebec to Montana and southward to Missouri and Georgia, attains a length of 18 inches, and is locally important as a food fish. The Buffalo Fish (*Ictiobus cyprinella*) of the Mississippi valley, so named because of its humped neck, is a huge sucker which attains a length of 3 feet and weighs from 20 to 40 pounds. Many millions of pounds of buffalo fish are marketed annually in Illinois, Missouri, Mississippi, and Arkansas. See *Carp, Minnow.*

Sunfish. A group of small, perchlike, freshwater fishes found in ponds and streams in most parts of North America. The common sunfish, or Pumpkin Seed (*Eupomotis gibbosus*), abundant from Minnesota eastward and southward, is usually about 8 inches long and weighs about half a pound. In color, it is olive green, often brilliantly marked with blue, orange, and scarlet. As it is easily caught, it is a prime favorite with young anglers. The blue-gill sunfish (*Lepomis pallidus*), a somewhat larger but less handsome species, is suitable for pond-culture.

Surf Fishes (*Embiotocidæ*). A family of small, perchlike fishes, 5 to 18 inches in length. All, save two Japanese species, are natives of California waters. They differ strikingly from all related higher fishes in being viviparous. The young, some 10 to 20 in number, are brought forth alive at an advanced stage of development, those of some species being about a third as long as their parents. The blue surf fish (*Embiotoca jacksoni*), first discovered in Sausalito bay in 1863, is the most common species.

Swallow. The swallows constitute a very distinct family (*Hirundinidæ*) of small passerine birds. They have compact, usually lustrous plumage; long pointed wings; more or less forked tails; very short, flat, triangular, deeply cleft bills, and weak feet, adapted only for perching. Swallows feed almost exclusively upon insects, which they capture on the wing. They nest in pairs and colonies, and during migrations associate in immense numbers. There are about 80 species, very widely distributed throughout the world, except in arctic regions. They cannot endure cold and hence migrate northward only upon the sure approach of summer, usually returning southward well in advance of frost.

Among the best-known American species are the familiar barn swallow, the cliff or eave swallow, the white-bellied or tree swallow, the rough-winged swallow, the bank swallow, and the purple martin. By reason of destroying many noxious insects, swallows are of considerable economic value.

Swan (*Cygninæ*). A group of large, graceful, web-footed, swimming birds, closely related to the ducks and the geese. Swans differ from geese in that the neck is longer than the body and from ducks in that the sexes are alike in color. There are about 8 species, all except 2 of which have pure white plumage. They walk awkwardly, fly strongly, and swim with remarkable grace. A young swan is called a cygnet. The handsome trumpeter swan (*Cygnus buccinator*), so named for its loud, sonorous cry, is found chiefly in the interior of North America and west to the Pacific coast, breeding from Iowa to the Arctic Ocean. It is about 5 feet long, with a wing spread of 8 to 10 feet.

The noisy whistling swan (*Olor columbianus*), 4½ feet long, with a wing spread of about 7 feet, nests and rears its young on the shores of the Arctic Ocean, ranging southward in winter to Mexico. At night its clamors may be heard at a distance of several miles. The famous black swan (*Chenopsis atrata*) of Australia, 40 inches long, is black throughout except the white outer wing feathers and the scarlet bill. It is comparatively tame and is frequently kept as an ornamental bird. The beautiful black-necked swan (*Chenopsis melanocoryphus*), of Argentina and Patagonia, is pure white throughout, except the upper part of the neck which is velvety black. The mute swan (*Cygnus olor*), native of Europe and Asia, so named because it is voiceless in the domesticated state, is the parent wild species from which the tamed swans of parks and gardens have been developed. It is about 5 feet long, with pure white plumage.

Swans were partly domesticated by the ancient Romans, who used their flesh for food. During the middle ages, swans became a part of the regalia of European courts, and only kings were permitted to keep them. Swans are now reared as ornamental birds throughout the world.

Swift. The swifts form a group of exceedingly active small lizards, which includes the small-scaled swifts (*Uta*) and the spiny swifts (*Sceloporus*). In the United States there are about 15 species of the former and 35 species of the latter, nearly all confined to the West and Southwest. The harmless common swift (*Sceloporus undulatus*), which feeds on insects, occurs from New Jersey to Oregon and southward. It is about 5½ inches long, gray with wavy black crossbands, and with sharply keeled and bristling scales. It frequents fallen tree trunks and rail fences, and moves about with lightning-like rapidity.

Swine (*Suidæ*). A name properly given to the domesticated pig or hog, but embracing also its wild relatives which include the Old World swine and the American peccaries. The true swine (*Sus*) have a long mobile snout, with the nostrils placed in its flat terminal surface, and narrow feet, each with four toes, two of which do not ordinarily reach the ground in walking. They include the wild boar of Europe (*S. scrofa*), the wild boar of India (*S. cristatus*), the banded pig of Sumatra (*S. vittatus*), the warty pig of Java (*S. verrucosus*), the bearded pig of Borneo (*S. barbatus*), and the pygmy hog of Nepal (*S. silvanus*). Closely related to the true swine are the river hogs and wart hogs, or bush pigs, of Africa, and the babiroussa of Celebes. See *Babiroussa*, *Hog*, *Peccary*.

Swordfish (*Xiphius gladius*). A huge, pugnacious fish of the open seas, with the bones of the upper jaw prolonged into a long, stiff, horizontally flattened sword. It attains a length of 15 feet and sometimes weighs from 400 to 800 pounds. The swordfish is a powerful fighter, and many instances are on record wherein it has driven its armed beak through the sides of boats or even of small ships. It preys upon fish which swim in schools, killing large numbers by swift strokes of its sword. While somewhat oily, its flesh is much esteemed for food, over two million pounds being marketed annually by New England fishermen.

Tanager (*tăn'à-jẽr*). The tanagers form a large, exclusively American family of birds (*Tanagridæ*), closely related to the finches, remarkable for their beautiful plumage. There are about 350 species, nearly all natives of the tropics, only 5 of which reach the United States during summer. They are forest-loving birds, nesting in trees, and feeding on flowers, fruit, and insects. Like many other birds of brilliant plumage, they are not musical. The scarlet tanager (*Piranga erythromelas*), about 7 inches long, bright scarlet with black wings and tail, breeds from Illinois and Virginia to southern Canada. The summer tanager (*P. rubra*), 7 inches long, dark red above and bright red below, is a summer resident of the southeastern United States which sometimes wanders northward as far as Nova Scotia. The western tanager (*P. ludoviciana*), 6½ inches long, with red, yellow, and black plumage, breeds from western Nebraska to British Columbia and southward to Mexico.

Tapir (*Tapirus*). Large, thick-skinned mammals of the tapir family, with the nose prolonged into a short movable trunk or proboscis. In appearance they somewhat resemble the pig and the elephant. Tapirs differ from all other ungulates in having 4 toes on the forefeet and 3 toes on the hind feet, all separate and with naillike hoofs. There are 5 known species, 4 of which occur in tropical America and 1 in the East Indies. Tapirs are forest loving and nocturnal, generally sleeping by day and going forth at night to feed upon fruits, grasses, water plants, and other vegetables. They are usually shy, solitary, and harmless, living near the water into which they invariably flee when attacked.

The American tapir (*T. americanus*), native to the great South American forests from Venezuela and Guiana southward through Brazil and Paraguay to Argentina, is about 6 feet long, 3½ feet high, and mahogany brown in color. It subsists chiefly upon palm leaves and fruits but often raids plantations in search of melons and sugar cane. It is much hunted by the natives for its juicy, well-flavored flesh, which is said to resemble beef. It is readily tamed when young, and domesticated tapirs are often seen wandering about the streets of South American towns. This species is the one commonly seen in menageries.

Tarantula (*tà-răn'tû-là*). The name given to various species of venomous spiders. The true tarantula is a large wolf spider (*Lycosa tarantula*) of southern Europe. Its bite was fabled to produce the dancing mania called tarantism. Several large hairy spiders of the American tropics, including the huge bird spider or the crab spider, are called tarantulas, as is a spider-like scorpion, *Tarantula whitei*, found from Texas to California. While painful, their bites, so far as authentic records go, are not dangerous and never prove fatal. See *Spider*.

Tarpon (*Tarpon atlanticus*). A magnificent game fish of the Gulf coast and West Indian waters, sometimes 7 feet long and weighing over 300 pounds. It is remarkable for its enormous silvery scales, 1 to 4 inches in diameter, which are sometimes sold as curiosities. Next to the tuna, it is the greatest of game fishes, and various points on the Gulf coast have become famous as resorts for tarpon fishermen.

Teal. A group of small, beautiful fresh-water ducks. There are about 15 species, all favorite game birds, widely distributed throughout the world. Teal are migratory, make their nests usually at some distance from the water, and lay greenish or cream-colored eggs. The most common North American species is the handsome green-winged teal (*Nettion carolinense*). Other North American species are the blue-winged teal (*Querquedula discors*) and the cinnamon teal (*Q. cyanoptera*).

Tern (*Sterna*). A long-winged, web-footed, swimming bird of very graceful flight, closely related to the gulls; called also sea swallow. There are about 50 species, distributed throughout the world, most abundant on ocean shores, but also found around many inland ponds, lakes, and rivers. In size, terns are smaller and more slender than the gulls, ranging from 6 to 22 inches in length. Some 18 kinds of terns occur in North America.

Terrapin. Various small chelonians, often called pond turtles or river turtles. They inhabit marshes, ponds, and shores of slow streams. In size they vary from 6 to 14 inches, and often have beautifully colored markings. Several edible species are sold in markets as "slider" terrapin. The Diamond-back (*Malacolemmys palustris*), of the salt marshes of the Atlantic coast, is highly valued by epicures, selling from $60 to $80 a dozen and upwards. The shield plates of the shell or carapace have diamond-shaped markings, whence the name "diamond-back."

The painted terrapin (*Chrysemys picta*), also called "painted tortoise" or "mud turtle," is beautifully marked with crimson, yellow, and olive. It is about 5 inches long, and occurs from New Brunswick to Louisiana. The Western Pond Turtle, or Ellachick (*Chelopus marmoratus*), is the only fresh-water turtle of the Pacific region north of Lower California. See *Turtle*.

Thrasher (*Toxostoma*). A name given in the United States to several large thrushlike wrens, with a decurved bill, short wings, and a long tail. They are usually brown or ashy in color, with spotted breasts.

The brown thrasher (*T. rufum*), often incorrectly called "brown thrush," is one of the most familiar song birds of eastern North America. Like the mocking bird, to which it is closely related, the brown thrasher is a fine mimic. It is about a foot long, reddish brown above and buffy white streaked with blackish below. The brown thrasher nests from the Gulf states to Manitoba, Quebec, and Maine, and winters from Virginia southward. It builds its nest in bushes, thickets, and hedgerows, laying 3 to 6 bluish white, thickly speckled eggs. Its food consists chiefly of insects, spiders, small fruits, and seeds. Although injuring some grain and fruit, it amply pays for it by destroying cutworms, cankerworms, and other noxious insects.

Several similar species, including the curved-bill, Sennett, Palmer, Bendire, Leconte, Crissal, and California thrashers, are found in the western and southwestern United States.

Thrush. The thrush family (*Turdidæ*) includes many of our most familiar birds and sweetest songsters. In America, the robin (*Merula migratoria*) and the bluebird (*Sialia sialis*), both of this family, are among the earliest birds of spring, and build their nests in orchards or near the habitations of men. Of the true thrushes (*Turdus*), the veery, or Wilson's thrush, the hermit thrush, and the wood thrush are famous for the sweetness and brilliancy of their song. All are cinnamon-brown upon the upper parts with brown spots upon the breasts or sides, and all are inhabitants of groves and woodlands.

Among the thrushes of the Old World are the song thrush or mavis of the Scotch, the fieldfare, the blackbird, the song ouzel, and many others. The name thrush is also inaccurately given to birds of other families that are fine singers. See *Bluebird*, *Robin*.

Tiger (*Felis tigris*). The largest, most powerful, and most dangerous of the great cats (*Felidæ*), slightly exceeding the lion in size, and far surpassing it in destructiveness. The tiger is purely Asiatic and reaches its highest development, both in size and coloration, in the hot plains of India. A full-grown male Bengal tiger is from 9 to 11 feet and the tigress from 8 to 10 feet from the nose to the tip of the tail, and from 3 to 3½ feet high at the shoulder. The ground color of the body is rufous or tawny yellow, shaded with white on the ventral surface. This is varied with vertical black stripes or elongated ovals and brindlings. On the face and posterior surface of the ears the white markings are peculiarly well developed.

While possessing immense strength and ferocity, the tiger, unless strongly provoked, rarely attacks groups of armed men, though it often carries off defenseless women and children. In India the principal food of the tiger is cattle, deer, wild hogs, monkeys, and peafowl. When pressed by hunger or enfeebled by age and incapable of dealing with larger prey, such as buffaloes, the tiger prowls around villages, and, having once tasted human flesh, becomes a "man-eater." In 1902, man-eating tigers caused the destruction of about 1300 lives in British India. See *Cat Family*.

Toad (*Bufonidæ*). The common name for a numerous family of tailless amphibians. Most toads have a short-limbed, thickset body, a warty skin, and are terrestrial or burrowing in habit. They differ from the true frogs in the absence of teeth. Although living chiefly on land, toads almost uniformly deposit their eggs in water, though one African species brings forth its young alive. There are upwards of 100 species, of which 13 are found in the United States, the greatest variety occurring in Texas.

The common toad (*Bufo lentiginosus*) occurs from Mexico north to Great Slave lake eastward of the Rocky mountains, throughout North America. It is 3½ inches long, or longer, with a rough, warty skin, generally brownish above and yellowish below. It remains quiet in shady places or burrows beneath the earth during the day, going forth at night in

search of food. A single female sometimes lays as many as 12,000 eggs, which are deposited in water in gelatinous ropes or cylinders. When frightened, toads puff out their skins, which secrete an acrid fluid very irritating to tender surfaces, such as the lips of a dog, but otherwise they are harmless. Toads are not poisonous, nor can they produce warts. On the other hand, they destroy immense numbers of injurious insects and should, therefore, be preserved and protected. See *Amphibians.*

Torpedo (*Narcobatidæ*). A family of remarkable rays. They are provided with an electric organ, situated under the skin about the back of the head, which is capable of benumbing an enemy by a severe electric shock. Torpedoes are known also as crampfishes and numbfishes, and, though not abundant, are found in all warm seas. The torpedo, or crampfish (*Tetronarce occidentalis*), of the Atlantic coast, 3 to 5 feet long and sometimes weighing 200 pounds, is one of the largest species known. The rare California torpedo (*T. californica*), which reaches 3 feet in length, is sometimes taken in warm sandy bays on the Pacific coast. See *Ray.*

Tortoise (*Testudinidæ*). The common name of the land turtles whose limbs are developed for walking. Many frequent barren situations and some live in true deserts. Of some 40 species, 3 occur in North America. The gopher tortoise (*Testudo polyphemus*) dwells in burrows in sand hills from South Carolina to Texas. Its high dome-shaped shell is much longer than wide. Agassiz's tortoise (*T. agassizi*), about 9 inches long, is found in the deserts of Arizona and southern California. The giant tortoise (*T. vicina*) of the arid Galapagos islands, attains great size, weighs several hundred pounds, and is believed to live for centuries. Specimens have been kept in captivity for more than 100 years. See *Turtle.*

Totem Animals. Among savage peoples no belief is more common than that some peculiar kind of animal is the guardian of each clan or local group, protecting it in all its affairs. This animal is the totem of the group. Each member of the group must show this totem animal proper respect, may regard it without fear, must not injure, kill, or eat it, but must worship and propitiate it.

The savage believes that he is descended from his totem. His clan is named from it, and identified by crude symbols or images of it. Be it bear, deer, eagle, or whatever else, he may embroider it as a symbol on his tent, as did the Indians of the United States, or carve it on a tall post set in front of his house, as did those of Alaska; or he may tattoo it upon his body, as did the natives of the South Pacific. When an animal of the kind dies, he buries it with the same rites that are accorded to a member of his clan.

Toucan. The toucans form a numerous family of birds (*Rhamphastidæ*), allied to the puff birds and woodpeckers, remarkable for the immense size of their bills, sometimes more than half the length of the body, and for their brilliantly colored plumage. There are about 60 species, all natives of tropical America. While subsisting chiefly on fruit, they also devour small birds, lizards, and other small animals. Toucans are readily tamed and make interesting pets. The largest is the Toco toucan (*Rhamphastos toco*) of Argentina, 24 inches long, with a bill nearly 7 inches long. One of the best-known is the ariel toucan (*R. ariel*) of Brazil, with brilliant yellow and scarlet markings.

Tree Frogs (*Hylidæ*). This interesting family of small amphibians, though possessing teeth in the upper jaw, is otherwise closely related to the toads. Tree frogs vary from less than 1 inch to 5 inches in length, are usually green or variegated in color, and their toes are expanded into adhesive disks for climbing. Owing to a large resonating sack in the throat, their voices are surprisingly loud. They possess the power of changing color to correspond with that of their surroundings. Owing to their abundance, they destroy immense quantities of insects. There are about 200 species, occurring throughout the world except in Africa. Fifteen species are found in North America. See *Amphibians.*

Trichina (*trĭ-kī'nȧ*) (*Trichina spiralis*). A small, nematode worm, closely related to the hookworm. In its immature state it inhabits the muscles of man, the pig, and other mammals, the original host being presumably the rat. The young worms, about $\frac{1}{25}$ of an inch long, are the cause of a very painful and often fatal disease, called *trichinosis,* in man.

When pork containing the encysted worms is eaten without being sufficiently cooked, living worms are released. Upon passing into the intestine they become mature in a few days' time. The female, a slender round worm, about $\frac{1}{6}$ of an inch in length, immediately brings forth young worms, continuing for a period of 2 or 3 weeks. These young worms pierce the intestinal wall and migrate through the blood and lymph to the muscles, where they encyst themselves. In thus migrating, they often so seriously impair the action of the muscles of the chest, throat, and jaws, as to cause death. See *Hookworm.*

Trogon. The trogons constitute a family (*Trogonidæ*) of beautiful tropical birds, related to the cuckoos and kingfishers. There are about 60 species, found in both hemispheres, but most numerous in tropical America. Trogons are of moderate size—the largest being somewhat smaller than a crow—with strong bills, weak feet, and long tails. They live in forests, feeding on insects, fruits, and berries, most of which they seize when on the wing. Their eggs, 2 to 4 in number, are laid in holes in trees. Among the most handsome species are the resplendent trogon, the red-bellied trogon, and the quezal. The coppery-tailed trogon (*T. ambiguus*), 12 inches long, bronze green above, rose-pink below, with black throat, white breast, and copper-colored tail, is found from southern Texas to Arizona and south to Mexico.

Trout (*Salmo* and *Salvelinus*). The most beautiful and highly prized of American fresh-water game fishes, closely related to the salmon. They are usually small or of medium size, and are often handsomely colored with various spots and markings. There are several species, all exceedingly active, swimming with arrow-like swiftness, stemming the strongest currents, ascending rapids, and leaping up small waterfalls.

For food, trout seek living prey, chiefly smaller fishes, crawfishes, worms, and insects. Trout thrive in cool, clear, rapidly flowing waters in which there are rapids and deep pools. They are most numerous in northern and western mountain brooks. Most trout spawn at the approach of winter, depositing their eggs in nests hollowed in the bottom of the stream, where they hatch early in the following spring. Nearly all trout are very gamy and afford fine sport for the angler. Their delicately flavored flesh is highly prized for food.

The brook trout (*Salvelinus fontinalis*) is the best-known American game fish. It is found in cold streams and lakes, from Maine to North Dakota, northward to the Arctic circle. It occurs also in the mountains of Alabama and Georgia and has been introduced in the Rocky Mountain and Pacific states. In small streams it ranges from 6 to 10 inches in length, but in larger ponds and lakes it attains 18 or 20 inches. Usually it does not exceed 1 or 2 pounds in weight, though it sometimes reaches 4 or 5 pounds.

The Great Lake trout or Mackinaw trout (*Christovomer namaycush*) is a food fish of great value, usually weighing from 15 to 20 pounds, but sometimes reaching 50 or 80 pounds. It occurs in

the larger lakes from Maine to Vancouver island, northward to Labrador and Alaska.

The mountain trout (*Salmo clarkii*) is characteristic of mountain streams and lakes from Colorado to California and northwestward. It weighs from 4 to 6 pounds in Lake Tahoe and from 20 to 30 pounds in Alaska.

The rainbow trout (*Salmo irideus*), "by many anglers regarded as the gamest of all fishes." (Jordan), is found in the mountains of California and Oregon. It is from 15 to 18 inches long and usually weighs from 2 to 3 pounds. This trout closely resembles the European salmon (*S. fario*). The steelhead trout (*S. rivularis*) is a highly prized game fish found in river mouths and bays from Santa Barbara to Alaska. It weighs from 12 to 20 pounds, and, on the Columbia river, it is canned in large quantities for food. It has been successfully planted in Lake Superior by the bureau of fisheries. See *Salmon*.

Trunkfish (*Ostraciidæ*). A family of curious fishes, mostly of tropical seas. Their bodies are enclosed in a bony box made up of six-sided scutes, connected by sutures, leaving only the jaws, fins, and tail free. They are from 4 to 12 inches long, are slow of motion, live in shallow water, and are protected against most enemies by their bony carapace. Unlike most solid-jaw fishes, they are not poisonous, and are often baked in the shell for food. The common trunkfish (*Lactophrys trigonus*), with the body enclosed in a three-angled shell, occurs on the Atlantic coast from New York southward.

Tuatara (*tōō'ä-tä'rä*) (*Sphenodon punctatus*). A lizard-like reptile of New Zealand. It is the only living representative of the primitive order *Rhynchocephalia* which otherwise became extinct in the Triassic age. As first pointed out by E. D. Cope, the anatomy of the tuatara sharply distinguishes it from the lizards. For example, the carpus or wrist contains ten bones, the primitive number, and all are separate. It is a sluggish animal, about 2½ feet long, fond of the water, and feeds upon worms, insects, crustaceans, and fish.

Turkey (*Meleagris*). The largest of the gallinaceous birds, and the only native American representative of the pheasant family. The wild turkey (*M. gallopavo*), of which there are several varieties, formerly ranged from the table-lands of Mexico northward over much of temperate North America, but is now rare in the United States except locally in the South and Southwest. It is about 3½ feet long and usually weighs from 15 to 20 pounds. In general its plumage is of a copper-bronze color with green reflections and variously barred with white, brown, and black. It inhabits woodlands, securing much of its vegetable and insect food by scratching among the leaves. While it runs swiftly, it is also a strong flier and roosts in trees. It nests on the ground, laying about 12 creamy-white eggs. The male is fond of strutting with the feathers puffed out and the tail spread.

The domestic turkey, a descendant of the Mexican wild turkey, was introduced into Europe by the Spaniards early in the 16th century. It is now reared in many countries for its excellent flesh and is the only domestic animal contributed by the New World that is in wide and valued use outside of its native region.

Turtle (Order *Chelonia*). The turtles differ from all other reptiles in having the body incased by a protective shell of bony plates. The upper part of this shell is called the *carapace*, and the lower, the *plastron*. Usually the head, legs, and tail can be drawn into the shell. While generally provided with claws, the feet of marine turtles are modified into flippers. Most turtles are carnivorous, though some are herbivorous. All lay eggs, covered with a leathery shell, which are usually buried in the sand and hatched by the heat of the sun, the young digging their way out. Turtles have no teeth, but their jaws have horny, chisel-like biting edges. While the name turtle properly applies to *marine* forms, terrapin to *fresh-water* forms, and tortoise to *land* forms, there is much confusion in their use.

The flesh and eggs of many turtles are much prized for food. Among the most highly esteemed are the green turtle and various terrapin. The eggs of Amazonian turtles yield oil of commercial value. There are about 300 living species of turtles, of which 44 occur in North America. Many fossil turtles are known, some of which are of enormous size. See *Sea Turtle, Terrapin, Tortoise.*

Umbrella Bird (*Cephalopterus ornatus*). A singular South American bird, related to the bell birds and cotingas, so named because of its large umbrella-like crest, which droops forward so as nearly to conceal the bill. It also has a feathered tuft or lappet, several inches long, which hangs down from the breast. The umbrella bird is about the size of a crow, with glossy black plumage. It lives in the tops of high forest trees, building a platform-like nest of small branches and laying four pure white eggs. Its food consists chiefly of fruits.

Ungulates (*ŭng'gû-lâts*) (*Ungulata*). An order of mammals embracing all the hoofed animals, or those characterized by having from one to four blunt nails or hoofs on each foot. To this important group belong most of the domestic animals, such as the horse, ox, sheep, goat, pig, and also the deer, antelope, buffalo, zebra, camel, llama, giraffe, tapir, elephant, rhinoceros, hippopotamus, and many others. With few exceptions, all the ungulates are herbivorous land animals. Their molar teeth are adapted for grinding, and the canine teeth are either very small or wanting. In all existing species the toes never exceed four in number, and in no case are plantigrade.

The living ungulates are grouped into four suborders: odd-toed forms (*Perissodactyla*), including animals like the horse, zebra, tapir, and rhinoceros; even-toed forms (*Artiodactyla*), embracing the cloven-footed animals, such as the ox, deer, pig, camel, and hippopotamus; animals with a proboscis or trunk, *Proboscidea*, as the elephant; and the peculiar conies or hyraxes, *Hyracoidea*. The elephants and the hyraxes differ so greatly from other ungulates that they are often regarded as composing distinct orders. There are more than 300 living species of ungulates, grouped in about 13 families and found in all parts of the earth except the Australian region.

Vampire. True vampires are small blood-sucking mammals belonging to the family of leaf-nosed bats, native of tropical Mexico and Central and South America. The bloodsucking vampire (*Desmodus rufus*) is a reddish brown bat, about 3 inches long, which remains in caves or hollow trees during the day. It issues forth at night in search of prey, attacking horses, cattle, and other warm-blooded animals, even including man, while they sleep, shaving the skin with their incisor teeth, and sucking the blood as it flows. It is believed that blood constitutes the sole food of this and a few other smaller species.

The great vampire, or false vampire (*Vampyrus spectrum*), a large leaf-nosed bat, 7 inches long, with a wing spread of 28 inches, occurs in the Amazon region. Its hideous face, black, shining eyes, erect, leathery ears, exposed teeth, and spear-pointed nose, give it a most diabolical expression, but it eats only fruit and insects and is entirely harmless. See *Bats.*

Vicuña (*vĭ-kōōn'yà*) (*Lama vicunia*). A South American animal of the camel family, intermediate in size between the llama and the alpaca. The vicuña is about 2 feet high at the shoulder, with a

slender neck, erectly carried head, and rich brown curly wool spotted with white. It is an exceedingly fleet-footed, alert, and active animal, with habits similar to those of the wild goat or antelope. It lives in herds in desolate places at very high altitudes in the Andes. While much hunted for its flesh and wool, it has never been domesticated like the guanaco. See *Guanaco*.

Viper (*Viperinæ*). The vipers compose a group of Old World serpents containing about 40 species, all venomous. They are usually short, with a thick body and a flat, often triangular, head, with no pit between the eye and the nostril.

The common viper, or Adder (*Vipera berus*), about 10 inches long, the only snake in England except the water snake, extends eastward throughout Europe and Asia. The Asp (*V. aspis*), common in the Alps, is the only poisonous snake found as far north as Sweden. The Puff Adder (*V. arietans*), found nearly throughout Africa, some 6 feet long, is a much dreaded reptile. When angry it hisses loudly with a puffing sound. The chain viper (*V. russellii*), sometimes 5 feet long, next to the cobra, is the most dangerous snake in India.

The horned viper (*Cerastes cornutus*), of North African deserts, about 2½ feet long, with a horn-like spike above each eye, is a vicious, aggressive snake whose bite is usually fatal. The asp associated with the death of Cleopatra is now supposed to have been this species.

Vulture. The New World vultures (*Cathartidæ*) are large, turkey-like, carrion-eating birds of prey, with powerful wings and of graceful flight. The head and the upper neck are bare; the long, weak bill is but slightly hooked, the nostrils are perforate, and the toes have blunt claws. All are voiceless. They build no nests but deposit their eggs, 1 to 3 in number, in a crevice in the rocks, in a hollow tree, or on the bare ground. There are about 9 species, most abundant in warm regions where they perform invaluable service as scavengers.

The turkey vulture, or Turkey Buzzard (*Cathartes aura*), ranges from Saskatchewan to Patagonia. It is about 2½ feet long, with a wing spread of 5 feet. The plumage is lustrous black, the bare head and neck crimson, and the bill white. It is very graceful on the wing, and soars in great circles to enormous heights. While subsisting chiefly on carrion, it will devour fresh meat, and even small living mammals, birds, and reptiles.

The black vulture, or Carrion Crow (*Catharista urubu*), is found from the Gulf states to Argentina. It is about 2 feet long, with a wing spread of 4½ feet. It associates with the turkey buzzard and acts as a scavenger, going about in flocks in the streets of populous cities. The rare California vulture (*Gymnogyps californianus*), called also California condor, is one of the world's largest birds of flight. It is from 44 to 55 inches long with a wing spread of 8¼ to 11 feet, and weighs 20 to 25 pounds. In wing spread it sometimes surpasses the famous condor of the Andes but is usually a lighter bird.

The Old World vultures (*Vulturinæ*) are similar to the American vultures in appearance though different in structure. There are 17 species, including the widely known lammergeier, the griffon, and the Egyptian vulture, or Pharaoh's hen. See *Buzzard, Condor*.

Walrus (*Odobenus*). A large marine mammal, closely related to the seals and sea lions, found in arctic regions. It is known at once by its enormous tusks or canine teeth which project straight downward from the upper jaw. These are longest in the female and sometimes attain a length of 2½ feet. They are composed of solid yellowish ivory, which is much inferior, however, to elephant ivory. Walruses have a thick, clumsy body, deepest at the shoulder. They reach a length of 12 feet and a weight of 2200 pounds. The skin, which rests upon a thick layer of fat, is clothed with brown fur but becomes more or less bare with age. The head is small and the upper lip has a sort of mustache of long, yellowish bristles. The feet, which are adapted for swimming, are also furrowed for holding on to smooth ice.

Walruses feed largely on clams and other mollusks, dug from the sea bottom with their tusks, though they also eat fish and various crustaceans. During the breeding season they visit islands and ice floes, often congregating in large numbers. Ordinarily only one young is produced at a birth and is suckled by the parent for about two years. In disposition the walrus is gentle and inoffensive, though a fierce, persistent fighter when attacked, and quick in rushing to aid a wounded companion.

There are two living kinds of walrus, one found in the Atlantic and the other somewhat larger form, in the Pacific. The Atlantic walrus (*O. rosmarus*), formerly abundant as far south as Newfoundland, is now found in few localities on the shores of the Arctic Ocean. The Pacific walrus (*O. obesus*) is the largest marine carnivore. It once existed in great herds on the northern shores of Alaska. Like the Atlantic walrus, it has been largely exterminated by commercial hunting for its valuable oil, hides, and tusks. South of the Aleutian islands it is now rarely seen.

To the Eskimo, the walrus is exceedingly valuable, furnishing flesh for food, oil for fuel and light, skins for making boats, sinews for bird nets, and ivory for various tools and implements. The almost total destruction of the walrus through commercial hunting caused great privation among the native peoples of Alaska and Siberia.

Wapiti (*wŏp'ĭ-tĭ*) (*Cervus canadensis*). A large, handsome species of true deer, the North American representative of the stag of Europe. It is usually but incorrectly called "elk." It was formerly widely distributed over the United States and Canada, but is now restricted to limited districts in the Rocky mountains and on the Pacific coast, being most numerous in the vicinity of Yellowstone national park.

The wapiti attains a height of about 5 feet at the shoulder and a weight sometimes exceeding 800 pounds. It is reddish brown in color, with blackish shades on the legs and ears. The antlers have a spread of 4 feet or more and weigh 20 to 30 pounds. Thriving equally well in mountains, forests, or plains, the wapiti is easily kept in parks and game preserves and increases in number in captivity. The Roosevelt wapiti (*C. roosevelti*), yellowish brown, with darker head and neck, and white spots on the body, is found in the Coast ranges of Oregon, Washington, and British Columbia. See *Deer* and *Moose*.

Warbler. Properly, a small song bird of either of two numerous passerine families, the American *Mniotiltidæ* or the Old World *Sylviidæ*.

The New World family, called by some the wood warblers, contains, according to Ridgway, about 200 species, most of which do not exceed 6 inches in length. They have pretty though never gorgeous plumage, and, while some sing well, most warblers have weak voices. With few exceptions, all are woodland birds and feed wholly upon insects. Of 60 or more kinds found in the United States and Canada, nearly all pass the coldest months within the tropics. Among these are the prothonotary, yellow, parula, swamp, Kentucky, Blackburnian, and hermit warblers. The birds known as redstart, ovenbird, yellow-breasted chat, water thrush, and Maryland yellowthroat are various species of wood warblers.

The Old World warblers number about 100 species, of which some of the best-known are the grasshopper, sedge, and willow warblers. The famous nightingale and robin redbreast belong to this family.

Wasp. The wasps belong to the *Hymenoptera*, the highest order of insects. They include the solitary wasps (*Sphecoidea*) and the social wasps (*Vespoidea*).

The social wasps, such as the hornet, or yellow jacket, are the best known. They build nests of paper attached to bushes, trees, roofs, and eaves of buildings. The paper is manufactured from wood fiber obtained from posts and unpainted boards. This is chewed in the mandibles or jaws and united into sheets, often of considerable extent. The nests are often top-shaped or balloon-shaped, with horizontal layers of cells inside resembling honeycomb, all enclosed in a spherical paper covering with a hole at the bottom for entrance and exit. The nests of some tropical species are occasionally 6 feet long. These wasps savagely attack intruders, and their sting is extremely painful. Wasp colonies include three forms,—males, females, and workers.

The solitary wasps include miners or diggers, mud daubers, and carpenters. The mason wasps, or mud daubers, are the most familiar, as their mud nests are commonly seen on beams and walls. The carpenters cut tubular nests in wood and divide them by mud partitions. The miners dig tunnels in the earth. Wasps are endowed with a marked degree of intelligence. See *Ant*, *Bee*, *Honeybee*.

Water Flea. A general name applied to small or microscopic crustaceans of the group of *Entomostraca*, found in all waters. They are mainly herbivorous, feeding upon the microscopic plants that float free in the water. In their turn, these minute crustaceans constitute a most important food supply for fishes and other aquatic animals. All water fleas have jointed swimming feet and antennæ. *Cyclops* has a pear-shaped body and a forked tail. *Daphne* has a flat body enclosed in a delicately sculptured, two-valved, spine-tipped shell. There are many other common forms of great beauty and interest. As their bodies are highly transparent and their internal organs varicolored, many water fleas, when observed through a microscope, are most beautiful objects. See *Crustaceans*.

Water Snake (*Tropidonotus*). A large genus of fresh-water snakes, living in ponds, rivers, and swamps. There are about 100 species, widely distributed in North America, Europe, and Asia. Ten species are found in the Southern and the Eastern states. While active and pugnacious, none are venomous. The common water snake (*T. fasciatus*, var. *sipedon*), often wrongly called "water moccasin," is very abundant from Canada to Wisconsin and southward. It is from 3 to 4 feet long, dingy brown above and spotted with red below. When cornered it flattens its head and strikes viciously, but it is perfectly harmless. It is ovoviviparous, sometimes producing 40 young in a brood.

Weakfish (*Sciænidæ*). A family of spiny-finned sea fishes, many of which are highly prized for food. The common weakfish, or Squeteague (*Cynoscion regalis*) is one of the most valuable food fishes of the Atlantic coast. It is graceful in form, has an undivided tail fin and a projecting lower jaw. It usually weighs from 1 to 6 pounds, though it is often larger. The White Sea Bass, or Santa Catalina Salmon (*C. nobilis*), attaining a length of 4 to 6 feet and a weight of 20 to 80 pounds, is an important food fish of the Pacific coast. The California Bluefish, or Corvina (*C. parvipinnis*), steel-blue in color, sometimes 2 feet long and weighing 8 pounds, is also an excellent food fish.

Weasel (*Putorius noveboracensis*). A small fur bearing mammal of the family *Mustelidæ*. It has a remarkably slender body, a long head, and short legs, and is usually from 12 to 16 inches long, inclusive of the rather short tail. In color it is brown above and white or pale yellow below, with the end of the tail black. In the North, during winter, the fur, except the black tip of the tail, becomes more or less white. When in the winter phase, the animal, like various other species of weasels, is known as ermine.

In one or more of its varieties, the common weasel occurs throughout the eastern United States and Canada, ranging westward to Minnesota and southward to North Carolina. With tireless energy and great courage it preys upon rats, mice, hares, rabbits, birds, and other small animals. Fastening upon the neck of its victim, the weasel first sucks its blood, next devours its brains, and then sometimes eats part of its flesh, often killing many more animals than it needs for food. It is especially fond of eggs and is a notorious despoiler of birds' nests and henroosts. Although numerous, even near large cities, the weasel is but little known to most people, owing to its habit of coming forth only at night. It lives in holes under walls, rocks, and trees, and in burrows captured from woodchucks and ground squirrels. See *Ermine*.

Weaver Bird. The popular name for a numerous family (*Ploceidæ*) of Old World birds, closely related to the finches. There are about 275 species, 200 of which occur in Africa and the remainder in Asia and the East Indies. They are small birds, with conical, often coral-red bills, noted for their remarkable skill in weaving elaborate nests. These exhibit great diversity of form and structure. Some are pouches elongated into tubes, entered from below; others are kidney-shaped, with the entrance at the side. The social weaver bird (*Philetærus socius*) lives in communities, building an umbrella-shaped roof in a tree, under which there may be as many as 200 or 300 individual bird homes.

Weevils. A general name applied to seed-eating snout beetles (*Rynchophora* in the order *Coleoptera*), especially to those that feed upon grain. The most important are the members of the genus *Calandra*, which feed upon cereals, as, for example, the granary weevil and the rice weevil. They are exceedingly hard-shelled, very small beetles, one-eighth of an inch long, of grayish color, with the front of the head produced in a long, stout beak. In tight bins, weevils are controlled by fumigation with poisonous gases. See *Beetle*, *Boll Weevil*.

Whale. A cetacean mammal, the largest of living animals. Though fishlike in form and living only in the sea, whales are true mammals. They are warm-blooded and air breathing, bringing forth their young alive and suckling them in the same manner as land mammals. There are two types of families, the baleen whales (*Balænidæ*) and the sperm whales (*Physeteridæ*), comprising in all about 25 species, distributed in all oceans.

The whale has an immense head, with distorted jaws and upward directed nostrils, great bulk, and rudimentary limbs. The nostrils, commonly called blowholes, are placed on the top of the head, and the animal can breathe only when these are above water. Instead of being vertical, as in fishes, the tail is horizontal, and furnishes immense driving power. The tail is used also as an offensive and defensive weapon. The blubber, which is a thick layer of fat, preserves the animal heat, and serves to bring the mighty bulk of the whale nearer to the specific gravity of the water in which it spends its life.

The food of whales consists chiefly of minute mollusks and crustaceans with which their immense pasture grounds in the seas abound. In the baleen whales the enormous head is entirely destitute of teeth. Instead of teeth, the palate is furnished with an apparatus of baleen, or whalebone. This serves the purpose of straining out of the water the small marine animals upon which these whales feed.

The sulphur-bottom whale (*Balænoptera sulfureus*) of the Pacific Ocean, the largest of the baleen group, and the largest known whale, sometimes reaches a length of 95 feet, and a weight of about

150 tons. The baleen of such whales weighs about 800 pounds. The blubber is from 1 foot to 2 feet in thickness, the whole mass in a large whale sometimes weighing more than 30 tons.

The right whale (*Balæna mysticetus*), called also the Greenland whale or "bowhead," is the most important species commercially. It abounds chiefly in the arctic regions, attaining a length of 60 or 70 feet. It furnishes large quantities of baleen and oil,—a single specimen sometimes yielding 3500 pounds of whalebone. The California gray whale (*Rachianectes glaucus*), 45 feet long, which frequents shallow water from the arctic seas to Lower California, is a savage and dangerous species.

Sperm whales have teeth in the lower jaw, but no baleen plates or whalebone. They live almost entirely upon cuttlefish and squid. The huge, very blunt head occupies one-third of the length of the body. The entire head consists largely of a cartilaginous case filled with an oily liquid. On exposure to the air, this oillike matter hardens, and the resulting waxlike substance is the valuable spermaceti of commerce, much used in making candles. The oil of this whale, called sperm oil, is much superior to ordinary whale oil. Another product is ambergris, used in perfumery. This is formed in the intestines but is usually found floating on the sea. The great sperm whale (*Physeter macrocephalus*), the largest and best-known member of the group, found in all warm seas, attains a length of 55 or 60 feet.

Whale fisheries were formerly a very important industry. Large fleets of whaling vessels sailed to nearly all quarters of the globe. Whale oil, whalebone, sperm oil, and spermaceti were staple articles of commerce. However, since the introduction of petroleum, gas, and electric lighting, the industry has greatly declined.

Whale Shark (*Rhinodon typicus*). An immense shark, called also basking shark, of the tropical Indo-Pacific ocean. It attains the greatest length of all known living fishes, sometimes exceeding 50 feet and reputed to reach 70 feet. It is a sluggish monster, with the mouth and nostrils near the end of the muzzle, and with feeble teeth. It does not pursue its prey, but feeds upon small marine creatures taken without effort. Like most species of sharks, it is harmless to man. See *Shark*.

Whippoorwill (*Antrostomus vociferus*). A species of goatsucker or nightjar, so named because of its peculiar cry, which is repeated continually in the night. The whippoorwill is found throughout eastern North America from the Canadian border southward. It is about 10 inches long, grayish in color, variegated with blackish and buff. The whippoorwill remains hidden during the day and flies by night, usually with its large mouth wide open to catch the insects which constitute its food. It makes no nest, but lays two brown-blotched whitish eggs on the ground or on a log or stump.

The similar Chuck-will's-widow (*A. carolinensis*), 12 inches long, reddish brown in color, occurs in the southern United States. It flies during twilight, feeding upon various insects. The Poorwill (*Phalænoptilus nuttallii*), about 10 inches long, breeds from Nebraska to British Columbia, southward into California, and winters in Mexico and Guatemala. It feeds upon night-flying moths and other nocturnal insects. See *Nighthawk*.

Whitefish (*Coregonus*). A group of food fishes of the salmon family. They have a long, flattened body, a cone-shaped head, and a very small mouth, almost destitute of teeth. In color they are bluish olive above and silvery below and on the sides. There are some 15 species, found in lakes and streams in northern America, Europe, and Asia.

The common whitefish (*C. clupeiformis*), 1 to 3 feet long, with an average weight of about 4 pounds, is regarded as the finest flavored food fish of interior American waters. It occurs in lakes from New England westward to Lake Superior and northward to the Arctic circle. The annual catch in the United States and Canada exceeds 30 million pounds.

The Sault whitefish (*C. labradoricus*), called also lake whiting, about 20 inches long, is found in clear lakes and streams from Maine to Labrador and Lake Superior. The Rocky Mountain whitefish (*C. williamsoni*) occurs in clear streams from the Rocky mountains to the Pacific coast. Like the trout, it will take a fly and is a favorite of sportsmen.

The closely related Lake Herring, or Cisco (*Argyrosomus artedi*), of the Great Lakes region, ranks next to the common whitefish in commercial importance. It is somewhat smaller, usually about 15 inches long, bluish above and silvery below, with a larger mouth and a projecting snout.

Wolf (*Canis*). A savage animal of the dog family, closely related to the fox and the jackal. There are several species, with numerous varieties, found chiefly in northern regions. None occur in Africa, South America, or Australia.

The gray wolf, or timber wolf (*C. occidentalis*), strongly resembles a tall, gaunt dog, with a wide head, erect ears, long nose, and pointed muzzle. The obliquely set eyes give it a vicious appearance. Including the bushy, drooping tail, it is about 5 feet long, and stands slightly over 2 feet high at the shoulder. In color it is gray above, more or less mixed with blackish, and yellowish gray varying to white below. As a rule, it is sly, stealthy, and cowardly, but, when provoked by hunger, becomes bold and dangerous.

The timber wolf lives chiefly upon poultry and other small animals, preying habitually upon the weak, sick, and injured. When hungry, it will eat also birds, mice, frogs, and sometimes carrion. It hunts singly and in packs. A single wolf can bring down a full-grown deer. A numerous pack will attack cattle, horses, and the largest game animals. Except when desperate from starvation, wolves rarely, if ever, molest man.

During the spring and summer, wolves live singly or in pairs, making dens in caverns in the rocks, in hollows under the roots of trees, or in holes in thickets dug by themselves. In these the young, called cubs, usually from 6 to 10 in number, are reared. During autumn and winter they often congregate in packs. When in groups, wolves utter short, rapid, snarling or snapping cries, but when alone their call is usually a long, weird, blood-curdling howl.

While formerly numerous, the timber wolf has been practically exterminated east of the Mississippi river and Lake Huron. It is locally abundant in the Rocky Mountain region, in the Pacific states, and in northern Canada, where it is often very destructive to sheep and other domestic animals.

The prairie wolf, or Coyote (*C. latrans*), is similar in form and color to the timber wolf but is about one-third smaller. While an exceedingly cowardly and slinking animal, it is a notorious killer of poultry, pigs, lambs, rabbits, young colts, calves, and other farm animals. The coyote is found in the Rocky Mountain region, from Mexico to northern Canada.

The white wolf (*C. albus*) of arctic America, pure white except the black-tipped tail, and the black wolf (*C. ater*) of the Florida everglades, are very closely related to the gray wolf. The European gray wolf (*C. lupus*), especially numerous in parts of Russia and Siberia, is also very similar in appearance, habits, and disposition to the American gray wolf.

While varying much as to length and thickness of hair, wolf skins are much prized for fur, and are extensively made into coats, robes, and rugs. See *Dog*, *Fox*, *Jackal*.

Wolverene (*Gulo luscus*). A carnivorous fur bearing animal, found in the northern United States and Canada. It is closely related to the marten, and is called also "carcajou," "glutton," and

"skunk-bear." It is about 2½ feet long exclusive of the tail, with a thickset body, square head, low ears, strong, short legs, bearlike feet, and a bushy tail. In color it is blackish with a light brown or whitish stripe on each side. The wolverene is noted for its voracity, ferocity, and sagacity. It feeds upon small mammals, birds, and carrion.

Where numerous, wolverenes are a great obstacle to fur-hunting, robbing traps of their bait or captured animals, and displaying great cunning in avoiding capture. The wolverene is notorious also for plundering stores of meat, fish, and provisions, often carrying away and hiding articles that it cannot use. Its valuable fur is much used for making mats, robes, and muffs.

Wombat (*wŏm'băt*) (*Phascolomys wombat*). A burrowing marsupial mammal, native to Australia and Tasmania. It is from 2 to 3 feet in length, of clumsy form, with stout legs, very short tail, blunt snout, and rough hair of varying color. In actions and general appearance, wombats resemble small bears. They have a similar shuffling gait, and even shorter legs and broader backs. Wombats live usually in burrows, and feed chiefly on roots, grasses, and other vegetable substances. In habit, they are nocturnal, sleeping by day and going forth for food at night. While possessing only limited intelligence, wombats are gentle in disposition and are capable of a minor degree of domestication. Their flesh, which is said to resemble pork, is highly esteemed for food. Besides the foregoing, there are several less common species, of similar size and habits. See *Marsupialia*.

Woodchuck (*Arctomys monax*). A hairy-tailed rodent, allied to the squirrels and known also as the American marmot and ground hog. It inhabits North America from the Atlantic seaboard to Nebraska and from Hudson bay to South Carolina. A full-grown specimen is about 19 inches long, inclusive of the tail, and weighs from 10 to 15 pounds. The head is broad and flat, the legs short, and the body thick and "chunky." The prevailing color is a grizzly, reddish gray, although individuals are frequently nearly black, while others are whitish. The fur has no commercial value.

Woodchucks dig holes, preferably in gravelly hillsides, in which they live and in which the young are born. The bottom of the burrow is usually below the frost line and may extend from 15 to 20 feet underground, sometimes having several connecting passages. In summer they frequent meadows and cultivated fields, doing much damage to the crops upon which they feed, and becoming very fat. At the approach of winter they retire to their burrows, preferring those in the woods, where they remain in a comatose state until spring.

The woodchuck is one of the earliest animals to go into winter quarters and one of the first to emerge in spring. According to popular legend he emerges on February 2, "Ground-hog Day." If he sees his shadow, he immediately returns to his burrow and sleeps six weeks longer, betokening a late, cold spring.

Woodcock (*Philohela minor*). A small game bird of the snipe family, found in eastern North America from Labrador to Manitoba and southward. It is about 11 inches long, with a stout body, short neck, and a long bill which is very sensitive at the tip. The large eye is placed far back in the head. In color it is mottled tawny, black, and gray above, and pale grayish buff below. The woodcock inhabits fresh-water swamps and margins of streams, feeding at night upon earthworms and various insects, which it secures by probing in the mud or by turning over leaves. It builds a nest of leaves and grass, usually on the ground in woods, and lays 4 buffy white eggs spotted with brown. The European woodcock (*Scolopax rusticola*) is similar but much larger. Both species are highly prized for the table, and, in consequence, their numbers have been very greatly depleted by hunting.

Woodpecker. The woodpeckers form a large and distinctly marked family of birds (*Picidæ*). They are forest birds, ranging from about 5 to 20 inches in length, with long, powerful, chisel-shaped bills, well adapted for cutting wood. The feet have two toes directed forward and two (rarely only one) backward, with strong claws for climbing. In many species the short, stiff, spiny-tipped tail feathers serve as a prop when climbing or resting. The long, distensible tongue has a horny, spearlike tip for impaling insects. Woodpeckers nest in holes which they excavate in trees, and their eggs are uniformly white. They feed chiefly upon insects, such as borers, grubs, and ants, which they dig from the bark and wood of trees. Some eat berries, seeds, and acorns, which they sometimes store like squirrels, and others subsist in part upon the sap of trees. The vocal powers of woodpeckers are of limited range, though some have strong, clear notes. Most species beat with their bills a long, rolling tattoo, which is a mating call or love song.

There are about 400 species of woodpeckers, found throughout the world except in Australia, Polynesia, and Madagascar. About half of these are native to the New World, some 25 occurring in North America. Among these are the flicker, the sapsucker, and the red-headed, white-headed, hairy, downy, ivory-billed, pileated, and three-toed woodpeckers. The California woodpecker (*Melanerpes formicivorus*), closely related to the eastern redhead, is noted for its habit of drilling holes in trees, sometimes thousands in a single trunk, into each of which it hammers an acorn to be used later as food.

Although occasionally eating fruit or grain, woodpeckers are very useful birds, destroying millions of tree borers and other injurious insects.

Wren. The wrens form a numerous family (*Troglodytidæ*) of small song birds. They are closely related to the mocking birds and creepers, and comprise about 150 species, chiefly natives of tropical America. About 12 occur in the United States, but only one true wren is found in Europe. Wrens have a somewhat curved bill, very short wings, a short tail, usually carried erect, slender legs, and dull plumage. As a rule, they are active, nervous, aggressive, highly musical birds, 4 to 8 inches long, dwelling mostly on or near the ground, in thickets, patches of cactus, or in piles of rock. Their food consists almost entirely of insects.

The familiar house wren (*Troglodytes aëdon*), 5 inches long, nests in or near dwellings from the Gulf states to Manitoba, Quebec, and Maine, and winters from South Carolina southward. It builds its nest in hollow trees, crevices in rocks, holes in walls, or in bird boxes, laying from 6 to 8 minutely speckled eggs, and often rearing two broods in a season.

Among other interesting species are the Bewick, Carolina, winter, and marsh wrens of the Eastern and Southern states, and the Baird, Vigors, Parkman, cactus, rock, and canyon wrens of the Western and Southwestern states. Of these, the cactus wren, about 8 inches long, is noted for its large size, and the Carolina and canyon wrens for their powers of song.

Yak (*Bos grunniens*). A ruminant mammal related to cattle and sometimes known as the "grunting ox of Tartary." It inhabits the highest and coldest regions of central Asia, pasturing near the snow line on the mountains. The yak is about the size of the domestic ox, which it somewhat resembles in form. The head is short, the horns tapering, spreading, and curved backward. The body is covered with long, silky, usually blackish brown hair which hangs down like the wool of a sheep. Between the horns is a mass of thick curly hair, and over the shoulders is a large bunch of long, fine hair, resembling a hump, and giving the animal the appearance of a buffalo or zebu. The tail is covered with long hair, like the tail of a horse,

and descends nearly to the ground. The voice is a short grunt very similar to that of a pig.

The domesticated yak is of great importance to the Tibetans, forming a large part of their wealth. It is used as a draft animal, as a saddle animal, and as a beast of burden. The milk is rich and yields a high per cent of butter, which is an important article of domestic commerce. The meat resembles beef and is palatable and nutritious. The hair is spun into ropes or woven into cloth for tent coverings; the finer fur of the hump is used for clothing. The skins, tanned with the fur on, are used for caps, outer winter garments, rugs, and blankets.

Yellowbird. The name given to several familiar birds with predominantly yellow plumage. In the United States, the name is applied to the American goldfinch and especially to the yellow warbler (*Dendroica æstiva*), which is commonly known as the "summer yellowbird." The latter is common in summer throughout the eastern United States and Canada. In color it is a bright yellow dimly marked with salmon-colored streaks. It builds a deep nest of strong, compactly woven fibers, which is placed in an upright fork of a shrub or small tree. The pinkish white eggs, 4 or 5 in number, are marked with reddish and purplish dots. Summer yellowbirds often outwit the cowbird which drops an egg in their nest, by building a false floor over the intruding egg and then hatching their own brood above it. Like various other warblers, the summer yellowbird has a sweet, trilling song, which is often heard in gardens, parks, and orchards. See *Goldfinch, Warbler.*

Yellowlegs (*Totanus*). The popular name for two well-known American birds of the snipe family. They have long, slender bills, cross-barred tail feathers, and long, greenish yellow legs. Because of their great alertness and continual noisy calls, sportsmen often call them "telltale snipe."

The greater yellowlegs (*T. melanoleucus*) is about 14 inches in length with a wing spread of 2 feet. The upper parts are dark ashy, and the under parts are white, streaked and barred with black. During some part of the year this game bird inhabits nearly all parts of the Americas. In summer, it breeds from the northern United States northward far beyond the Arctic circle; in winter, it migrates as far south as Argentina. In the United States, it is seen most commonly along ocean shores, though it migrates through the Mississippi valley, and is found also around the interior lakes. Its food consists largely of small fishes, mollusks, shrimps, crabs, worms, and insects. Its nest is a grass-lined depression in the ground, in which it lays usually 4 greenish yellow eggs, blotched with gray and brown.

The lesser yellowlegs (*T. flavipes*), 10 to 11 inches long with a wing spread of 20 inches, is very similar in color, range, and habits. In the eastern United States, it is more common than the greater yellowlegs, flies in larger flocks, and is better known to hunters of shore birds.

Yellowtail. The name given in various parts of the world to several different fishes because of the yellow or orange color of their tail fins. The yellowtail, or blanquillo (*Caulolatilus princeps*), of southern California and Mexican coasts, is interesting as a game fish, and is also highly prized for food. It is closely related to the Atlantic tilefish, and is abundant along rocky shores. While usually of smaller size, it attains a length of 3 feet and a weight exceeding 50 pounds.

Zebra (*Equus*). A large asslike mammal, native of Africa. It is strikingly distinguished from all other members of the horse family by having the body marked with dark brown or blackish stripes. It differs from the horse in its larger head, longer ears, narrower hoofs, and upright mane. Four species are usually recognized, one of which, the *quagga*, has recently become extinct.

The mountain zebra (*E. zebra*), often called the "true" zebra, is a native of the mountainous districts of South Africa. It is about 4 feet high at the shoulder, of graceful form, with slender limbs, light head, and long open ears. Its ground color is white or yellowish white, and the head, neck, body, and legs are transversely striped with black. This handsome species has now become rare.

The other living species are Burchell's zebra (*E. burchelli*), of South Africa, and Grevy's zebra (*E. grevyi*), which inhabits the hilly country north of the Victoria Nyanza. The former, called "dauw" by the Boers, is the species most often seen in menageries. The latter is more slender than the true zebra, and the black markings are narrower and closer together. The habits of the zebra, on the whole, are very similar to those of wild horses and asses. See *Horse.*

Zebra Wolf (*Thylacinus cynocephalus*). The largest of the flesh-eating marsupial animals; called also pouched dog, Tasmanian wolf, or thylacine. It is slightly smaller than the common wolf, which it resembles in general appearance, but differs by having black stripes across the back, somewhat like those of a zebra. This peculiar marsupial is found only in Tasmania, where it was formerly abundant. In its nocturnal raids for food, it commits great depredations on sheep and poultry. See *Marsupialia.*

Zebu (*Bos indicus*). The European name given to the humped ox found in southern Asia, eastern Africa, and adjacent islands. It has been domesticated since remote antiquity and the parent wild species is unknown. The ancient Egyptians pictured it on their monuments, and the Hindus have held it in age-long veneration. Thousands of years of domestication have produced breeds varying extremely in size, some being larger than our largest oxen while others are no larger than a Newfoundland dog.

The prevailing color is a rusty gray or mouse color but this is not constant, buff, red, and black also being found. The ears are pendulous and the horns usually short or wanting. There is a conspicuous dewlap, and a prominent fatty hump over the shoulders. The flesh makes excellent beef, the fatty hump being regarded as a great delicacy. These cattle are gentle and docile, and are used as beasts of burden and as draft and saddle animals. It is said that a zebu may be driven 30 miles in a day when hitched to a carriage, or ridden when saddled at the rate of 6 miles an hour for 15 hours.

In India, the white bulls are considered sacred by the Brahmans and allowed to graze, without interference, in gardens and cultivated fields as they will. Humped cattle have been introduced into Central America and Jamaica for use on plantations. The Galla Ox, called also sanga or sunga, is a peculiar Abyssinian breed with massive horns nearly 4 feet long. See *Ox.*

Zeuglodon (*zū'glō-dŏn*). A member of a group of extinct whalelike cetaceans whose fossil remains are found in the strata of the Eocene period. The living animal was probably about 70 feet long and in shape somewhat resembled the whale of the present day, but was more slender and snakelike. It differed from all existing whales, however, in having two kinds of teeth. The incisors and canines were conical, but the back teeth, or molars, had serrated triangular crowns and were inserted in the jaw by two roots. In appearance each molar tooth resembled two teeth united by their crowns. This peculiarity gave rise to the name zeuglodon, which, in Greek, means "yoke tooth."

The bony remains of these whales occur in great profusion in the Eocene marls of the southern United States. According to Dana, the larger joints of the backbone (vertebræ) were a foot and a half long and a foot in diameter. In some localities in Alabama these bones were formerly so abundant that they were built into walls or burned in order to clear the fields for cultivation.

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MOTHS AND BUTTERFLIES

1 Ailanthus Silkworm Moth. 2 Polyphemus Moth. 3 Cocoon, Ailanthus Silkworm Moth. 4 Luna Moth. 5 Cocoon, Polyphemus Moth. 6 Larva, White-lined Sphinx Moth. 7 Promethea Moth. 8 Larva, Cecropia Moth. 9 Spicebush Swallow-tail Butterfly. 10 Cocoon, Cecropia Moth. 11 Mourning-Cloak Butterfly.

Citrous Fruits

BOTANY

BOTANY is the science which treats of plant life. As plants may be considered from various points of view, there are several important divisions of the science.

Regarded as a living organism, an individual plant may be considered in two ways. First, it may be studied with reference to its form and parts; that is, its *structure*. Second, it may be studied with reference to the uses of these parts or organs; that is, its *functions*. In these are represented the two great fundamental divisions of botanical science,—anatomy, or structural botany, and physiology, or physiological botany. All other divisions of the science are special developments of one or both of these, either exclusively or in relation also to other branches of knowledge.

Structural Botany. This division, called also *Plant Morphology*, deals with the form and structure of plants, especially with the shape and relation of their different parts or organs. It includes *Plant Anatomy*, and passes into the microscopic consideration of vegetable tissues, or *Plant Histology*. The latter includes *Cytology*, which is the study of the various forms of *cells* as the organic units of plant life. The essential element in the cells is *protoplasm*, or life substance. All plant structures, from the simplest to the largest and most complex, arise from various combinations of cells.

Physiological Botany. The study of the living plant in action, called also *Plant Physiology*. It considers all the important life processes and functions, including nutrition, absorption, transpiration, photosynthesis, respiration, movement, and reproduction.

Systematic Botany. The study of the classification of plants and their grouping into floras, or the orderly arrangement of the plants of different regions. This division is called also *Taxonomy*.

Plant Sociology. This division, commonly termed *Ecology*, and also regarded as a part of *Bionomics*, takes up plants in their relation to other plants and considers their adjustment to their physical surroundings. Certain plants live in the water, other plants live in marshes, still others in deserts, and some upon high mountains. Ecology studies the plants of each group in relation to their environment.

Economic Botany. The study of plants with reference to their usefulness to man, including the origin and distribution of cultivated plants. This division of botany considers also wild plants of economic value, such as timber trees, rubber and other gum trees, medicinal plants, dye plants, and forage plants.

Plant Breeding. The study of plant improvement, by means of crossing and selection, thereby developing more productive or desirable varieties of economic plants. On its scientific side, called *Genetics*, it deals with the problem of heredity. The practical application or art of plant breeding is revolutionizing agriculture, horticulture, and floriculture.

Plant Pathology. The study of plant diseases, called also *Phytopathology*. In agriculture, horticulture, and floriculture, this subject is of immense practical value. By reason of their great economic importance, the nature, effects, and especially the prevention of plant diseases, are subjects of extensive investigation and research.

Plant Geography. The distribution of plants throughout the world, called also *Phytogeography*. This division of botany concerns itself with the causes which have brought about and now maintain the distinctive plant populations or floras existing in various regions. On the side of plant relations, plant geography merges with ecology, and, on the side of plant history, with paleobotany.

Geological Botany. This division, called also *Paleobotany*, comprises the study of fossil plants or extinct vegetable life. It is of great interest and value for what it reveals concerning the ancestry, development, and relationships of the plants now existing upon the earth.

CLASSIFICATION OF PLANTS

Beginning with plants having the simplest structure and progressing upwards to the most highly organized forms, the vegetable world comprises four great natural divisions:

PLANT KINGDOM

Phylum I. THALLOPHYTES. Unicellular and multicellular plants of simple organic structure; propagation by spores and division.

- Class 1. Algæ. Chlorophyll-bearing. Diatoms, desmids, pond-scums, seaweeds.
- Class 2. Fungi. Destitute of chlorophyll. Bacteria, yeasts, molds, mushrooms—lichens.

Phylum II. BRYOPHYTES. Moss-like plants. Composed of cellular tissue showing little differentiation.

- Class 1. Liverworts (*Hepaticæ*)
- Class 2. Mosses (*Musci*)

Phylum III. PTERIDOPHYTES. Ferns and Fern Allies. Plants with vascular tissue and true roots.

- Class 1. Ferns (*Filicinæ*)
- Class 2. Club-mosses (*Lycopodinæ*)
- Class 3. Horsetails (*Equisetinæ*)

Phylum IV. SPERMATOPHYTES. Flowering and Seed-bearing Plants. Trees, shrubs, herbs.

- Class 1. Gymnosperms. Ovules borne naked; no proper ovary. Cycads; ginkgo; conifers.
- Class 2. Angiosperms. Ovules in a carpel or ovary.
  - Subclass 1. Monocotyledons. One seed-leaf.
  - Subclass 2. Dicotyledons. Two or more seed-leaves

The thallophytes have plant bodies which are not separated into root, stem, and leaves, and they do not possess the reproductive structures known as *archegonia* found in the next higher group.

The moss plants have reproductive structures known as *archegonia*, but they do not possess the fibrovascular bundles or true plant ducts and woody tissues found in all higher groups.

The fern plants possess fibrovascular bundles but do not produce seeds. (In phyla I, II, and III, propagation is by spores.)

The seed plants possess fibrovascular bundles or true woody tissue, and normally produce seeds.

While all plants so far known may be readily referred to the foregoing groups, these grand divisions are not regarded as equivalent natural groups. Some eminent authorities hold that there should be more subkingdoms; that is, more divisions of primary rank.

The plants which, without the aid of cultivation, grow naturally and spontaneously in any region constitute its flora. The name "flora" is given also to a book in which the plants of a designated area are described in systematic order.

The classification of a plant in a flora is determined by the structure of the plant itself and by its relationships to other plants. For example, the place of the white oak in the plant kingdom is as follows:

Phylum:	*Spermatophyta*, or seed-bearing plants.
Class:	*Angiospermæ*, or plants with seeds enclosed in seed vessels.
Order:	*Fagales*, plants of the beech-birch alliance.
Family:	*Fagaceæ*, plants of the beech group.
Genus:	*Quercus*, the oaks.
Species:	*alba*, the white oak.

PLANTS

Acacia (*à-kā'shà*). A numerous genus of shrubs and trees of the mimosa group of the pea family, containing about 450 species. Of these, about 300 are native to Australia and Polynesia, the remainder being found in other warm regions. About 17 species grow in the southern United States. The leaves are usually divided into minute leaflets, but in many Australian species the leaflets are practically wanting, the enlarged green leafstalks, called *phyllodia*, serving in place of true leaves. The very numerous small flowers are mostly borne in globular clusters.

Many acacias are of importance as the source of valuable gums, timber, tan barks, and food products. Several Asiatic and African species yield gum arabic. Gum senegal and the drug catechu come from acacias. The Blackwood, or Blackheart, an Australian species (*A. melanoxylon*), now grown in California, furnishes a very valuable cabinet wood. Various species of acacia are planted for ornament, especially those of rapid growth.

Among the best-known American species are the Catsclaw (*A. greggii*), an exceedingly thorny shrub of the southwestern deserts, and the Huisache (*A. farnesiana*), a small tree, native to Texas, with bright yellow, very fragrant blossoms appearing in February. The huisache is often grown for ornamental purposes.

Alder (*Alnus*). Trees and shrubs of the birch family, natives of cold and temperate regions. There are about 14 species, some 9 of which occur in North America.

The European black alder (*A. vulgaris*), a native of Europe and Asia and introduced into eastern America, is a tree 30 to 60 feet high, with smooth bark and sticky leaves. The wood is extensively used in making the best kinds of charcoal for gunpowder. It resists decay in water and is much employed for piles, pumps, sluices, and pipes. The bark yields a yellow and a black dye.

The speckled alder (*A. incana*) is a swamp shrub which grows from Newfoundland to Saskatchewan and south to Pennsylvania and Nebraska. The wood is of little value but the bark is used in dyeing.

The white alder (*A. rhombifolia*), 30 to 100 feet high, grows in the Sierra Nevada and Coast ranges from southern California to Washington. The Oregon alder (*A. rubra*), 40 to 90 feet high, ranges from Idaho to Washington and Oregon and southward through California. The wood is used for cheap furniture, piles, bridge foundations, and boats. The mountain alder (*A. tenuifolia*), 8 to 30 feet high, found from Saskatchewan to British Columbia and southward to New Mexico and Lower California, is the common alder of the Rocky Mountain region. The Sitka alder (*A. sinuata*), 20 to 30 feet high, grows from Alaska to Oregon and Montana. The wood is of no commercial value.

Alders are usually the first trees to grow at the borders of retreating glaciers or in the track of avalanches.

Alfalfa (*Medicago sativa*). A valuable fodder plant, called also lucerne, of great importance throughout the world.

Alfalfa belongs to the clover group and is closely related to peas, beans, and other legumes. It is a strong, deep rooted perennial, with a large root system often penetrating from 10 to 20 feet or more below the surface. The much branched stem grows from 18 to 24 inches in height and bears small leaves composed of three-toothed leaflets, and small, purplish flowers, somewhat like those of the pea. The pods are coiled into two or three spirals and the kidney-shaped seeds are about one-twelfth of an inch long.

Alfalfa is native to western Asia, where it has been cultivated for at least 2500 years, and is especially well adapted to dry regions. The Persians introduced it into Greece about 470 B. C.,—the present scientific name *Medicago* meaning "what the Medes planted." Virgil, Varro, and other Roman writers mention it. The Spanish took it to Mexico and South America, whence it was introduced from Chile into California in 1854.

In the western United States and Canada, alfalfa is the chief forage crop under irrigation. It is becoming an increasingly valuable crop eastward to New York without irrigation, particularly in Kansas and Oklahoma. In commercial beekeeping alfalfa is of great importance as a honey plant. See *Leguminous Plants*.

Algæ (*ăl'jē*). The simplest and most primitive forms of plant life. They constitute a large group which embraces the seaweeds and also various filamentous and microscopic organisms found everywhere in stagnant pools and in moist places, such as damp soils, dripping stones, and the bark of trees Algæ vary in size from minute bits of nucleated protoplasm, distinguishable only by the microscope, to giant seaweeds 800 feet long.

None of the algæ possess true leaves, stems, or roots, however much some of their structures may resemble them. All possess chlorophyll, though its green color is sometimes masked by other pigments. They differ from the fungi by possessing the power to extract and to build up their own food from inorganic substances, while the fungi subsist only on plant or animal food.

The algæ are divided into four great groups: The blue-green algæ (*Cyanophyceæ*), the green algæ (*Chlorophyceæ*), the brown algæ (*Phæophyceæ*), and the red algæ (*Rhodophyceæ*). The green algæ embrace those of simplest structure, including the green slimes (*Protococus*) found on the bark of trees, the pondscums (*Spirogyra*), diatoms, desmids, and stoneworts. The brown algæ include the kelps, rockweeds, and other marine forms. The red algæ contain the red seaweeds, the most beautiful of all the marine algæ.

Almond (*Prunus amygdalus*). A small tree of the rose family, closely resembling the peach, native to the Mediterranean basin and western Asia. It yields the sweet almond, valued as an edible nut, and the bitter almond, used in making flavoring extracts and as a source of prussic acid. The cultivation of the almond is prehistoric in western Asia, where it has been grown for more than 4000 years. The great naturalists of the ancients, Theophrastus, Pliny, and Dioscorides, mention the almond, and references are made to it in the Bible.

The production of sweet almonds is commercially important in southern Europe and in California, but cultivation of the bitter almond is limited chiefly to the Mediterranean region. Sweet almonds, either raw or cooked, are widely used for food and also in making cakes and candies. Salted almonds and sugared almonds are highly esteemed delicacies. The bland oil of sweet almonds is used in medicine.

The flowering almond (*A. nana*), a low shrub native to southern Russia, which bears a profusion of purplish red flowers in early spring, is often planted for ornament. See *Peach*.

Aloe (*ăl'ō*). A genus of plants of the lily family, containing about 100 species, mostly natives of western Asia and South Africa, some of which are cultivated in the Mediterranean region and the West Indies. They vary in height from a few inches to 30 feet. From the fibers obtained from their succulent leaves, the Negroes of West Africa make cordage and nets. Aloes are valuable chiefly for their medicinal properties, the dried juice of the leaves of various species yielding the intensely bitter cathartic drug called aloes.

Alpine Plants. The vegetation of high mountains near the line of perpetual snow. The adverse conditions for growth result in various gnarled, dwarfed, and creeping plants. These grow usually in close tufts, often forming mats, or carpet-like patches. The flowers of many species are abnor-

mally large and brilliantly colored so as to attract the scarce insect life of such regions. Saxifrages, arenarias, primroses, gentians, and certain forms of heaths, especially rhododendrons and azaleas, are characteristic flowering plants of high altitudes. Along with these, and extending above them sometimes to the snow line, are various small ferns, mosses, lichens, and algæ. See *Desert Plants*.

Anemone (*ă-nĕm'ô-nē*). A genus of small perennials of the crowfoot family, comprising about 90 species native to cold and temperate regions. About 18 species occur in North America, usually bearing beautiful flowers which blossom in early spring.

The wood anemone (*A. quinquefolia*) is a delicate forest species of the eastern United States, having white flowers tinged on the outside with purple. The Pasque Flower (*A. patens nuttalliana* or *Pulsatilla hirsutissima*) is conspicuous in early spring on the prairies from northern Illinois to Saskatchewan and southward across the high plains to Texas. It is the state flower of South Dakota. The Canada anemone (*A. canadensis*), with large, showy white flowers, is abundant in low grounds from Labrador to Saskatchewan and southward to Maryland and Colorado.

The garden anemone, much prized by florists, was probably developed from *Anemone coronaria*, a handsome West Asian species, thought by some to be the "lily of the field" mentioned in the Bible.

Anise (*ăn'ĭs*) (*Pimpinella anisum*). An annual of the parsley family, 1½ to 2 feet high, native to Mediterranean countries. It is much cultivated in southern Europe, Germany, South America, and India for its pleasantly aromatic seed. This is used as a condiment, in making liqueurs, and in medicine.

Annuals. The term annual is applied to a plant which reaches maturity and completes its life cycle during the first season of growth. After producing flowers and ripening seeds, the plant dies. The annuals include a vast number of ornamental plants together with the most important economic plants, such as the cereals,—wheat, maize, rice, rye, barley, and oats; the sorghums and millets; the fiber plants,—cotton, flax, hemp, and jute; the legumes,—pea, bean, peanut, lentil, lupine, and various clovers; the gourd plants,—watermelon, muskmelon, pumpkin, and squash; the vegetables,—tomato, lettuce, radish, mustard, okra, eggplant, and spinach; the narcotic, tobacco; and the subtropical food plants,—quinoa and sesame. See *Biennials*, *Perennials*.

Apple (*Pyrus malus*). A small tree of the rose family, native of Europe and Asia Minor, producing a valuable fruit, which ranks with the grape, olive, orange, lemon, and banana among the leading fruits of the world. It has been cultivated since prehistoric times, having been grown in Europe for at least 4000 years. Apples were abundantly used by the Lake Dwellers of the Stone age in Italy and Switzerland.

North America, however, is now the leading apple growing region. Cultivation dates back to the earliest settlements. The records show the introduction of the apple in Massachusetts in 1629 and the production of cider in New York in 1639. New York, Pennsylvania, Ohio, Michigan, Virginia, and West Virginia in the East, and Washington, Oregon, and California in the West, are important apple producing states. In Canada, the apple is the leading fruit, Ontario producing more than half of the total yield. See *Crab Apple*, *Pear*, *Quince*.

Apricot (*Prunus armeniaca*). A small tree of the rose family, widely esteemed for its plumlike fruit. In some regions it blossoms as early as January, the white flowers appearing in advance of the heart-shaped leaves. The sweet, yellowish fruit, somewhat smaller than a peach, has a delicate flavor. It is marketed fresh and is also dried and canned in large quantities.

The apricot is supposed to be a native of China where it was in cultivation earlier than 2000 B. C. It was introduced into southeastern Europe at the time of Alexander the Great, and is now extensively grown in India, Persia, southern Europe, and Egypt. In the United States, marketable quantities have been produced in New York, but the crop is commercially important only in California and Oregon, where it is a leading orchard fruit. See *Peach*, *Plum*.

Aquatic Plants. Plants which live either entirely or partly submerged in water. Among the lower forms of plants the seaweeds and the freshwater algæ are typical aquatics. Among the higher plants, noteworthy aquatics are the cat-tail, pondweed, arrowhead, water hyacinth, water buttercup, pickerel weed, nelumbo, and water lily. With few exceptions, as in the sea wrack (*Zostera*) which blossoms under water, aquatic seed plants produce their flowers above the surface. There they are fertilized by the wind and by insects, like the flowers of other higher plants. Aquatic plants usually have special modifications of structure to insure the retention of air in their tissues.

Araucaria (*ăr'ô-kā'rĭ-ă*). A genus of magnificent trees of the pine family, highly prized for timber and for ornamental planting. There are some 15 species, native to South America and Australia. While in form they somewhat resemble the true pines, the leaves are very different, being scalelike, stiff, and broad, and the branches usually appear in whorls.

The Chile Pine (*A. araucana*), often called "monkey puzzle" on account of the peculiar growth of its branches, attains a height of 150 feet. It is highly valued for its strong, white wood, and for its seeds which are used by the Indians for food.

The Norfolk Island Pine (*A. excelsa*), a native of New Caledonia, reaches 220 feet in height and 11 feet in diameter. The wood is close-grained, tough, and very heavy. This species is a favorite greenhouse plant. Both of the foregoing are much planted in warm regions, particularly in California, and occasionally in the Southern states.

Arbutus, Trailing (*Epigœa repens*). A creeping plant of the heath family, with branching stems and oblong, hairy, evergreen leaves, known in New England as "mayflower" and in the South as "ground laurel." It occurs in gravelly soils from Canada to Texas and is highly esteemed for its delicate, fragrant, pinkish white flowers which blossom in early spring. See *Mayflower*.

Arnotto (*ăr-nŏt'ō*) (*Bixa orellana*). A small tropical-American evergreen tree of the bixa or Indian-plum family. The seed coverings yield the well-known yellowish red dye, arnotto, used for coloring butter, cheese, various lacquers, varnishes, ointments, and plasters. The tree, long cultivated in tropical America and now naturalized in India, is called also arnatto, annatto, and anatto.

Arrowroot (*Maranta arundinacea*). A perennial plant, about 2 feet high, of the arrowroot family. It is a native of tropical America now extensively cultivated in the West and the East Indies. It is grown also in Africa and in Florida. The tuberous rootstocks yield the excellent starch food called arrowroot, widely used for children and invalids. The name "arrowroot" is said to have originated from the use of the freshly cut roots by the South American Indians as a remedy for arrow poison.

Artichoke (*Cynara scolymus*). A somewhat thistle-like plant of the composite family, native to South Europe and North Africa. It is much esteemed in Europe as a garden vegetable, but as yet is only sparingly used in the United States. Parts of the flower head are eaten raw as a salad, or boiled and served with butter. The artichoke was cultivated 2000 years ago by the Romans. It was not brought into England, however, until 1548. In the wild state the plant is called cardoon.

During the 19th century the cardoon was introduced into Argentina, where, as a weed, it has spread over vast areas of the pampas.

Artichoke, Jerusalem (*Helianthus tuberosus*). A tall species of sunflower, native to the Ohio and the Mississippi valley, sparingly cultivated in the United States for its large, coarse, tuberous roots, used chiefly as food for swine. The plant is now grown most extensively in France, some 300,000 acres being planted annually for the production of alcohol from the roots. Fruit sugar also may be derived from the roots. It yields enormous crops of 200 to 500 bushels or more to the acre.

Ash (*Fraxinus*). A genus of valuable forest trees of the olive family, with light, tough wood, and usually with rather thick furrowed bark and ash colored branches. Some 50 species grow in northern temperate regions. About 20 are native to the United States, several of which are important timber trees.

The white ash (*F. americana*), of the eastern and southern United States, with a trunk sometimes 120 feet high and 6 feet in diameter, is the most valuable for timber. It is extensively used in making agricultural implements, wagons, carriages, and tool handles, and sparingly for furniture. The black or brown ash (*F. nigra*) grows from Canada to Delaware and Arkansas, reaching 90 feet in height. It is much used for making barrel hoops, splint baskets, and for interior finish.

The red ash (*F. pennsylvanica*), occasionally 60 feet high, grows from Canada to Florida. The heavy hard wood is sometimes substituted for that of the more valuable white ash. The green ash (*F. lanceolata*), very similar to the red ash, occurs from New York to Saskatchewan and southward to Arizona. The wood is likewise used in place of white ash. The blue ash (*F. quadrangulata*), confined mainly to the central United States, usually 60 to 70 feet high, has stout, four-angled branchlets. In general appearance it resembles the black ash. The wood is the strongest of all the ashes, and is the finest for fork handles. A blue dye is obtained from the bark. The Oregon ash (*F. oregana*) has a trunk sometimes 80 feet high and from 2 to 3 feet in diameter. It is one of the most important deciduous timber trees of the Pacific states.

Asparagus (*ăs-păr'ă-gŭs*) (*Asparagus officinalis*). A perennial plant of the lily family, native to Europe and western Asia. It has been much changed by 2000 years of cultivation, the succulent young stems, highly prized for food, attaining many times their usual size in the wild state. Asparagus is an increasingly popular table vegetable. The plant is often grown in flower gardens and cemeteries for its delicate ornamental foliage.

Aster. A large genus of the composite family, containing some 250 species, mostly natives of the United States. They are usually perennial, blooming from July to November, with a profusion of blue, lavender, pink, or white flowers, and, with the goldenrods, are the most common autumn wild flowers in eastern North America. The New England aster (*A. novæ-angliæ*) is one of the most showy native species. Many kinds are in cultivation. The most valuable of these is the China aster (*A. chinensis* or *Callistephus chinensis*), of which more than 200 varieties are grown. In the United States, wild asters are of considerable economic importance as late autumn honey plants.

Avocado (*ăv'ô-kä'dō*) (*Persea americana*). A tree of the laurel family, native to Central America and the West Indies. It is much cultivated for its highly esteemed fruit, called also midshipman's butter and alligator pear. There are three natural varieties, the Mexican, Guatemalan, and West Indian. The Mexican has a small thin-skinned fruit, usually below 8 ounces in weight; the Guatamalan bears fruit weighing from 1 to 3 pounds. These two are very rich in fruit oil. The West Indian type is sweeter and has an oil content about one-half that of the other two. Its fruit averages from 8 ounces to 3 pounds. The shape of the avocado varies in form from nearly spherical to pear-shaped and bottle-shaped, and varies in color from light green to purple, brown, and red.

The properly ripened fruit has a firm, butter-like marrow, possessing a rich, nutlike flavor. While essentially a salad fruit, the avocado is also eaten as a dessert, with sugar and cream. In the United States, avocados are grown chiefly in Florida and southern California.

Azalea (*ă-zā'lê-ă*) (*Azalea* or *Rhododendron*). Shrubs of the heath family, usually with showy flowers, differing from the true rhododendrons chiefly in having deciduous instead of evergreen leaves. There are about 40 species, natives of North America and Asia. The Pinksterflower, or Wild Honeysuckle (*A. nudiflora*), which grows in rocky woods from Canada to Texas, has long been cultivated in Europe for its delicate pink-white flowers. The Swamp Pink, or Honeysuckle (*A. viscosa*), with showy, fragrant blossoms, is found in swamps from Maine to Texas. At flowering time, the flame azalea (*A. calendulacea*) covers whole mountain slopes in the South with a robe of brilliant scarlet. Many species are cultivated as ornamental shrubs. See *Rhododendron.*

Baby Blue-eyes (*Nemophila insignis*). A small plant of the waterleaf family, native to California. It bears delicate blue blossoms veined with white, which bloom in early spring. This dainty plant is one of the most beautiful of Pacific Coast wild flowers, and is now widely cultivated. In England it is regarded as one of the choicest garden annuals.

Bacteria. Minute, one-celled plants, the smallest living things known, called also microbes or germs. They are so minute that microscopes magnifying 1000 or more diameters are required for their study. A single drop of water may contain thousands of these tiny organisms.

Bacteria are found almost everywhere,—in the air, in water, and in nearly all foods. They are always present in the mouth, in the digestive organs, and in the outer layers of the skin. Well water, spring water, artesian well water, and even sulphur spring water alike contain bacteria, as does the air, not only of cities, but also of plains and mountains. They are present in enormous numbers in all decaying vegetable and animal matter; in fact, they are the chief cause of decomposition.

Bacteria are of various shapes. For example, *Bacillus* forms little rods, *Micrococcus* consists of single rounded cells, *Streptococcus* forms chains of rounded cells, *Sarcinæ* occur in irregular cubes, and *Spirillum* is spiral in form. Bacteria multiply either by transverse division or by spore formation. When a bacillus reproduces by division, it elongates and an indentation appears near the middle. This is followed by complete division into two smaller daughter cells exactly similar to the parent cell. These new cells in turn split in the same manner. Under favorable conditions this process is very rapid. A bacterium sometimes reproduces itself in 15 or 20 minutes. At such rate a single germ would produce many millions of its kind within the short period of one day.

In reproduction by means of spores, the process is much slower. The bacillus, for example, forms within itself a small round body which finally entirely replaces the bacillus. This minute body is called a spore. A bacillus can form only a single spore, and a spore, upon developing, can form only a single bacillus. But the spore may be blown about by the winds or be subjected unharmed to severe heat, cold, or other extremes that would instantly destroy the bacillus.

Many bacteria are beneficial to man. Various kinds convert dead organic matter into soluble food material for plants. Some possess the power to transform the nitrogen of the air into usable plant food, thereby greatly enriching soils. Other bacteria promote useful fermentations, as in the making of vinegar and in the curing of cheese. On the other hand, various *pathogenic* bacteria cause nearly all of the most dangerous contagious and infectious diseases, such as diphtheria, typhoid fever, pneumonia, tuberculosis, leprosy, lockjaw, cholera, erysipelas, influenza, and bubonic plague. See *Fungi.*

Balsa (*Ochroma lagopus*). An American tropical tree having a light strong wood, called also *corkwood*, used for rafts or floats.

Bamboo (*Bambusa*). The common name of a group of treelike grasses. There are many species, native to the warmer parts of Asia, Africa, and America, ranging from a few feet to fully 100 feet in height and reaching a foot in diameter.

The best known is the common bamboo (*B. vulgaris*), abundant in tropical and subtropical regions. From the underground rootstock spring several round jointed stalks, which grow to their full height unbranched, but afterward throw out horizontal branches. The oval leaves, eight or nine inches long, are placed on short footstalks. The flowers grow in large panicles from the joints of the stalk.

The woody stems grow to eight or ten inches in diameter, and are so hard and durable as to be used for innumerable purposes in the East Indies, China, and other eastern countries. Cottages are made almost wholly of bamboo. It is also used for making bridges, boxes, water pipes, ladders, fences, bows and arrows, spears, baskets, mats, paper, and masts for boats. The young shoots are pickled and eaten, or otherwise used as food; the seeds also of some varieties are eaten. Several species of bamboo have been introduced into Florida, Louisiana, and California. Some of the more hardy kinds are widely used in landscape gardening.

Banana (*Musa sapientum*). A perennial plant, with a tall, herbaceous stem, 10 to 40 feet in height, bearing a whorl of very large leaves, each usually 6 to 10 feet long and 1 or 2 feet wide. It belongs to the banana family (*Musaceæ*) and is a native of India, where its cultivation, antedating all historical records, has been extensive for more than 4000 years. Pliny writes that the Greeks with Alexander the Great saw the banana growing in India.

Only the wild plants produce seeds, the various cultivated varieties being reproduced by offshoots or suckers from parent rootstocks. When the plant is full grown, a huge cluster appears, composed of small purple blossoms, from each of which, when fertilized, grows a banana. From 50 to 150 bananas grow in a single cluster or bunch, which may weigh from 40 to 100 pounds. The fruit, which is eaten both raw and cooked, contains about 20 per cent of starch and sugar. Pound for pound it has a greater food value than other common fresh fruit.

The banana is the most important tropical fruit used in temperate regions, ranking with the apple, grape, olive, orange, and lemon among the leading fruits of the world. It is grown in all tropical countries, enormous quantities being produced in the West Indies and Central America and shipped to the United States and to Europe. Beginning with a few hundred bunches in 1870, the shipments of bananas to the United States have increased in value to millions of dollars annually.

Banyan (*băn'yăn*) (*Ficus bengalensis*). A noted East Indian fig tree remarkable for its habit of growth. From its larger branches it sends down shoots that take root in the ground and grow into prop trunks. These, in turn, extend from their branches similar shoots which likewise take root. Thus the tree becomes in time a cluster or small grove of connected trunks which sometimes covers a considerable area of ground. In the Calcutta Botanical Gardens there is a famous banyan, known to be about 100 years old, which has upwards of 200 trunks ranging from 6 to 10 feet in circumference. A banyan, with 350 large prop trunks and more than 3000 smaller ones, has been described. It is estimated that 7000 persons can stand under it. The Hindus rank the banyan among their sacred trees and believe that its bark and leaves have medicinal virtues. The wood is too soft and porous to be of commercial value.

Baobab (*bā'ô-băb; bā'ô-băb*) (*Adansonia digitata*). One of the largest trees known, though not one of the tallest, called also sour-gourd and cream-of-tartar tree. It belongs to the silk-cotton-tree family (Bombacaceæ) and is a native of tropical West Africa but is now cultivated in other warm regions. Although in height the baobab is usually less than 70 feet, the massive trunk sometimes attains a girth of 90 feet. Old baobabs have branches as large as the trunks of our ordinary forest trees. In shape the leaves resemble those of the horse-chestnut. As the huge branches droop, the foliage forms an immense dome which makes the tree appear at a distance like a small grove.

Baobabs bear large, white, somewhat poppy-like flowers, and woody, gourdlike fruits. Each fruit contains 8 or 10 cells filled with pulp, enclosing seeds about the size of peas. The pulp is somewhat tart but has an agreeable flavor and is eaten by the natives. It is also a favorite monkey food; hence the Negroes call the baobab the monkey-bread tree. A beverage is prepared from the pulp, and an infusion of the bark is used as a medicine in fevers. Ropes and cloth are made from the bast or inner bark. Decayed baobabs are often hollowed out by the natives and utilized as houses or as receptacles for corpses.

Barberry (*Berberis*). A genus of low shrubs of the barberry family. They have small leaves, which grow in the axils of spines, and produce showy, yellow flowers followed by an oblong, acid, usually red fruit. There are about 80 species, widely distributed throughout the world. While used chiefly as ornamentals, some kinds yield an edible, currant-like fruit and others are used in tanning and dyeing.

The common barberry (*B. vulgaris*), a native of Europe, was formerly widely planted in the United States. Its fruit is made into preserves, and various parts of the plant have been used medicinally. Since the discovery that this species acts as an intermediate host plant for the destructive wheat rust, its culture has been very greatly restricted. The similar American barberry (*B. canadensis*), native to mountain woods from Virginia to Missouri, as well as the Japanese barberry (*B. thunbergii*), planted for hedges, does not harbor the wheat rust.

Barley (*Hordeum vulgare*). A valuable cereal, belonging to the grass family, native to Asia, and widely cultivated throughout the world. Barley is found in the oldest Egyptian tombs and among the remains of the Lake Dwellers of the Stone age in Switzerland, so that for upwards of 4000 years it has been grown for food. This grain yields profitable crops in greater extremes of climate than any other cereal. It is grown in Iceland, Alaska, and Norway; also in Egypt and India, as well as in all temperate regions. Barley ranks sixth in importance among the great world cereals, being preceded by wheat, rice, maize, oats, and rye. See *Cereals, Grasses.*

Bean, Lima (*Phaseolus lunatus*). A leguminous annual plant, native to Brazil. It is widely grown for food in tropical regions, especially in Africa, where it was introduced through the slave trade. In temperate regions this bean is rather sparingly grown. In the United States, production is most

extensive in California. The presence of the Lima bean in ancient Peruvian tombs indicates its prehistoric cultivation in South America.

Bean, Mexican Jumping. This name is popularly applied to the fruit of a euphorbia, native to the southwestern United States and Mexico. The larva of a moth enters the seed, on which it feeds, and by its contortions makes the seed jump.

Bean, Navy (*Phaseolus vulgaris*). An annual, more or less climbing plant of the pea family, called also kidney bean. It is a native of South America, and was introduced into Europe after the discovery of the New World. It is now the common garden and field bean of the United States. More than 150 varieties are grown as garden vegetables and as forage crops. The closely related *frijoles*, now grown in the southwestern United States, are universally cultivated in Mexico and other Spanish American countries, where these beans rank second only to maize as a food crop.

Bean, Soy (*Glycine hispida*). A leguminous annual, closely related to the common kidney bean, native to China, Java, and Japan. Its cultivation is most ancient, being mentioned in Chinese records dating to 2700 B. C. It is now grown in enormous quantities in eastern Asia, especially Manchukuo. In various preparations this bean enters largely into the daily food of millions of people, supplying necessary protein elements. It is used also for fodder and for making plastics, glue, paint, varnish, linoleum, soap, lubricating oil, flour, and milk substitutes. The soy bean is extensively planted in Europe and in the United States as a forage, hay, and soiling crop. On a rapidly increasing acreage in America, the crop is cultivated for the making of fast drying paint oils and of plastics, many of which are used in automobile manufacture.

Beech (*Fagus*). An important forest tree, closely related to and of the same family as the oak and chestnut. It is much valued for its hard, fine-grained wood and small, sweet flavored, triangular nuts. There are about five species of beech, only one of which is native to the United States. The American beech (*F. grandifolia*) is a handsome tree, usually 70 to 80 feet high, with a trunk 3 to 4 feet in diameter, smooth, gray bark and deep green foliage. It grows from eastern Canada to Wisconsin and southward to Florida and Texas, often forming nearly pure forests. The wood is extensively used in making chairs, shoe lasts, plane stocks, tool handles, and for fuel.

Beet (*Beta vulgaris*). A fleshy-rooted plant of the goosefoot family, native of the Mediterranean region. Since about the 3d or 4th century B. C. it has been cultivated in southeastern Europe for its root and leaves. Its cultivation for the production of sugar from the root was established in France and Germany about 1810.

The development of this relatively unimportant garden vegetable into an economic plant of the first rank is perhaps the most striking achievement of modern scientific agriculture. In less than a century the sugar beet rose to the leading position among the world's sources of sugar, furnishing in 1900 over three-fifths of the total production. Germany, France, and Russia have been the principal producers. Since 1900 the beet sugar industry has developed notably in the United States.

Garden beet roots vary in color from white to dark red, the red varieties being preferred. Sugar beet roots are usually yellowish white and the better varieties contain, on the average, about 14 per cent of sugar. Some varieties of the beet are grown exclusively for the leafy top, as, for example, the excellent Swiss chard. Coarse varieties, commonly called mangels, are widely grown as food for cattle. See *Sugar*.

Begonia (*bē-gō'nĭ-à*). A numerous genus of herbaceous plants of the begonia family. They have fleshy, oblique, variously colored leaves, and showy, mostly pink or red flowers. There are 450 species, natives of the tropics. Cultivation of begonias began in 1777, and since that date hundreds of fine varieties have been developed. From the shape of their leaves these plants are sometimes called elephant's-ear.

Betel (*bē't'l*) (*Piper betle*). A shrub of the pepper family, native to the Malaysian islands. The leaves have been chewed with the betel nut, or areca nut, since ancient times by Malay peoples. Cultivation of betel is extensive in the East Indies, where the consumption of the leaves as a narcotic stimulant is enormous.

Betel Nut (*Areca catechu*). A small palm tree, native to the Malay archipelago. It produces a nut, about the size of a hen's egg. This nut, called also areca nut, is extensively used wherever betel chewing is practiced. The cultivation of this palm by Malay peoples considerably antedates the Christian era. The betel nut, mixed with lime and chewed with betel leaves, serves as a stimulant and narcotic. Its use in this manner stains the lips and blackens the teeth. Immense quantities of the betel nut are produced in India, Cochin China, Ceylon, and the Malaysian islands, where it forms a considerable article of trade. See *Betel*.

Biennials. Plants whose life period requires two seasons of growth in order to produce flowers and ripen seeds. In many cases the first season is employed to store up surplus food in enlarged portions of the root, stem, or leaves. This is used during the second season to mature seeds. Then the plant perishes. While few in number compared with annuals or perennials, the biennials include several valuable economic plants, such as the beet, cabbage, carrot, celery, parsley, parsnip, turnip, and onion. See *Annuals*, *Perennials*.

Big Trees. According to information issued by the United States Forest Service in 1930, the tallest tree in the United States was a California redwood (*Sequoia sempervirens*), growing in Bull Creek flat, California, which was 363 feet high. The tallest tree in Australia to be accurately measured was a Eucalyptus (*Eucalyptus regnans*), at Colac, Victoria, which grew to a height of 346 feet. A Douglas fir (*Pseudotsuga mucronata*), in Seymour valley, near Vancouver, Victoria, cut down in 1895, is reported to have measured 417 feet.

None of the above species of trees attain to a diameter equal to that of the giant redwood, or California big tree (*Sequoia washingtoniana*), which may reach a basal diameter of 30 to 35 feet and a height of more than 300 feet. The baobab, or monkey-bread tree (*Adansonia digitata*), of tropical Africa and the East Indies, attains a basal diameter of 20 to 30 feet or more but does not rise to a great height.

The giant cypress (*Taxodium mexicanum*) of Mexico sometimes grows to an immense girth. Like the baobab, it does not reach a correspondingly great height. For example, the famous "big tree" of Tule measures 154 feet in circumference at 6 feet above the ground. Yet the height of the huge spreading crown is only about 150 feet.

The banyan tree (*Ficus bengalensis*) of India, with its immense system of prop roots, shades a greater area than any other tree. See *Banyan*, *Baobab*, *Blue Gum*, *Eucalyptus*, *Sequoia*.

Birch (*Betula*). A genus of trees and shrubs of the birch family, *Betulaceæ*, all natives of the North Temperate Zone. There are about 30 species, of which 20 species and varieties grow in North America, ranging in size from small shrubs to large forest trees.

The European birch (*B. alba*), of northern Europe and Asia, is a beautiful, hardy tree which sometimes attains a height of 70 feet. It is noted for its silvery white bark, slender, drooping branches, and bright green, quivering leaves. The close-grained wood has many uses, and an extract from the bark is used in medicine and also in tanning

Russia leather. A graceful variety, with long, pendulous branches, called weeping birch, is often planted for ornament.

The paper birch, or canoe birch (*B. papyrifera*), very similar to the European birch, 80 feet high, grows from Newfoundland to Alaska and southward to Pennsylvania, Nebraska, and Washington. The brilliant white bark, which is easily separated into thin layers, is used by the Indians for making canoes and baskets. Very thin strips of the bark have been used as a substitute for paper. The light wood is used for making wood pulp and in turnery.

The cherry birch, or sweet birch (*B. lenta*), which grows from 70 to 80 feet high and sometimes 5 feet in diameter, has aromatic twigs and bark. These yield an oil very similar to the oil of wintergreen, for which it is used as a substitute. This birch grows from Newfoundland to Iowa and southward. The strong, hard, reddish brown wood is much prized for making furniture.

The yellow birch (*B. lutea*), one of the largest deciduous trees of northeastern America, sometimes reaches a height of 100 feet and a trunk diameter of 4 feet. It is distinguished by its glossy, yellowish brown bark, and is native to rich woods from Newfoundland to Minnesota and southward to North Carolina. The valuable, close-grained wood of this birch, and also that of the sweet birch, is much employed in making imitation mahogany furniture, wheel hubs, tool handles, and interior finishings.

The red birch, or river birch (*B. nigra*), grows in swampy land and along streams and lakes from Massachusetts to Minnesota and southward to Florida and Texas. It is a slender tree, sometimes attaining a height of 90 feet and a trunk diameter of 2½ feet. The bark is reddish or greenish brown, peeling in very thin layers. The light brown, hard, strong wood is used for ox-yokes, woodenware, and furniture. This tree, sometimes called black birch and water birch, grows rapidly and is suitable for planting in lawns and parks.

Bitterroot (*Lewisia rediviva*). A low, stemless plant of the purslane family, related to the portulacas of the gardens. It bears thick roots, short, fleshy leaves, and large, handsome, rose-red, cactus-like flowers which bloom in great profusion on mountain ridges and in alpine valleys in early spring. The bitterroot grows from Montana to British Columbia and south to New Mexico and southern California. It was first described from specimens collected by Captain Meriwether Lewis of the Lewis and Clark Expedition, the scientific name *Lewisia* being bestowed in his honor. On account of its large, starchy roots, bitterroot was highly prized as a food plant by the Indians, who called it spatlum.

Bitterroot is a corruption of butterroot, a common name first given to the plant. The Bitterroot mountains and the Bitterroot valley, in Montana, derive their names from this plant, which has been adopted as the state flower.

Bittersweet (*Solanum dulcamara*). A poisonous plant of the potato family, called also dulcamara or woody nightshade. It is a native of the Old World, now widely introduced in the United States and Canada. It has climbing, somewhat woody stems, heart-shaped or spear-shaped leaves, and purple or blue flowers much resembling those of the potato. The bittersweet bears poisonous red berries of tempting appearance. These are sometimes the cause of serious accident to children who carelessly eat them. The twigs contain solanin and dulcamarin, used in medicine. See *Climbing Bittersweet.*

Blackberry (*Rubus*). The name given to various prickly fruit-bearing shrubs, closely related to the raspberries. There are two main types, the trailing or creeping forms, commonly called Dewberry (*R. villosus* or *canadensis*), and the upright, bushy forms, generally known as blackberry or as high-bush blackberry (chiefly *R. allegheniensis* or *nigrobaccus*).

Although several wild species of the eastern United States yield berries of excellent quality, they received but little attention as garden fruits previously to 1850. Since that date, numerous improved varieties of blackberries and dewberries have been developed from the native plants. Many of these are widely grown, producing an important bush-fruit crop. Blackberries are marketed chiefly fresh for dessert purposes and are also used extensively for canning. Outside of the United States and Canada, the blackberry has not as yet become commercially important.

The bark of the blackberry root possesses tonic properties and an extract made from it is sometimes prescribed in cases of diarrhea. In Great Britain, the bramble (*R. fruticosus*), which bears an inferior fruit, is sometimes called blackberry. See *Loganberry, Raspberry.*

Black-eyed Susan (*Rudbeckia hirta*). A rough, hairy, biennial species of coneflower, common in the eastern United States. It grows about 2 feet high, with nearly entire leaves and naked flowering stems. Each of these stems bears a single large head of brilliant yellow ray flowers surrounding a conical dark brown center. This is one of the most handsome of native American plants and is the state flower of Maryland.

Bladder Nut (*Staphylea trifolia*). A shrub of the bladder nut family, usually 6 to 15 feet high, with leaves of three leaflets, and greenish striped branches. It bears small flowers from which develop large, bladdery, three-horned pods. This shrub, which becomes treelike in the South, grows in moist thickets from Quebec to Minnesota and southward to South Carolina and Kansas. A somewhat similar species (*S. bolandieri*) occurs in California.

Bloodroot (*Sanguinaria canadensis*). A beautiful plant of the poppy family. It has palmately lobed leaves and a fleshy rootstock, the latter containing a red, acrid juice. It produces large, handsome, pure white blossoms, which are among the earliest and most conspicuous of eastern American wild flowers. The bloodroot, called also "red puccoon," "redroot," and "snakebite," is found in rich woodlands from Nova Scotia to Manitoba and southward. The stem and root are poisonous.

Blueberry (*Vaccinium*). Widely branching shrubs of the heath or huckleberry family. In the eastern United States and Canada the sweet, edible, many seeded, bluish black berries of several species are gathered wild in large quantities. Efforts are being successfully made to bring some of the most highly prized native blueberries into cultivation.

The tall blueberry (*V. corymbosum*), 6 to 15 feet high, is found in swampy woods from Quebec to Minnesota and southward to Florida and Louisiana. It yields the greater part of the late blueberries of the markets, and is the species best adapted for cultivation.

Several smaller species, ranging from 6 inches to 4 feet in height, are locally abundant and produce excellent fruit. Among these are the early blueberry (*V. pennsylvanicum*), the low blueberry (*V. vacillans*), and the Canada blueberry (*V. canadense*).

Bluebonnet (*Lupinus texensis*). A small plant of the pea family. It has silky-hairy, palmate leaves of five leaflets and handsome blue flowers borne in a terminal cluster. The bluebonnet is a native of Texas, where it is exceedingly abundant and popular, having been adopted as the state flower. See *Lupine.*

Blue Gum (*Eucalyptus globulus*). A large tree of the myrtle family, native to Australia. It is one of the world's tallest trees, sometimes reaching a height of 375 feet. The blue gum was introduced into various dry and warm regions of the world about 1850. It was planted in California first in 1856 and is now grown there extensively for fuel and timber. It is said to be the most rapidly growing hardwood tree in the world. The heavy wood is difficult to work but exceedingly strong. It is used for wheel spokes, hubs, and in turnery, and also for mining timber, as it is resistant to borers. The leaves yield eucalyptus oil, important medicinally.

Plantations of eucalyptus thrive only in climates permanently above the frost line. It was once believed that where this tree grew there could be no malaria. Hence it was extensively planted in and about the Pontine marshes of Italy. Its effectiveness in this respect is now known to be due to its enormous consumption of soil moisture. These quickly growing trees remove the water in which the malaria-carrying mosquito breeds. See *Big Trees, Eucalyptus.*

Boneset (*Eupatorium perfoliatum*). A useful perennial herb, of the composite family, called also "thoroughwort." It is a native of North America, growing from Nova Scotia to Manitoba and south to Florida and Texas. The plant is easily recognized by its tall stem, four or five feet in height, passing through the middle of large, double, hairy leaves, and surmounted by a broad, flat cluster of white flowers. In pharmacy, boneset is a recognized official plant, used for its stimulant, laxative, and emetic properties. Boneset tea, made from the leaves, is much used in household medicine as a tonic and for causing perspiration.

Bottle Tree (*Sterculia*). Peculiar trees of the sterculia family, somewhat allied to the cacao or cocoa tree. The Australian bottle tree (*S. rupestris*) is noted for the globular expansion of its trunk, which gives it the aspect of a huge bottle with the limbs appearing to grow from its mouth. The enlarged stems are hollow and contain a quantity of water which travelers and the Australian natives sometimes secure for use by cutting through the soft wood.

The maple-leaved bottle tree, or Flame Tree (*S. diversifolia*), the stem of which tapers rapidly from a broad base, is also a native of Australia. It is often planted for ornament in California and in other mild climates. The seeds of various species are edible, some contain an illuminant oil, and the bark contains a tough, waterproof fiber, suitable for mats and cordage.

Box Tree (*Buxus sempervirens*). A shrubby evergreen tree, of the box family, native to Europe and parts of Asia. It grows about 12 feet in height and bears small, oval, opposite, evergreen leaves, and greenish, inconspicuous flowers. The wood is yellowish, close-grained, very hard and heavy, and takes a beautiful polish. It is much used by turners, wood carvers, engravers on wood (no wood surpassing it for their requirements), and by mathematical-instrument makers. Flutes and other wind instruments are made of it. The boxwood of commerce comes mostly from the regions adjoining the Black Sea and the Caspian Sea, and from Spain and Portugal. In gardens and shrubberies, box trees may often be seen clipped into various formal shapes. A dwarf variety is grown as an edging for garden walks.

Brake (*Pteris aquilina*). One of the most abundant and widely distributed ferns, called also bracken. It occurs in nearly all parts of the world, frequently covering large tracts. The plant has a long, creeping, black rootstock from which arise naked stipes. Each of these stipes divides at the top into three branches which bear the leafy portion of the fern. In Japan the young shoots are highly prized as food; in Siberia great quantities of the rootstock are used as an ingredient in making a beerlike beverage. Brake is sometimes used in dressing leather, for thatching, and as fodder for cattle.

Brazil Nut (*Bertholletia excelsa*). A beautiful tree of the lecythia family, native to Amazon and Orinoco forests. It grows from 100 to 150 feet high, with leathery leaves 2 feet long. It bears a large, spherical, hard-shelled fruit, about 6 inches in diameter, which contains 18 to 24 three-sided seeds or nuts—the brazil nuts or "niggertoes" of commerce. The fruit is extensively gathered by the natives, who chop open the thick shell to obtain the nuts. These are exported in large quantities, chiefly from Pará.

Breadfruit (*Artocarpus communis*). A slender tree of the mulberry family, related to the fig. It is a native of the Sunda islands, from which its cultivation has been widely extended in the Indian archipelago and the Pacific islands. The tree attains a height of from 30 to 40 feet and bears large, glossy, deeply cut leaves. The large, edible fruit is somewhat like a watermelon in size and shape. Upon being properly baked, it resembles wheat bread. The bark furnishes a fairly good fiber for making clothes, the juice yields a serviceable glue for caulking canoes, and the wood has many economic uses. The breadfruit tree, like certain species of palms, is necessary to the existence of the native peoples inhabiting many oceanic islands. The closely related African breadfruit, the Australian breadfruit, and the jack fruit are also valuable as food producers.

Broom Corn (*Sorghum saccharatum*). One of the many useful varieties of *Sorghum* which have been developed in the course of forty or more centuries of cultivation. Broom corn is grown solely for the valuable brush fibers of the flowering panicle, which remain after the more or less ripened seeds have been removed. It is cultivated chiefly in Italy, France, Germany, and the United States, and the product is used entirely in making various kinds of brooms. The first broom corn in the United States was grown somewhat earlier than 1800. Illinois, Kansas, Missouri, and Oklahoma now produce nearly the entire crop, Oklahoma contributing approximately one-half. See *Sorghum Cane.*

Brussels Sprouts. A cultivated variety of cabbage with an elongated stem, from 2 to 5 feet high, on which are borne numerous small, clustering green heads, like miniature cabbages. This vegetable is extensively cultivated near Brussels and in many other parts of the world. See *Cabbage.*

Buckeye (*Æsculus*). A genus of trees or shrubs of the buckeye family. They have digitate leaves and bear large, nutlike seeds, somewhat resembling chestnuts and often called horse-chestnuts. There are about 15 species, natives of the northern hemisphere. Of these, 6 species occur in the United States.

The Ohio buckeye (*Æ. glabra*) grows sometimes 70 feet high. It bears yellow flowers and spiny seed capsules. This tree is native to rich soil from Pennsylvania to Iowa and southward. The leaves and nuts are reputed poisonous.

The sweet buckeye (*Æ. octandra*) often attains a height of 90 feet and a trunk diameter of 3 feet. It has yellow flowers and smooth seed capsules. This species occurs in the central and southern United States.

The red buckeye (*Æ. pavia*), a shrub 4 to 12 feet high, with red flowers and smooth fruiting capsules, grows from Virginia to Texas. The southern buckeye (*Æ. austrina*), about 25 feet high, with downy leaves and yellow seeds, is found from Tennessee to Texas. The California buckeye (*Æ. californica*), sometimes 30 feet high, with pale rose-colored, showy flowers and with large,

smooth seed capsules, is sometimes planted for ornament. Its seeds are said to be used for food by the Indians.

The Horse-chestnut (*Æ. hippocastanum*) is a native of Asia, now grown extensively in many temperate countries. It bears white flowers followed by large prickly seed capsules. This common Old World species is widely planted as a shade tree in the eastern United States and Canada. In France, starch, used for food, is made in large quantities from the seeds. During the World War the British government caused enormous stores of the seeds to be collected from the horse-chestnut trees in England. The bitter principle, esculin, always present in the starchy flesh, was removed by a chemical process, so that the seeds could be utilized for human food. In several countries the seeds are extensively used for feeding livestock.

The soft wood of the horse-chestnut and of the various species called buckeye is of little commercial value.

Buckthorn (*Rhamnus*). Small trees or shrubs of the buckthorn family (*Rhamnaceæ*). There are some 90 species, native to tropical and temperate regions, about 15 of which grow in the United States and Canada.

The common buckthorn (*R. cathartica*), a somewhat spiny shrub, 6 to 20 feet high, is a native of Europe. It is cultivated and sparingly naturalized in the eastern United States. The berries yield a yellow dye and have powerful purgative properties. The Indian Cherry (*R. carolinana*), sometimes 40 feet high, with a black, seedy fruit resembling small cherries, grows wild from Virginia to Nebraska and southward.

The Cascara Sagrada (*R. purshiana*) yields the cascara bark of commerce, widely used in medicine. It is a slender tree, 35 to 40 feet high, which grows from Idaho and northern California to Puget sound. The California Coffee (*R. californica*), with large, black, grapelike fruit, is a common shrub, 6 to 8 feet high, on the Sierra Nevada foothills. The medicinal properties of the bark are similar to those of cascara sagrada, and the two barks are said to be mixed by collectors.

Buckwheat (*Fagopyrum esculentum*). An annual plant of the buckwheat family, native of Manchukuo and Siberia. It has smooth, branching stems, somewhat heart-shaped leaves, and pale red or white flowers, which yield a good quality of honey. The triangular, dark-coated seed, called buckwheat, is sometimes incorrectly classed with the true cereals.

The cultivation of buckwheat as a food plant probably dates back 2000 years in Asiatic Russia, whence it was introduced into Europe during the middle ages. While a common article of diet throughout much of Russia, buckwheat is relatively unimportant as a food in the remainder of Europe and elsewhere.

In the United States, where the chief use of buckwheat is for pancakes or griddlecakes, production has declined about one-third since 1860. New York and Pennsylvania are the leading producers. Canada grows over half as much buckwheat as the entire United States, the production centering chiefly in Ontario and Quebec.

Buffalo Berry (*Shepherdia argentea* or *Lepargyrea argentea*). A handsome shrub of the oleaster family, native to the northern Rocky Mountain region. It has small, silvery leaves and bears red or yellow currant-like berries. Long valued as an ornamental, the buffalo berry has recently taken rank as a fruit plant. It is successfully cultivated in the Northwest, where it is much used for jellies.

Buttercup. The popular name for many yellow-flowered species of *Ranunculus*, usually growing in moist places and flowering in early spring. The marsh or swamp buttercup (*R. septentrionalis*), with large, brightly colored blossoms, abounds in wet grounds from New Brunswick to Kansas. The creeping buttercup (*R. repens*), spreading by runners, occurs from Newfoundland to British Columbia and southward. The early buttercup (*R. fasciculatus*), with tufted thickened roots, is found in woodlands from Ontario to Texas. The California buttercup (*R. californicus*) is a showy species, immensely abundant on the Pacific coast. In early spring, unforested hills, sometimes many square miles in extent, are colored bright yellow by the blossoms of this wild buttercup. The tall or meadow buttercup (*R. acris*), naturalized from Europe, is very abundant in fields and roadsides in southern Canada and the northeastern United States. The bulbous buttercup (*R. bulbosus*), also introduced from Europe, is common from New England to Louisiana.

Cabbage (*Brassica oleracea*). A fleshy-leaved plant of the mustard family, native to rocky shores of Europe. It has been cultivated in various forms since prehistoric times, and is perhaps the most ancient of all vegetables now in extensive use. There are evidences indicating that the cabbage has been in cultivation for more than 4000 years. It is now very widely grown in the Old World. In the United States, cabbage is produced upon a greater number of gardens and farms than is any other vegetable. The leaves only are eaten, and, in ordinary kinds, these are crowded in a dense head around the top of the short, stout stem. The name "cabbage" is derived from the Latin *caput*, meaning a head.

The ancient Greeks grew three varieties of cabbage; Pliny mentions six; and at the present time there are more than 150. Centuries of cultivation have developed several greatly modified forms, remarkably different from ordinary cabbage. Among these are kale, kohl-rabi, cauliflower, and Brussels sprouts. The tree cabbage, or cow cabbage, grown for cattle, is a tall perennial form which, in France, sometimes attains a height of 15 feet. See *Brussels Sprouts*, *Cauliflower*, *Kale*, *Kohl-rabi*.

Cacao (*kà-kā'ō*; *kà-kä'ō*) or **Cocoa** (*Theobroma cacao*). A medium-sized tree, 12 to 30 feet high, with large, entire leaves and clustered flowers, belonging to the sterculia family. It was cultivated in the Amazon valley before the discovery of America; at present about 78 per cent of the world's supply comes from British West Africa and the adjacent regions, the remainder from Brazil and other American countries. The seeds lie embedded in a large pulpy, edible fruit. These seeds, known as cocoa beans in commerce, are the source of chocolate, cocoa, and the semisolid oil, chemically a hard fat, called cocoa butter, the last mentioned constituting over 50 per cent by weight of the shelled beans. The cacao tree bears fruit within 4 or 5 years from planting, attains full productiveness in 12 years, and thereafter yields 2 principal crops annually for many years. Cocoa, as usually prepared, contains an alkaloid stimulant called theobromine similar to the caffeine of coffee and the theine of tea. See *Coffee*, *Maté*, *Tea*.

Cactus. Any plant of the cactus or Indian fig family. There are about 1000 species, commonly fleshy-jointed, succulent shrubs a few feet high. All, except a few African species, are natives of America, and are found mostly in very dry, warm regions, being most numerous in Mexico. In structure these plants show remarkable adaptation to climatic conditions. Their problem is to absorb and retain as much moisture as possible. The stems are fleshy, permitting the storage of a large amount of water. To avoid losing it by evaporation, they expose but little surface to the air. The leaves are reduced to minute bracts, scales, or hairs, or are entirely wanting, and the smooth, hard, green bark functions in place of leaves.

The various types assume many weird and peculiar forms of growth. Some have great treelike, deeply-ribbed stems, 40 to 70 feet high, with huge

columnar branches. Others are cylindrical, barrel-shaped, or globular, ranging in height from a few inches to several feet. Many of the most widely known are made up of thick, oval, flattened joints. Practically all are heavily armed with exceedingly sharp, needle-like spines.

In the arid deserts of the southwestern United States about 100 kinds of prickly pear (*Opuntia*) occur, together with some 30 kinds of hedgehog cactus (*Echinocereus*), and many other species. Among the most striking are the giant cereus or saguaro, the thorny chollas, the deerhorn cactus, the melon cactus, and the barrel cactus. About 10 kinds of cactus grow from the Great Plains eastward, one species of which, the eastern prickly pear (*Opuntia vulgaris*), occurs in Massachusetts, Kentucky, and Florida. Several kinds of cactus have become naturalized in the Old World; as, for example, in Italy, northern Africa, Palestine, and various islands in the Mediterranean.

The fruits of the prickly pear, Indian fig, or tuna, and various other species are edible. The stored sap of the barrel or melon cactus is sometimes used for drinking when water is not available. A thornless variety of opuntia, developed by Burbank, with large oval-jointed stems 8 to 15 feet high and cucumber-like fruit, promises to become valuable as a food and forage plant in arid regions.

The flowers of the various kinds of cactus are usually very large and brilliantly colored. Some, such as those of the night-blooming cereus, are remarkably beautiful. Many varieties of cactus are cultivated in greenhouses and gardens. See *Cereus, Saguaro.*

California Poppy (*Eschscholtzia californica*). One of the most common, striking, and widely diffused of native California plants. It blossoms profusely in the spring, but is sometimes found in flower at all seasons. This wild poppy has suberect, diffuse stems a foot or two in length, dissected leaves, and large, golden yellow flowers. The petals are sometimes 2 inches or more long, with a rich sheen, very brilliant in the sunshine. There are many fanciful or poetic names for this handsome plant, mostly from Spanish sources, such as "copa de oro," "toroso," "amapolo," and "dormidera." It is the state flower of California, and is widely planted in gardens in other regions.

Calla Lily (*Zantedeschia æthiopica*). A fleshy-leaved plant of the arum family, native to Africa. It is now widely grown as a house plant and in gardens for its large beautiful white spathes. These surround a central portion (spadix) which bears the true but inconspicuous flowers.

Camellia. Handsome shrubs or trees of the tea family with dark green, shining, laurel-like leaves, and showy, roselike, waxy flowers. *Camellia japonica*, native to Japan and China, is a tall tree of graceful proportions. It is the parent of many beautiful cultivated shrubs with double-flowered variations, universally grown in gardens. Besides the foregoing, the so-called *Camellia sasanqua*, with small, white, scentless flowers, and *Camellia reticulata*, with large, peony-like blossoms, are also cultivated in the southern United States. While these ornamentals were long regarded as belonging to the genus *Camellia*, and are popularly known as camellias, some botanists now place them in the genus *Thea*, to which the tea plant also belongs. See *Tea, Tea Oil Tree.*

Camphor Tree (*Cinnamomum camphora*). A large evergreen tree of the laurel family, usually regarded as a native of China, now extensively cultivated in many warm countries. It is highly valued for timber and as the source of gum camphor, much used in making celluloid and explosives and also in medicine. Camphor trees are extensively planted in California and in the Gulf States, chiefly for ornament.

Candleberry (*Myrica cerifera*). A shrub or small tree of the sweetgale family, native of the eastern United States, called also bayberry, wax myrtle, and tallow tree. It is usually from 4 to 18 feet high, with evergreen lanceolate leaves, small flowers, and a somewhat fleshy, stone fruit. When bruised, both the bark and the leaves emit an agreeable odor. The fully ripe, dry fruits are covered with a whitish wax. This is collected by boiling the fruits and skimming the wax off the surface of the liquid. The refined wax is used in making candles which burn slowly with a pleasant, balsamic odor, though with a feeble light.

The California Myrtle (*M. californica*), a small tree or shrub, grows on the Pacific coast from Washington to California. Its wax-covered berries yield a wax similar to that of the eastern candleberry. See *Tallow Tree.*

Caraway (*Carum carui*). A perennial plant of the carrot or parsley family, with a tapering, fleshy root, a furrowed stem, and white flowers. It is native to Europe where it extends northward to within the arctic circle. Caraway is widely cultivated for its aromatic seeds, used by confectioners and perfumers and also in making cakes and sweetmeats. In medicine, caraway seeds have recognized stimulant and diuretic properties.

Carnation. The name given to double-flowering forms of the clove pink (*Dianthus caryophyllus*). The carnation ranks among the most popular flowers in cultivation. It is a native of southern Europe, where, for more than 2000 years, it has been grown for its spicily fragrant flowers. Carnations are now produced in immense quantities for city flower markets. A large number of varieties, as to both form and color, have been developed. Red, white, pink, and yellow varieties predominate. Striped variegations occur, ranging from one to three colors. In other forms, petals are found edged with a color which is different from the general hue of the flower.

Carrot (*Daucus carota*). A hardy biennial of the parsley family, native to Europe, where it has been grown since ancient times. It is in general, though not extensive, cultivation as stock food and as a table vegetable. The slender, tapering roots of the cultivated kinds are yellow, white, or reddish in color, with a bland or sweetish taste when cooked, owing to the sugar which they contain. The carrot is wholesome and nutritious as an article of diet and is especially prized as a food for dairy cattle.

In the wild state and wherever naturalized, as in the eastern United States, where it is known also as Queen Anne's lace, the carrot often becomes a pestiferous weed. In this condition it has a woody root with a very strong flavor. The wild plant is frequently infected by the leaf-spot fungus (*Cercospora apii*) which is very injurious to celery.

Carthamin (*kär'thà-mĭn*) (*Carthamus tinctorius*). An annual plant of the composite family, called also safflower. It is unknown in the wild state but is thought to be originally a native of western Asia. Carthamin has been cultivated since remote antiquity as the source of a beautiful red dye for cotton and silk. The grave clothes of mummies were dyed with carthamin, and fragments of the plant itself have been discovered in ancient Egyptian tombs. The Chinese received the plant from the West about 150 B. C. It has been largely supplanted as a dyestuff by modern coal-tar products, except in China and India, where it is still locally important. Carthamin is grown to some extent in France, Italy, and Spain. The extract, when mixed with talcum powder, forms the standard cosmetic known as rouge.

Cashew (*kà-shōō'*) (*Anacardium occidentale*). A spreading tree, of the cashew or sumac family, which attains a height of from 20 to 40 feet. It is a native of tropical America, where it is much

cultivated for its fleshy fruit stalks and oily nuts which are used as food. The trunk of the tree yields a gum similar in character to gum arabic. Since the discovery of America the cashew has become very widely distributed in tropical regions, notably in West Africa, British India, and the East India islands.

Cassaba (*kă-să'bă*). A variety of winter muskmelon, called also pineapple melon. Under proper handling, it is capable of keeping several weeks after being picked. The cassaba melon is large, firm, smooth skinned, and yellow in color, with a very thick, yellow flesh. When fully ripened it has a delicious flavor. The name is derived from the town Kassabah, not far from Smyrna in Asia Minor, whence it was introduced. Seeds were sent to California in 1878, and the first crop was produced for the market in 1879. This attempt was a failure because the melons were picked too green. With later improved methods of handling, the cassaba has become very popular. It is now very extensively grown in the San Fernando valley and elsewhere. See *Muskmelon.*

Cassava (*kă-să'vă*) (*Manihot utilissima*). A bushy, somewhat herbaceous shrub, 6 to 8 feet high, with large palmately divided leaves. It belongs to the spurge family, and is native to tropical America, where it was cultivated for food for several centuries previous to the Spanish exploration. During the period of the slave trade, cassava became widely distributed in Africa. It is now grown to some extent in Florida.

Cassava is propagated from cuttings of its stems and branches planted in furrows, and is cultivated much like corn. About 7 months are required to mature the large, farinaceous roots, which are 1 to 3 inches thick and 1 to 3 feet long. There are 2 varieties, the poisonous, or bitter, and the nonpoisonous, or sweet. The poison in the bitter variety is due to the presence of hydrocyanic or prussic acid in its sap. Both varieties yield wholesome food, as the poisonous principle is readily dispelled by cooking.

The starchy, somewhat potato-like roots constitute an important article of food in many tropical countries. The starch of cassava is the arrowroot of commerce. This starch, when it is dried quickly under the action of intense heat, forms into irregular masses and is sold under the name of tapioca. Sago, or pearl tapioca, is a fine-grained form of this product.

Castor Oil Plant (*Ricinus communis*). A widely known plant of the spurge family, thought to be a native of tropical Africa. In warm countries it is a perennial, occurring as a small, much-branched tree; but, as it cannot endure frost, it becomes an annual in temperate regions.

The castor oil plant has been cultivated since extremely remote antiquity, dating back more than 4000 years in Egypt, where its seeds are found in the ancient tombs. The Romans knew it as *Ricinus* and it is mentioned by Theophrastus and by Dioscorides. The oil obtained from the seeds, called castor beans, is used in medicine, in the arts, and, in the Far East, as lamp oil. The plant is cultivated in Italy, France, Spain, India, Algeria, and the West Indies. Although often planted in the United States for ornamental purposes, its cultivation for commercial use is as yet of slight importance.

Catalpa (*kă-tăl'pă*). A tree of the trumpet creeper family, with large leaves and showy flowers in terminal clusters. The common catalpa (*C. catalpa* or *bignonioides*) is native to the Gulf States but is widely cultivated in the eastern United States for ornament. It reaches 60 feet in height, has light gray bark, strong scented, entire or sometimes lobed leaves, and bears numerous white flowers strongly dotted inside with yellow and purple spots.

The hardy catalpa (*C. speciosa*) occurs from southern Indiana, Illinois, and Tennessee to Missouri and Arkansas. It attains a height of 120 feet and a diameter of 4½ feet. The bark is rough and thick, the leaves are not unpleasantly scented, and the large white flowers are but faintly spotted within. It grows rapidly and in the Middle West is often planted for timber as well as for ornament. The durable wood is used for ties and fence posts and for telephone and telegraph poles.

Catnip (*Nepeta cataria*). A small erect herb of the mint family, so named because of the remarkable fondness which cats display for its foliage. It grows from 2 to 3 feet in height, with velvety, heart-shaped leaves, whitish-downy beneath, and a terminal spike of small blue flowers. It is a native of Europe and has become widely naturalized in North America from New Brunswick to Oregon and southward. Catnip is used in rural districts as a home remedy, its properties being regarded as tonic.

Cat-tail (*Typha*). A genus of reedlike aquatic plants of the cat-tail family. They have swordlike leaves, and an erect stem bearing a club-shaped spike of minute flowers. There are about 10 species, two occurring in North America.

The broad-leaved cat-tail (*T. latifolia*) has stout stems 4 to 8 feet high, flat leaves about an inch wide, and dark brown spikes an inch or more in diameter. It is abundant in swamps nearly throughout the northern hemisphere. The astringent rootstocks are rich in starch. In Russia the young shoots are eaten like asparagus.

The narrow-leaved cat-tail (*T. angustifolia*) has slender stems 5 to 10 feet high, somewhat convex leaves about a half inch wide, and light brown spikes, usually less than a half inch in diameter. This plant occurs abundantly in coastwise marshes but rather rarely inland.

The leaves of both species are used in making mats, baskets, chair bottoms, and in cooperage. Cat-tail rootstocks are much eaten by muskrats. These valuable fur-bearing animals are usually numerous in large cat-tail marshes.

Cauliflower (*kô'lĭ-flou'ẽr*). A variety of cabbage in which the budlike head of compacted leaves is replaced by a tight head of clustered rudimentary flowers. On account of its delicate flavor, cauliflower is highly esteemed as a table vegetable. However, its cultivation is much more difficult than that of cabbage. Cauliflower seed is very expensive, being largely imported from northern Europe, though increasing quantities are supplied from Washington and British Columbia.

Broccoli is a variety of cauliflower, the popular Italian or sprouting kind having an open panicle instead of a dense head, of undeveloped flowers.

Cauliflower requires a well drained but permanently moist and highly fertile soil. It must also be sheltered from the direct rays of the sun. The latter condition is met either by growing it on north slopes or by planting it very early or very late in the season, so as to avoid maturing the heads during midsummer. When the head begins to form, the surrounding leaves are drawn up and tied above it. This process, by screening the sunlight, blanches the heads to a milk white color, making them more tender and delicate and improving their appearance for the market. See *Cabbage.*

Cedar. A name given to various kinds of evergreen coniferous trees. However, it is properly applied only to the two or three species of *Cedrus*, namely, the cedar of Lebanon (*C. libani*), famous since biblical times for its fragrant, enduring, reddish wood; the Himalayan or deodar cedar (*C. deodara*), of India; and the African cedar (*C. atlantica*), of the Atlas mountains.

The so-called white cedar of the eastern United States (*Chamæcyparis thyoides*) grows in swampy regions near the Atlantic coast. The yellow cedar of the Pacific coast (*Chamæcyparis nookatensis*), with fragrant yellow wood, occurs from California to Alaska. The Port Orford cedar (*Chamæcyparis lawsoniana*), a valuable timber tree often 175 feet high, is found in Oregon and California. The arbor vitæ (*Thuya occidentalis*) is called northern white cedar, while the giant arbor vitæ of the Northwest (*Thuya plicata*) is called western red cedar.

The name cedar is also popularly given to red-wooded species of juniper (*Juniperus*) and to various trees which are not conifers. Among the latter is the Spanish cedar (*Cedrela odorata*), extensively used for cigar boxes. See *Deodar*, *Juniper*.

Celandine (*sĕl'ăn-dĭn*) (*Chelidonium majus*). A smooth, brittle, branching herb of the poppy family. It has deeply cut leaves and bears small clusters of showy yellow flowers. A native of Europe, celandine is now widely naturalized in the eastern United States as a weed. The yellow juice is very acrid and burning to the skin, and, in large doses, is an active poison.

Celery (*sĕl'ĕr-ĭ*) (*Apium graveolens*). A biennial plant of the parsley or carrot family. It is a native of Europe, West Asia, and North Africa. The plant was anciently grown as a vegetable in the Mediterranean region. It is mentioned in Homer's *Odyssey*; and eating celery, as well as eating the onion, was recommended by Dioscorides as a means of inducing sleep. Celery is now widely cultivated in Europe and America for the leaf stalks, which are blanched and eaten as a salad and also cooked as a vegetable. In Europe a form called celeriac is extensively grown for its thickened root. The ripe seeds of celery contain a volatile oil used in medicine as a sedative.

Century Plant (*Agave americana*). A stout perennial of the amaryllis family, native to Mexico, called also agave and American aloe. In its growing stage the plant consists of a large rosette of long, fleshy, sharp-pointed, spiny-margined leaves. It is sometimes many years in attaining maturity, whence the misleading name century plant. At blossoming time it quickly develops a very tall and stout flowering stem, sometimes 30 feet high, surmounted with a huge panicle of flowers. After flowering, the seeds ripen and the whole visible plant withers and dies.

The cultivation of the agave in Mexico far antedates the Spanish discovery of that country. *Pulque*, the national beverage of the Mexicans, is made from the fermented sap, and, by distillation, *mescal* is produced. The maguey or Pita flax and the sisal hemp, both very valuable fibers used for cordage and binding twine, are obtained from very similar species. The agave was introduced into Europe in 1561, and is widely grown in many countries as an ornamental plant. See *Sisal*.

Cereals. The plants belonging to the grass family which are cultivated for their seeds used as human food,—the name being derived from Ceres, the goddess of agriculture. They are called also corn plants or bread plants. The standard cereals are wheat, barley, rye, oats, rice, and maize or Indian corn. The millets and sorghums, also raggee and Job's tears, are often grouped with the cereals. Buckwheat, which is not a grass, is sometimes incorrectly classed with them.

Cereus (*sē'rē-ŭs*). A genus of the cactus family, including about 100 species, natives of the southwestern United States, Mexico, and dry regions southward to Argentina. Some of these attain gigantic size and others produce some of the most splendid flowers known. The immense flowers of the night-blooming cereus (*C. grandiflorus*), sometimes eight inches in diameter, are famous for their beauty and fragrance. See *Cactus*.

Chamisal (*chă'mē-săl'*) (*Adenostoma fasciculatum*). A small evergreen shrub of the rose family. It grows usually from 2 to 5 feet high, with resinous, narrow leaves in bundles or fascicles, and small clusters of white flowers. The chamisal covers large areas on the slopes of California mountains. It is one of the most valuable covering shrubs of the chaparral belt, preventing erosion and the rapid run-off of water.

Chaulmoogra (*chôl-mōō'grà*) (*Taraktogenos kurzii*). A large tree native to tropical forests of southeastern Asia. It bears a fruit which, in size, is about equal to a small orange. Within the hard rind is a sweetish pulp, closely packed with large seeds. From these seeds is obtained the highly valuable chaulmoogra oil. This oil, which, in the Orient, has been long used in the treatment of skin diseases, is the only known means of arresting the course of leprosy.

Cherimoya (*chĕr'ĭ-moi'à*) (*Anona cherimola*). A small tree of the custard apple family, called also cherimoyer. It is a native of tropical America and is widely cultivated in warm regions for its delicious fruit. It grows from 15 to 30 feet high, with drooping branches, oblong leaves which are velvety beneath, and highly fragrant flowers. The fruit, which ranks among the finest produced in the tropics, ranges from the weight of an orange to 15 pounds or more. It is roundish or heart-shaped, with a thick, yellowish or reddish skin and a white, juicy flesh. Cherimoyas are grown to some extent in southern California and Florida.

Cherry (*Prunus*). A genus of small trees of the rose family, comprising, with the almond, peach, apricot, and plum, the important group of stone fruits. Garden cherries have originated chiefly from two species, the sour cherry (*P. cerasus*) and the sweet cherry (*P. avium*), both natives of eastern Europe and western Asia where they have been cultivated since ancient times. They bear a profusion of white flowers in early spring, followed by mostly red, yellow, or black fruit, without bloom, containing a smooth, nearly round stone.

The common red or sour cherry is a low, spreading tree, usually not exceeding 15 feet in height, with somewhat drooping branches. Sour cherries, especially the dark red morello varieties, are extensively grown in the eastern United States. Large quantities are marketed, either as fresh fruit or canned, Pennsylvania usually leading in production.

The sweet cherry, called also bird cherry or mazzard, is a larger and stronger tree, sometimes reaching a height of 45 feet. It includes the various black and white cherries which have a sweet pulp when ripe. While cultivated to some extent in the eastern United States, sweet cherries are produced chiefly in California, whence they are shipped to eastern markets.

The wood of both species is reddish brown, close-grained, and takes a high polish. It is prized for making furniture, interior finishings, and musical instruments. See *Plum*.

Cherry, Wild (*Prunus*). Trees or shrubs of the rose family, closely related to the plums. Those found in North America form three groups, the bird cherries, with small, bright red fruit, the dark fruited cherries, and the evergreen cherry laurels.

The most important is the wild black cherry (*P. serotina*), a large, handsome tree, sometimes 100 feet high, with a trunk 4 to 5 feet in diameter, and bearing a small, thin-fleshed, bitterish, black fruit. It grows from Nova Scotia to North Dakota and southward to Florida and eastern Texas. The light red wood is much used in cabinetmaking.

The wild red cherry (*P. pennsylvanica*), called also bird cherry, 30 to 40 feet high, with slender trunk, reddish branches, and small, light red, sour fruit, occurs throughout eastern North America. The bitter cherry (*P. emarginata*), often a mere

shrub, but sometimes 30 to 40 feet high, with bright red, bitter fruit, grows from Montana and Arizona westward to the Pacific Ocean. The choke cherry (*P. virginiana*), a shrub or small tree, with reddish black, very astringent fruit, is common east of the Rocky mountains. The western choke cherry (*P. demissa*), similar to the last, occurs from the Rockies to the Pacific slope.

The holly-leaved cherry or Islay (*P. ilicifolia*), an evergreen species of California and the coast islands, is usually shrubby but sometimes grows 30 feet high. It bears thick, spiny-toothed leaves and dark purple fruit with a very large stone.

The laurel cherry (*P. caroliniana*), of the South Atlantic and Gulf states, sometimes called "mock orange," is another evergreen-leaved species. It is usually a small tree and in the South is sometimes planted for ornament. Its small, black fruit has a thin, dry flesh. See *Plum*.

Chestnut (*Castanea*). A genus of trees of the beech family. There are 4 or 5 species, natives of temperate climates.

The American chestnut (*C. dentata*) is a stately, spreading tree which reaches a maximum height of about 90 feet with a trunk diameter of 4 feet. It is found from Maine to southern Michigan and southward to Delaware, Tennessee, and Mississippi. The fruits are finely flavored nuts, which are enclosed in burs, usually 2 or 3 nuts in a bur. The wood is yellowish brown, soft, and weak, but durable in the soil and much used for fence posts and also in furniture manufacturing. In recent years a fungus disease, believed to have been introduced from China, has killed thousands of chestnut trees.

The Japanese chestnut (*C. crenata*), a smaller tree, is now much cultivated for its productiveness, its large nuts, and its freedom from blights. It is often grafted on the American species.

The Chinquapin or Chinkapin (*C. pumila*) is a shrub or small tree native to dry soil from New Jersey to Missouri and southward to Florida and Texas. It is generally about 10 feet in height, but occasionally reaches 40 feet, especially in Arkansas, where it attains its highest development. The nuts are ovoid, sweet, and about half the size of ordinary chestnuts. The brown, coarse-grained, hard, durable wood is extensively used for fence posts and railroad ties.

Chicory (*Cichorium intybus*). A herbaceous perennial of the composite family, with handsome blue flowers, native to the Mediterranean region. It was known to the Greeks and Romans and is still widely cultivated in Europe as a salad plant, for fodder, and for its roots. The latter, when roasted and ground, are used as a substitute for, or as an adulterant of, coffee. Chicory has become naturalized as wayside weed in many parts of the United States, where it is now grown to some extent for its roots.

Christmas Berry (*Heteromeles arbutifolia*). A shrub or small tree of the rose family, native to the chaparral belt of California foothills and low mountains. This elegant shrub is known also as toyon, tollon, and California holly. It has a short, thick trunk with many upright branches, ashy gray, wrinkled bark, oblong, shiny, evergreen leaves, and whitish flowers borne in large clusters. The handsome, bright red berries, which ripen from October to February, are sold in the markets, like holly, for holiday decorations. Though very suitable for turnery, the hard, heavy, reddish brown wood is as yet but little used. See *Holly*.

Chrysanthemum. A numerous genus of plants of the composite family, embracing about 200 species, mostly native to Asia, Europe, and North Africa. Nearly all are free blooming and produce showy white, yellow, or rose-purple flowers. In popular language the name chrysanthemum is confined to the many greenhouse and garden varieties, now widely cultivated in Europe and America, which have been derived from two Chinese and Japanese species, *C. indicum* and *C. sinense*. By cross-fertilization and selection, a remarkable array of forms and colors has been produced, ranging in size from mere button-like tufts to huge heads nearly 8 inches in diameter, with ray florets 4 inches long. Like the rose in the western world, the chrysanthemum is a favorite in the Far East, and is the national flower of Japan.

The Oxeye Daisy, which has become a troublesome weed in the eastern United States, is a chrysanthemum (*C. leucanthemum*) native to Europe, as are also the Feverfew (*C. parthenium*) and the Costmary (*C. balsamita*), which have escaped from gardens. In France, the Marguerite (*C. frutescens*) is much grown in gardens for ornamental purposes.

Cinchona (*sĭn-kō'nȧ*). A genus comprising several small trees of the madder family, natives of Bolivia and Peru. They yield cinchona bark, the source of the quinine of commerce, and are now extensively cultivated in Jamaica, Japan, India, and Ceylon. The bark of these trees was first introduced into Europe by the Countess of Cinchon, the wife of a viceroy of Peru. She was cured of malaria by its use.

Cinnamon (*Cinnamomum zeylanicum*). A small tree belonging to the laurel family, native of Ceylon, the bark of which yields cinnamon oil and cinnamon, the well-known spice for flavoring. From biblical times the bark had been taken from wild trees until systematic cultivation was begun by the Dutch in Ceylon about 1765 and later was extended to Brazil, the West Indies, Egypt, and Java.

Citrous (or **Citrus**) **Fruits.** A group of valuable fruits, produced by trees and shrubs of the rue family. They belong chiefly to the genus *Citrus*, and, by many, are called "citrus" fruits. The most important are the orange, the lemon, and the grapefruit. Other fruits of the group include the citron (*C. medica genuina*), the thick rind of which is used in confectionery and in preserving; bergamot (*C. aurantium bergamia*), which yields an essential oil used in perfumery; also the citrange, the mandarin, the tangelo, and the tangerine. The closely related trifoliate orange (*Poncirus trifoliata*) and the kumquats (*Fortunella*) are classed with the citrous fruits. See *Citrous Belt, Grapefruit, Kumquat, Lemon, Lime, Orange, Tangerine*.

Clematis (*klĕm'ȧ-tĭs*). A genus of trailing vines of the crowfoot family. They bear conspicuous flowers and seeds, the latter having usually long feathery awns. There are about 150 species, some 20 of which are native to the United States and Canada.

The Virgin's Bower (*C. virginiana*), with leaves divided into three leaflets and showy clusters of white flowers, grows from Nova Scotia to Manitoba and southward to Georgia. The Western Virgin's Bower (*C. ligusticifolia*), with leaves divided into five leaflets and flowers similar to the preceding, ranges from Missouri to the Pacific coast. The large-flowered clematis (*C. lasiantha*), with leaves of three leaflets and solitary flowers, is found in California.

Many handsome species are in cultivation. Among the most popular are *Clematis paniculata*, with fragrant flowers, *Clematis viticella*, with solitary bell-shaped flowers, and *Clematis patens*, with large, blue flowers—all natives of Japan, and the evergreen *Clematis indivisa*, from New Zealand.

Climbing Bittersweet (*Celastrus scandens*). A woody vine of the staff-tree family, which grows in rich soil from Quebec to Manitoba and southward to North Carolina and New Mexico.

It has alternate leaves, greenish flowers with finely toothed margins, and an orange-yellow fruiting capsule or pod. This opens after the leaves have fallen, exposing the scarlet aril covering the seeds. The handsome clusters of brightly colored fruit are used for winter ornament. See *Bittersweet.*

Clover (*Trifolium*). An important genus of plants of the pea family, embracing 275 species widely distributed in temperate regions. Of these, more than 60 are native to the United States. The true clovers have leaves composed of three leaflets, nontwining, herbaceous stems, and roundish or oblong heads of small flowers, which persist in a withered state until the seeds ripen. Several species are of great value to agriculture as pasture, fodder, and honey plants.

Among the most important cultivated kinds are red clover (*T. pratense*), alsike or Swedish clover (*T. hybridum*), Italian or crimson clover (*T. incarnatum*), and Egyptian clover (*T. alexandrinum*). In many sections the white clover (*T. repens*), a native both of Europe and of North America, quickly establishes itself in pastures and meadows without cultivation. In common with many other leguminous plants, the clovers possess the power, through the agency of bacteria living on their roots, of taking nitrogen from the air and transforming it into a soil fertilizer.

Many related plants which do not belong to the true clover group (*Trifolium*) are popularly called clovers. Among these are the sweet clover (*Melilotus*), bur clover (*Medicago*), prairie clover (*Petalostemon*), and bird's-foot clover (*Lotus*). See *Leguminous Plants.*

Clove Tree (*Eugenia aromatica*). An ornamental evergreen tree, 20 to 40 feet high, belonging to the myrtle family. It bears large oval leaves and numerous clusters of crimson flowers. The unexpanded flower buds, when properly dried, form the cloves of commerce. The tree was found native in the Molucca or Spice islands by early Portuguese traders. It has since become naturalized in various other warm regions, and is now cultivated in Sumatra, Mauritius, Zanzibar, the West Indies, and elsewhere in the tropics.

Coca (*Erythroxylum coca*). A small shrub, 3 to 6 feet high, belonging to the coca family, native to Peru and Bolivia. The tealike leaves are much used by the natives of several South American countries as a narcotic stimulant. The plant was grown for this use by the Indians of the Andes long before the discovery of America. Quantities of the leaves are found buried with the mummies in ancient Peruvian tombs. Coca is the source of the medicinal alkaloid *cocaine*, extensively used in medicine. The shrub is now cultivated in various parts of South America, India, Java, and Ceylon. The yearly production of leaves in the South American trade is estimated at about 35 million pounds.

Coconut (*Cocos nucifera*). A very valuable tree of the palm family, probably native to the Malay archipelago and possibly to tropical America. In southern Asia and the East India islands this palm has been cultivated for upwards of 3000 years. It is now diffused along the coasts of all tropical regions and is the principal food plant of many Pacific islands. The stem, which is about a foot in diameter and from 60 to 80 feet high, bears at the summit a crown of downward-curving leaves, 12 to 20 feet long.

The chief product of this palm is the coconut, whose dried kernel or meat is the *copra* of commerce and the source of coconut oil. Palm wine, arrack, and sugar are obtained from the sap; cordage is made from the fiber of the leaves, and coir from husks of the nut. The wood of the lower part of the stem, very hard when seasoned, takes a beautiful polish and is employed for a great variety of uses. It is known commercially as porcupine wood. See *Palms.*

Coffee (*Coffea arabica*). A small tree of the madder family, native to Ethiopia, and ranking with tea among the world's most important beverage plants. In ordinary cultivation, coffee is a pyramidal tree, 6 to 10 feet high, with evergreen, leathery leaves and small, white, fragrant flowers. It bears a dark red, cherry-like fruit which encloses two somewhat hemispherical seeds with flattened faces, called coffee beans. These seeds, when properly prepared and cleaned, constitute the coffee of commerce.

The use of coffee is comparatively recent, probably dating back about 500 years in Arabia, whence it was introduced into Europe in the 16th century. The Dutch began growing coffee in South America in 1718, and its cultivation has since become extensive in many tropical countries. Coffee culture is now the chief industry of Brazil, which produces about two-thirds of the world's supply.

The stimulating principle in coffee is the alkaloid, caffeine, which is very similar in its action to the theine of tea and the theobromine of cocoa. See *Cacao, Maté, Tea.*

Columbine (*kŏl'ŭm-bīn*) (*Aquilegia*). A herbaceous plant of the crowfoot family, noted for its handsome flowers. These have 5 petal-like, colored sepals and 5 tubular petals with hornlike spurs, usually ending in honey sacs. There are about 50 species, mostly native to north temperate countries, over 20 of which occur in North America. The common columbine (*A. canadensis*), with scarlet, yellow, or rarely white flowers, 1 or 2 inches long, grows in rocky woods throughout eastern United States and Canada. The blue columbine (*A. cærulea*), one of the most beautiful species, native to the Rocky mountains, is the state flower of Colorado.

Compass Plant (*Silphium laciniatum*). A tall, coarse plant of the composite family, native to the prairie regions of the United States, called also resinweed. It has a tall, resinous stem and nearly vertical root leaves. When growing in open situations, exposed alike on all sides to the sunlight, the edges of most of the leaves point approximately north and south. This peculiarity is mentioned in Longfellow's "Hiawatha." The stem leaves of the prickly lettuce (*Lactuca scariola*) exhibit the same compass-like property.

Compositæ (*kŏm-pŏz'ĭ-tē*). The composite family, called also aster, thistle, or sunflower family, is the most numerous natural group of flowering plants. It contains upwards of 800 genera and about 12,500 known species, or about one-tenth of all seed-bearing plants, very widely distributed throughout the world. In some regions this family constitutes a large part of the total flora, comprising over one-sixth of the flowering plants in California, over one-fifth in Chile, and in certain regions of the Andes more than one-third.

The *Compositæ* are now regarded by botanists as the most highly developed of plants, and in recent classifications the group is placed at the head of the vegetable kingdom. Some botanists divide this great group into three distinct families, as, for example, into the *Cichoriaceæ* or chicory family, the *Ambrosiaceæ* or ragweed family, and the *Asteraceæ* or aster family. Other authorities, while regarding the ragweed and chicory families as distinct and separate, retain the name Compositæ for the remainder, which comprises about five-sixths of the entire group.

The family includes many useful plants, such as the artichoke, carthamin, endive, chicory, lettuce, salsify, scorzonera, wormwood, camomile, tansy, arnica, coltsfoot, pyrethrum, and elecampane. Among the very large number of cultivated ornamental plants belonging to this family are the dahlia, chrysanthemum, aster, cineraria, coreopsis, cosmos, cornflower, immortelle, and marigold.

Conifers (*kō'nĭ-fĕrz*) (*Coniferæ* or *Coniferales*). The chief group of living gymnosperms. All are trees or shrubs of temperate regions or of high altitudes in the tropics, mostly with evergreen, resinous, needle-shaped or scalelike leaves. They usually produce a cone-shaped strobile, or cone, containing the seeds, whence the name *conifer*, or "cone-bearer." There are two great groups: (1) the pine family (*Pinaceæ*), with about 240 species, commonly with scaly cones, including the pines, spruces, firs, hemlocks, cedars, larches, junipers, cypresses, redwoods, and araucarias; (2) the yew family (*Taxaceæ*), comprising about 75 species, with a somewhat fleshy fruit, including the yews, *Torreyas*, *Cephalotaxus*, *Dacridium*, and the South American podocarps.

Cork Tree. The cork oak (*Quercus suber* and *Q. occidentalis*) is native to southern Europe and northern Africa. It grows from 20 to 40 feet high and sometimes has a trunk 4 feet in diameter. The thick, spongy outer bark, known as cork, has been widely used since ancient times. Theophrastus refers to it; Plutarch mentions cork life preservers; and Pliny tells of the use of cork for stoppers, floats for nets, and for inner soles of shoes. Cork is taken from both wild and cultivated trees, at intervals of about 9 years. The removal of the thick outer layer does not injure the vitality of trees, which yield the best bark at 40 years and continue to produce for about 150 years. Spain and Portugal now furnish over two-thirds of the world's supply of cork.

The cork oak trees planted in the South Atlantic and Gulf states and in southern California between 1880 and 1890 are still living. They have not, however, been worked for commercial cork, which, under proper management, they would probably yield. See *Oak*.

Corn (*Zea mays*). An annual of the grass family, producing a valuable cereal grain. Corn, called also Indian corn and maize, is the most important contribution made by the New World to the economic plants used by man, ranking with wheat and rice among the world's chief food plants.

Like wheat and some other very anciently cultivated plants, corn is unknown in the wild state. By most authorities it is supposed to have originated from a parent wild species growing on the high plateaus of tropical America between Mexico and Peru. Some investigators have regarded the Mexican teosinte (*Euchlæna mexicana*) as a possible ancestor of maize. These two plants hybridize freely and produce fertile offspring. From such hybrids Burbank and other plant breeders derived by selection degenerate forms of corn, but the origination of corn from pure teosinte has not been proved.

While botanists generally recognize only a single species of corn, centuries of cultivation have developed many varieties, ranging in size from dwarf kinds only two feet high to giant West Indian forms exceeding 30 feet in height. The most important varieties are the dent corns, flint corns, sweet corns, pop corns, soft corns, and pod corns. See *Cereals*, *Grasses*.

Cotton (*Gossypium*). A genus of small trees, shrubs, and herbaceous plants of the mallow family, comprising many species which are widely distributed in the tropics. From the long hairs covering the seeds of various forms now cultivated in warm regions, the world's supply of cotton fiber is obtained. The seeds yield cottonseed oil, cottonseed meal, and fertilizer.

According to the researches of Sir G. Watt, the commercially important cottons are derived chiefly from the following five species: (1) sea island or Egyptian cotton (*G. barbadense*), native to tropical America, and highly valued for its long fiber; (2) upland cotton (*G. hirsutum*), native to Mexico, the most important cotton yielding plant and source of the standard American cotton; (3) kidney cotton (*G. brasiliense*), native to South America, and yielding a harsh, wiry fiber suitable for mixing with woolens; (4) levant cotton (*G. herbaceum*), native to India, and source of most of the short-fibered cottons grown in Asia, and (5) tree cotton (*G. arboreum*), native to northern Africa, and sparingly cultivated in the Orient for its silky fiber.

Cotton has been grown in southern Asia for upwards of 2000 years, and was known also to the ancient Greeks. In the New World its cultivation and use were well established from the West Indies to Peru and from Mexico to Brazil at the time of the discovery of America. See *Cotton Cloth*, *Flax*, *Ramie*.

Cowpea (*Vigna sinensis*). A leguminous annual, native to southeastern Asia. It has been cultivated since prehistoric times as a food and forage plant, having been known to the ancient Romans. The cowpea is now widely distributed in tropical and subtropical regions. Its introduction into the United States dates from about 1725. In the South the cowpea has become a valuable fodder and soiling crop, corresponding in importance to red clover in the North or to alfalfa in the Western States.

Crab Apple (*Pyrus*). A name commonly given to various species of apple, bearing hard, sour fruit. The Siberian crab apple (*P. baccata*), a native of northern Asia and Europe, has been notably improved by cultivation. It is of great importance to fruit growers because it transmits its hardiness to crosses with the common apple, many valuable resistant varieties having been developed.

The American or sweet crab apple (*P. coronaria*) is one of the most beautiful trees of the eastern United States when its fragrant pink flowers are in bloom. Its fruit is of little value. The similar narrowleaf crab apple (*P. angustifolia*), a small tree growing from Pennsylvania to Florida and Louisiana, is very popular on account of its sweet-scented, rose-colored flowers. The prairie or Iowa crab apple (*P. ioensis*), similar to the eastern crab apple, produces larger and less acid fruit. Valuable crosses with the common apple have already been made, including the so-called Soulard apple (*P. soulardii*). Horticulturally, the Iowa crab apple is the most promising native species. See *Apple*.

Cranberry (*Vaccinium macrocarpum*). A small, creeping shrub of the heath family, native to peaty bogs and marshlands in the northeastern United States and in Canada. It is highly esteemed for its firm, red, acid fruit, which is of good keeping quality. The cultivation of the cranberry was begun in New England about 1800. Cranberry culture is now of commercial importance in Wisconsin, New Jersey, and Massachusetts, the last-mentioned state usually producing somewhat more than half of the total crop. This now exceeds a million bushels.

Creosote (*krē'ô-sōt*) **Bush** (*Covillea glandulosa*). A common evergreen desert shrub, of the caltrop or bean caper family, occurring from Texas to California, and usually attaining a height of 3 or 4 feet. It has somewhat brittle stems and small, olive green leaves which emit a strong, tarry odor. Early in the season it bears a profusion of yellow flowers, followed by woolly seed vessels. Throughout vast areas in the Gila, Colorado, and Mohave deserts the creosote bush is a characteristic plant. As it harbors a small insect which secretes a resinous substance identical in composition with the lac used in making varnishes, the creosote bush possibly may become commercially important.

Cucumber (*Cucumis sativus*). A vinelike annual of the gourd family, native to India, and cultivated as a garden vegetable since prehistoric times. It was known to the ancient Greeks and Romans, was introduced into China about 150 B. C., and is now widely grown throughout the world. The oblong, fleshy fruit, 4 to 30 inches long, is eaten in the green state as a salad and is also extensively used in pickling.

Cultivated Plants. Along with the domestication of animals, the invention of tools, and the use of fire, the cultivation of plants ranks as one of the fundamental advances made by primitive man. The earliest historical records show that many of the plants still of supreme importance to mankind were well established in cultivation at an extremely remote period.

According to De Candolle, some 50 plants are known to have been in cultivation for upwards of 4000 years. Among these are wheat, barley, millet, rice, bean, lentil, apple, peach, apricot, olive, fig, date palm, cabbage, onion, turnip, flax, hemp, saffron, carthamin, and tea.

Among plants in cultivation since the beginning of the Christian era but not known to have been grown for more than 4000 years are oats, rye, beet, carrot, lettuce, celery, pea, asparagus, watermelon, orange, lemon, grapefruit, madder, indigo, poppy, cotton, and probably the potato, sweet potato, maize, and tobacco.

During the last 2000 years few plants of primary importance have been placed in cultivation, though some older plants have been very greatly improved and many valuable minor plants have been added to husbandry. Among these are buckwheat, horseradish, parsnip, parsley, chicory, endive, artichoke, pumpkin, squash, tomato, Lima bean, okra, New Zealand spinach, currant, gooseberry, raspberry, blackberry, strawberry, muskmelon, persimmon, pineapple, various clovers, jute, sisal, cinnamon, clove, hop, and cinchona, coca, peanut, coffee, maté, and cocoa.

There were three distinct regions in which most cultivated plants were developed, namely, China, southwestern Asia from the Ganges to the Nile, and tropical America from Mexico to Peru. The number of useful cultivated plants when compared to the vast array of unused wild species is exceedingly small. About 140,000 species of higher plants have been described, but of this number only about 300 have become permanently useful and economically important in cultivation. Of these, the Old World has contributed about four-fifths and the New World about one-fifth. In the New World, South America heads the list, being credited with the potato, tobacco, tomato, Lima bean, peanut, manioc, coca, cocoa, cassava, cinchona, and usually with Indian corn or maize. Among those originating in the United States are the American grape, strawberry, plum, blackberry, and raspberry; also the pumpkin and the Jerusalem artichoke.

Currant, Black (*Ribes nigrum*). A small shrub of the saxifrage family, native to northern Europe, and Asia. It has been cultivated in Europe since the early middle ages for its black, strongly scented, berry-like fruit. It is now widely grown in Canada but only sparingly in the United States. The unpleasant odor and taste of the raw fruit are removed by scalding. In France large quantities of *liqueur de cassis* are made from it. The native North American black currant (*R. floridum* or *americanum*), possessing similar qualities, is sparingly cultivated.

Owing to the fact that this and other species of *Ribes* are intermediate hosts of the white pine blister rust, a deadly fungous disease of all 5-leaved pines, the sale and distribution of currant and gooseberry bushes have been greatly curtailed. See *Gooseberry*.

Currant, Red (*Ribes rubrum*). A small shrub of the saxifrage family, native to northern temperate regions. It is highly esteemed for its agreeable, acid fruit, which is extensively used for jellies. In Europe, the cultivation of the red currant began early in the middle ages, though it was but little known in England until after 1600. It is now very widely grown in fruit gardens in the northern United States and Canada. As with the black currant, this fruit is much less cultivated than formerly because of the threat it carries to white pine. See *Gooseberry*.

Cypress (*Cupressus*). A genus of coniferous trees. The European cypress (*C. sempervirens*) is a dark-colored evergreen, with extremely small, scalelike leaves entirely covering the twigs. Cypress trees, though of a somewhat somber appearance, may be used with great effect in shrubberies and gardens. They are much valued also on account of their wood, which is hard, compact, and very durable, of a reddish brown color and a pleasant smell.

The Monterey cypress (*C. macrocarpa*) is native to a few miles of shore (Cypress and Pinos points) near Monterey, California, whence all the trees of this species, now widely planted for ornament in America and Europe, were originally obtained. The bald cypress (*Taxodium distichum*), of the southern United States and Mexico, is a deciduous-leaved species, highly prized for its valuable timber, which, under water, is almost imperishable. In the swamps of the southern United States this cypress constitutes forests hundreds of square miles in extent. See *Big Trees*.

Dahlia. A genus of perennial plants of the composite family, native to Mexico and Central America, and named in honor of Dahl, a Swedish botanist. Dahlias were first brought to Madrid in 1789, and from two species, *Dahlia variabilis* and *Dahlia juarezii*, have been derived the immense number of handsome kinds now in cultivation. In the wild state the dahlia is a stiff, formal flower with 8 red rays about a yellow center. But, under cultivation, dahlias are produced in a great variety of colors and shapes. Some are compact and spherical, others have large, flat petals, while the beautiful cactus dahlias have double blossoms with twisted rays. After frost in the autumn the tuberous roots are dug and stored in cellars, like potatoes, to be planted in the spring for the next season's flowering.

Dandelion (*Taraxacum officinale*). A common, stemless plant of the composite family. The smooth, erect, hollow flower stalk rises from the center of a rosette of leaves. It bears a bright yellow flower head, followed by a "blow-ball" of feathered seeds, which are blown everywhere by the wind. The whole plant contains a bitter, milky juice.

Originally a native of Europe and Asia, the dandelion is now very widely naturalized in temperate countries, and often immensely abundant as a weed, particularly in the eastern United States. It is used to some extent as a potherb and for salads. Medicinal qualities are ascribed to the root, which is sometimes used to adulterate coffee. The name dandelion means "tooth of a lion," referring to the irregular, jagged teeth on the leaves.

In the spring the dandelion is an exceedingly valuable plant to commercial beekeepers. It furnishes large quantities of nectar and pollen when most needed by the bees for rearing their brood.

Date Palm (*Phœnix dactylifera*). A large tree of the palm family, native of the oases in the deserts of southwestern Asia and northern Africa. In height it ranges from 40 to 80 feet and bears at its summit a crown of large, pinnated leaves. The fruit is produced in huge clusters, a single tree frequently yielding 300 to 500 pounds. In Egypt and Arabia the date palm has been cultivated for its valuable fruit for more than 4000 years. It is mentioned in Herodotus and is the palm of the Bible. This palm is an important source of wealth in Mediterranean countries, producing, in addition to the date of commerce, oil, fiber, and wood. Its cultivation has extended to Italy, France, China, and southwestern United States. American production exceeds one million pounds annually and is of exceptionally high quality. See *Palm*.

Deodar (*dē'ō-där'*) (*Cedrus deodara*). A magnificent cedar of the Himalaya mountains, called also the "god tree." It sometimes grows to a

height of 70 feet without branching, the trunks attaining great size. The close-grained, perfumed, highly resinous wood is much used for building. The deodar is often grown as an ornamental tree; it is also much planted in California for shelter belts about orange groves. See *Cedar*.

Desert Plants. Without special modifications of their structure, plants living in a very dry atmosphere would soon wither and die. Some desert plants are protected by a covering of densely matted hairs. Others are covered with scurfy scales or with waxy or resinous exudations. Still others have highly specialized structures guarding the breathing pores of the leaves. Many desert plants are bulbous, especially the biennials, and quickly wither down to the ground after a brief period of growth. Some, such as the cactus, century plant, and aloe, have fleshy leaves or stems in which a supply of water is stored. However, the great majority of desert perennials are shrubby or woody.

Besides perennials and biennials, desert vegetation usually includes a large number of short-lived annuals. These spring up with great rapidity after the scant rains. They often grow to maturity and ripen their seeds within a period of a few weeks. Then they quickly perish, leaving their seeds to be scattered broadcast by the winds. See *Alpine Plants, Aquatic Plants*.

Dogwood, Flowering (*Cornus florida*). A small tree of the eastern United States, rarely over 30 feet high. The true flower is greenish-yellow and inconspicuous, but is surrounded by four or more white or pink bracts. These bracts are showy and lend conspicuous beauty to the tree in the spring. The dogwood is the state flower of Virginia.

Douglas Fir (*Pseudotsuga taxifolia* or *P. mucronata*). A valuable timber tree of the pine family, called also red fir and Douglas spruce. It has some of the characteristics of the hemlocks and the firs but most closely resembles the spruces.

Except the great sequoias of California, the Douglas fir is the most gigantic tree of Pacific Coast forests. Under the most favorable conditions of growth, it often attains a height of 180 or 190 feet and a trunk diameter of from 3½ to 6 feet. Occasionally, the tree reaches a height of 250 feet, with a trunk diameter of 10 or 12 feet. It grows from British Columbia to South Dakota and southward to Texas and Mexico, attaining its greatest development in Oregon and Washington. In the two last-named states it forms immense forests, furnishing the strong structural timber known as "yellow fir" or "Oregon pine."

The Big-cone Spruce (*P. macrocarpa*), 30 to 90 feet high, grows on southern California mountains. It is remarkable for its large cones, sometimes 3 inches thick and 7 inches long, which hang downward from the widely spreading branches. This species is a valuable covering tree on dry mountain slopes. See *Fir, Hemlock, Spruce*.

Dutchman's-pipe (*Aristolochia macrophylla*). A slender, twining vine of the birthwort family. It grows sometimes 30 feet long, has broad heart-shaped leaves, and bears curved, somewhat pipe-shaped, purple-brown flowers. This quaint plant, which is native to rich woods from Pennsylvania to Minnesota and southward to Georgia and Kansas, is often planted for ornament.

Ebony (*Diospyros ebeneum*). A large tree of the ebony family, native to India, Ceylon, and other tropical regions. It produces a hard, heavy, durable, intensely black heartwood, susceptible of a fine polish, highly prized by cabinetmakers. Ebony is used in making various instruments and as a veneer. Various other species of *Diospyros* furnish ebony of a less excellent quality, including the native American persimmons (*D. virginiana* and *D. texana*), of the Southeastern states and Texas. See *Persimmon*.

Edelweiss (*ā'dĕl-vīs*) (*Leontopodium alpinum*). A beautiful perennial of the composite family. It grows about 6 inches in height, with sage-green leaves and dense heads of silver-white flowers surrounded by woolly bracts. Edelweiss is native to high mountains in Switzerland, where it is protected by law. It has become famous because of its rarity in the Alps and on account of the dangers involved in obtaining it. The plant, however, thrives in cultivation, and is now grown in gardens in Europe and America.

Eggplant (*Solanum melongena*). An annual plant of the potato family, called also aubergine and guinea squash. It has somewhat woody stems, usually less than 2 feet high, and prickly leaves. The eggplant is a native of India, where it has been grown since remote antiquity for its large, white or dark purple, fleshy fruit. This is sometimes 6 or 8 inches in diameter and is used as a vegetable. Through long cultivation the eggplant has become an important garden product in the East Indies. It is easily grown in many parts of the United States, particularly in the South, and its cultivation is increasing.

Eglantine (*ĕg'lăn-tīn*). A poetic name of the sweetbrier rose (*Rosa rubiginosa*). It has fragrant foliage and is often grown in gardens. A climbing West Asian rose (*R. eglanteria*), which has ill-scented yellow flowers, is likewise known as eglantine. The fruits of the sweetbrier and other roses are known as "hips." In Norway and other European countries these hips are collected and used as an article of food. See *Rose*.

Elder (*Sambucus*). A genus of shrubs and small trees of the honeysuckle family. There are about 25 species, widely distributed throughout the world. Of these, several are North American.

The common elder (*S. canadensis*) is a shrub with pithy stems, 4 to 10 feet high. It bears creamy white flowers appearing in June, and dark purple, edible berries. This elder grows from Nova Scotia to Manitoba and southward in the United States. The Simpson elderberry (*S. simpsonii*), of southern Florida, formerly thought to be a southern form of the preceding shrub, is a veritable tree, often a foot in diameter. The red-berried elder (*S. racemosa*) is a shrub 2 to 12 feet high, with white flowers appearing in April or May, and red, inedible berries. It occurs from Newfoundland to California and northward to Alaska.

The Mexican elder (*S. mexicana*), a tree 25 to 30 feet high, with creamy white flowers, appearing in March, and black fruit, is found from western Texas to California. The blue-berried elder (*S. glauca*), a widely branching tree, 30 to 50 feet high, with blue-black, pleasantly acid fruit, grows from British Columbia and California eastward to Utah.

Many species of elder possess medicinal qualities, the fresh fruits are used in making elderberry wine, and a perfume is made by distilling the flowers.

Elecampane (*ĕl'ē-kăm-pān'*) (*Inula helenium*). A tall, stout, herbaceous plant of the composite family, native to Europe and naturalized in America. It sometimes grows 6 feet high, has coarse, wrinkled leaves clasping the stem, and bears large yellow flowers which appear in late summer. The root contains an aromatic, acrid resin used in medicine.

Elm (*ĕlm*) (*Ulmus*). A genus of trees of the elm family common to all north temperate regions except western North America. The English elm (*U. campestris*), 60 to 80 feet high, found throughout Europe, West Asia, and North Africa, has been extensively planted in the eastern United States. The compact, durable wood is superior to that of any other elm. The smooth-leaved or Huntington elm (*U. glabra*), native of Europe, is also used as a shade tree in America, as are the Scotch elm (*U. montana*), a rough-leaved species of northern Europe, and the Camperdown elm, which has a low, broad, umbrella-shaped crown.

The American or white elm (*U. americana*), a magnificent, widely branching tree, sometimes 120 feet high, with a huge buttressed trunk 6 to 11 feet in diameter, grows in river bottoms from Newfoundland to the Rocky mountains and southward to Texas. The Washington elm which was at Cambridge and a large elm formerly on Boston Common rank as famous examples. The tough, coarse-grained wood, very difficult to split, is used for piles, flooring, and wheel hubs, and also in cooperage.

The red or slippery elm (*U. fulva*), 60 to 70 feet high, with a trunk sometimes 2 feet in diameter, grows on stream banks and forest hills from Quebec to North Dakota and southward to Florida and Texas. The dark red, straight-grained wood is more valuable for various uses than that of the white elm. The mucilaginous bark is used for various purposes in medicine.

The wahoo elm, or winged elm (*U. alata*), a rather slender tree 40 to 50 feet high, with branchlets often bearing 2 thin, corky wings, grows chiefly in moist uplands in the Southern states. It is often planted as a shade tree as far north as Maryland. The cork elm (*U. thomasi*), sometimes 80 to 100 feet high, with branchlets usually clothed with 3 or 4 thick, corky wings, occurs from Quebec to Wisconsin and southward to New Jersey and Missouri. The cedar elm (*U. crassifolia*), with small, leathery leaves, often grows 80 feet high. It occurs from Texas and Arkansas to Mississippi and Mexico and is the common elm tree of Texas.

Endive (*ĕn'dīv*; *-dĭv*) (*Cichorium endivia*). An annual or biennial, somewhat bitter plant of the composite family, closely related to chicory. It is a native of the Mediterranean region where it has long been cultivated, perhaps since Greek and Roman times, as a salad plant. It is grown like lettuce and is blanched for use by tying the root leaves together at the top.

Epiphytes (*ĕp'ĭ-fītz*). Plants which grow upon the surface of other plants for mechanical support but which do not obtain nutriment from their sap or growing tissues as do parasitic plants. Epiphytes are most abundant in warm, moist regions. Various mosses and lichens are epiphytic as are an immense number of tropical orchids and arums. The so-called Spanish moss (*Tillandsia usneoides*), a true flowering plant, which hangs in festoons from live oaks in the Southern states, is a good example of an epiphyte. See *Parasitic Plants.*

Eucalyptus (*ū'kă-lĭp'tŭs*). A numerous genus of trees of the myrtle family, comprising about 300 species, mostly natives of Australia and Tasmania. Many of these are popularly called gums or gum trees. They are usually trees of striking appearance and give a characteristic aspect to the forests of which they form a most valuable part. The leaves, which contain much volatile oil, are entire, leathery in texture, hang obliquely on their stalks, and are usually placed with their edges to the sun. The various species furnish excellent timber adapted to nearly every requirement. Some produce a kind of sugar and others yield kino, tannin, and the eucalyptus oil widely used in medicine. Certain species are exceedingly rapid growers, and several attain immense size. The Great Gum, or Peppermint Tree (*E. amygdalinus*), one of the tallest of trees, has been known to reach a height of 346 feet.

About 70 species of eucalyptus are grown for timber or ornament in California, Arizona, and Florida. Among these are the blue gum (*E. globulus*), the sugar gum (*E. corynocalyx*), the gray gum (*E. tereticornis*), the red gum (*E. rostrata*), the branched gum (*E. viminalis*), and the desert gum (*E. rudis*). See *Big Trees, Blue Gum.*

Evergreen. A tree or plant which remains verdant throughout the seasons. The commonest examples are the conifers, but not all conifers are evergreens. See *Cedar, Deodar, Douglas Fir, Hemlock, Juniper, Larch, Laurel, Pine, Spruce.*

Everlasting. The name given to various plants of the composite family whose flowers retain their form and color for long periods after being gathered and dried. Various species of *Helichrysum*, called also immortelles, are often cultivated. The pearly everlasting (*Anaphalis margaritacea*), a beautiful wild species, grows in dry woodlands from Newfoundland to Alaska and south to Oregon and Kansas.

Feijoa (*fā-zhō'ȧ*) (*Feijoa sellowiana*). A small tree of the myrtle family sometimes 15 feet high. It is native to Brazil, Paraguay, Uruguay, and Argentina, and is closely related to the guava. The feijoa has olive-like leaves, glossy green above and silver-gray beneath, and large flowers, white outside and purplish crimson within. The oval, dull green fruit is marked with crimson. It is about two inches long, with a translucent melting pulp and a delicate pineapple flavor for which it is very highly esteemed. The feijoa was introduced into cultivation in southern Europe in 1890. It was brought to the United States about 1900, and is now widely planted in California.

Ferns (*Filices* or *Filicales*). The highest group of the flowerless or non-seed-bearing plants, comprising about 5000 species, very widely distributed throughout the world but most numerous in humid tropical regions. In size they range from minute, mosslike plants to treelike forms rivaling the palms. Ferns are leafy plants, often strikingly beautiful in outline and texture, varying from delicate, filmy structures to vigorous, luxuriant growths.

In ordinary ferns, only the leaves, properly called *fronds*, are seen above the ground. The fronds are borne on more or less lengthened stalks, known as *stipes*, which usually rise from a nearly horizontal underground stem or *rhizome*. In tree ferns, the fronds form a rosette at the summit of a hollow arborescent trunk.

The method of reproduction in ferns is very interesting. The leafy plant never produces structures corresponding to flowers with stamens and pistils. It is, therefore, *asexual*. But, on the under side of the fronds of typical ferns are borne groups (*sori*) of little brownish structures, called *sporangia* or spore cases. In these are developed countless, exceedingly minute bodies, known as *spores*. Each spore consists of a single plant cell and is totally unlike a seed. When the spores have ripened, the spore cases split open, scattering abroad the spores. Upon falling on moist earth, these germinate and grow, not into leafy fronds, but into minute flattened bodies, called *prothallia*. These tiny prothallia bear organs corresponding to flowers, and are therefore *sexual*. They produce egg cells and antherozoids which, by a process of fertilization similar to that effected by the stamens and pistils of higher plants, develop an entirely new plant organism. In time this grows into the asexual leafy fern, which, in its turn, bears spores. This regular recurrence of asexual and sexual forms in the life history of a plant is known as the *alternation of generations*.

Ferns occur in greatest variety in moist tropical or subtropical islands, as, for example, in Hawaii, Samoa, the Philippines, and New Zealand. In the United States and Canada there are about 300 kinds of native ferns. In the island of Java there are nearly 600 species. The state of New York, about equal to Java in area, has only about 50 wild species. Among the best-known ferns growing in the United States and Canada are the bracken, maidenhair, spleenwort, polypody, adder's tongue, lady fern, shield fern, sword fern, Christmas fern, New York fern, royal fern, ostrich fern, sensitive fern, climbing fern, hay fern, chain fern, walking fern, deer fern, and gold fern.

On account of their graceful foliage, many ferns are widely cultivated for ornamental purposes. The bracken is sometimes used for thatch and the oil extracted from the male fern is used in medicine. See *Bracken, Maidenhair.*

The black walnut grows widely over the eastern half of the United States and southern Ontario. A valuable furniture wood, it is also the leading wood for gunstocks. It rises to 60 feet or more. Black walnut has beautiful grain and is easily worked.

The American Basswood, sometimes called linden or beetree, is a large tree found generally in northeastern states. It may rise to 75 feet.

AMERICAN TREES

Ponderosa pine trees are found in all the Rocky Mountain and Pacific Coast States, as well as Canada.

The redwood trees in Humboldt County, California are the world's tallest trees. One towers to 364 feet.

An important timber tree and a leading native pulpwood is the shortleaf pine. The State tree of Arkansas.

Chief source of delicious maple sirup is the sugar maple tree, which also stands third as a producer of hardwood lumber.

A most outstanding and beautiful shade tree is the American elm. Under city conditions it will live from 70 to 100 years and attain heights of 50 to 100 feet.

SOME WILD FLOWERS OF AMERICA

1—New England Aster
2—Golden Buckwheat
3—Flowering Dogwood
4—Oswego Tea
5—Black-eyed Susan
6—Bush Morning-Glory
7—Azalea
8—Mountain Laurel

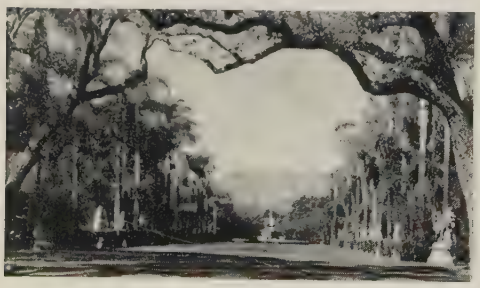
SOME WILD FLOWERS OF AMERICA

9—California Poppy
10—Columbine
11—Leopard Lily
12—Bluebonnet
13—Meadow Phlox
14—Indian Paintbrush
15—Spiderwort
16—Prickly Pear Cactus

Boxwood garden located on the estate of George Washington in Mount Vernon, Virginia. Upon entering the estate, the garden lies to the left of the Bowling Green and is dominated by the rows of Boxwood hedges believed to have been planted in 1798.

Above Historic Orton Plantation near Wilmington, North Carolina. The gardens and the moss-covered trees have delighted tourists for four decades.

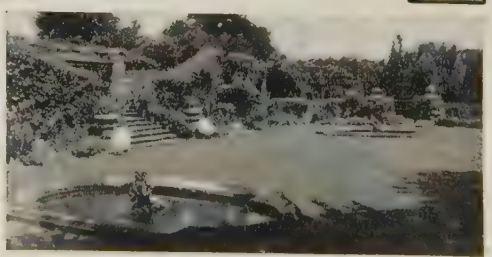
The garden and home of George Wythe in Williamsburg, Virginia. George Wythe was the first professor of law in America and his home was the headquarters for General Washington before the siege of Yorktown.



The truly magnificent North Vista of the Henry E. Huntington Botanical Gardens in San Marino, California. Stately trees planted in nearly perfect rows frame both sides of the vista.

FAMOUS GARDENS

The fountains viewed from the front of the Longwood Conservatory and Gardens in Kennett Square, Pennsylvania. These are the public gardens of the Du Pont family.



The gardens at Dumbarton Oaks, Washington, D. C., are a public showplace. The Dumbarton Oaks Estate and Library are now owned by Harvard University.

Fig (*Ficus carica*). A tree of the mulberry family, 15 to 30 feet high, with large, rough, deeply lobed leaves. It is a native of western Asia and the Mediterranean region, where, since prehistoric times, it has been extensively grown for its valuable fruit. The fig is pictured in Egyptian pyramids and its cultivation by the Greeks is mentioned by Homer, Herodotus, Aristophanes, Plato, and Theophrastus.

The fig is an oblong or pear-shaped fruit, about the size of a small peach. It is green, yellow, red, or blue-black in color, and, when ripe, very pulpy, juicy, and pleasant flavored. It is eaten fresh, canned, preserved, or, most commonly, when dried. The dried figs of commerce, which are nearly as nutritious as dates, are obtained chiefly from Asia Minor, especially from the vicinity of Smyrna. Since 1899 figs of Smyrna quality have been grown in California, where, in 1920, the production of dried figs exceeded 20 million pounds. Figs are grown also in Texas and other Gulf states.

The golden fig (*F. aurea*) and the poplarleaf fig (*F. populnea*) are small trees found in Florida and adjacent islands. Their fruit is unimportant.

Fir (*Abies*). A genus of large, handsome, evergreen trees of the pine family, some of which attain immense size. There are about 25 species, mostly native to northern mountain regions. The firs have more or less conical-shaped crowns, linear, flat, scattered leaves, and bear large cylindrical cones erect on the uppermost branches. The firs are peculiar in having blister-like cavities in the trunk bark which contain a honey-like oleoresin used in medicine and in the arts. The resin is obtained by puncturing the "blister" and forcing the fluid to flow into a wide-mouthed bottle. The cones of firs differ from those of spruces in having deciduous scales which fall away from a central woody stem when the fruit is ripe.

The balsam fir (*A. balsamea*) is a rather widely branching tree, 50 to 60 feet high, with fragrant, resinous leaves, growing from Labrador to Alberta, southward to Minnesota, and in the mountains to Virginia. It is the source of the valuable oleoresin known as Canada balsam.

The silver fir (*A. amabilis*), a handsome tree, native to the Olympic and Cascade ranges from Oregon to British Columbia, often attains a height of 250 feet, with a trunk 4 to 6 feet in diameter. The lowland white fir (*A. grandis*), sometimes 300 feet high, grows in valleys from Montana, Idaho, and British Columbia through Washington and Oregon to California. The red fir (*A. magnifica*), of the Sierra Nevada, is a beautiful tree often 200 feet high, with a trunk 4 to 6 feet in diameter. A variety of the red fir, the Shasta fir, occurring on Mt. Shasta, bears cones with exserted bracts.

The white fir (*A. concolor*) occurs from the Rocky mountains to the Sierra Nevada where it sometimes grows 250 feet high, with a trunk 6 feet or more in diameter. The noble fir (*A. nobilis*) forms extensive forests in the mountains of Oregon and Washington, whence it extends to northern California. It is a handsome tree, commonly 150 to 200 feet high, but sometimes reaching 250 feet, with a trunk diameter of 6 to 8 feet.

Unique among all of our native firs is the bristlecone fir (*A. venusta*), found only in a few narrow canyons in southern California. It is a handsome but little known species, with unusually long, sharp-pointed, glossy leaves, and long, bristle-like bracts extending from the cone scales.

While, with the exception of the noble fir, the wood of most of the firs is much inferior to that of pine or spruce, it is used for lumber, pulpwood, and various other purposes. See *Douglas Fir*.

Flax (*Linum*). A fiber and seed plant of great importance, cultivated since very ancient times in the Old World, and now widely grown in the New. The common flax (*L. usitatissimum*) grows wild in western Asia. It is an erect, narrow-leaved annual with a slender stem, 2 or 3 feet high, which branches near the top where it bears many handsome, bright blue, nodding flowers. These are followed by small, globular, many-celled pods, containing very smooth, flattened, brownish seeds, the linseed of commerce, from which linseed oil is obtained. Since the dawn of history various kinds of linen cloth, thread, cordage, and rope have been made from the fiber of flax stems. The mummies found in the most ancient Egyptian tombs are wrapped in cloth woven from the narrow-leaved flax (*L. angustifolium*).

Flax is grown in vast quantities for fiber in Russia, Hungary, Belgium, Holland, France, and Ireland. Russia usually produces about half the world's crop, though western Europe contributes the finer grades. Comparatively little effort has been made to produce flax fiber in the United States. The world's commercial crop of flaxseed or linseed is grown in about equal proportions by the United States, Canada, Argentina, India, and Russia. In the United States, North Dakota, Montana, Minnesota, and South Dakota lead in production. In Canada, Saskatchewan is the chief producer. See *Cotton*, *Hemp*, *Jute*, *Manila Hemp*, *Sisal*.

Forget-me-not (*Myosotis*). Low, more or less hairy, branching herbs of the borage family. They bear alternate, entire leaves and small blue, pink, or white flowers in stemless, one-sided racemes. There are about 35 widely distributed species, several of which occur in the United States and Canada. Various species are cultivated for their delicately beautiful flowers, which long have been regarded as emblematic of friendship. Among the best known of these is the true forget-me-not (*M. scorpioides*). This plant is a native of Europe and Asia, now widely grown in gardens in temperate countries. It has escaped from cultivation and become naturalized from Newfoundland southwestward to Tennessee.

Foxtail Grass. A common name for various grasses. The true meadow foxtail (*Alopecurus pratensis*), an excellent European pasture grass, has become naturalized in eastern North America. Jointed foxtail (*Alopecurus geniculatus*), native of Europe and Asia, now widely introduced in moist soils, is highly prized by cattle. The yellow foxtail (*Setaria glauca*) and the green foxtail (*Setaria viridis*), both naturalized from the Old World and often called pigeon grass, are extremely abundant everywhere as field and wayside weeds.

Fuchsia (*fū'shĭ-ȧ*; *fū'shȧ*). A genus of climbing plants, shrubs, and trees of the evening-primrose family, named in honor of the botanist, Leonhard Fuchs. There are about 70 species, mostly native to tropical America. Several varieties are cultivated for their handsome flowers, which occur in many forms and colors.

Fungi (*fŭn'jī*). A large class of flowerless plants, comprising, with the *Algæ*, the lowest primary division of the plant kingdom, known as thallophytes. Fungi range in size from the minutest organisms known to threadlike masses several feet long. They are either *parasitic*, deriving their nutriment from living plants and animals, or *saprophytic*, deriving their sustenance from dead or decaying organisms.

It is estimated that there are more than 250,000 species of fungi, of which only about one-third have been described. Fungi are usually classed in five divisions: *Myxomycetes*, or slime molds; *Schizomycetes*, or bacteria; *Phycomycetes*, or alga-like fungi; *Ascomycetes*, or sac fungi, including molds and mildews; and *Basidiomycetes*, or basidium fungi, including rusts, smuts, puffballs, and mushrooms. Some authorities, however, place the slime molds in a separate class, distinct from the fungi; others regard them as animals (*Mycetozoa*) and group them with the protozoa.

Some fungi, such as truffles, morels, puffballs, and various mushrooms, are edible. Others, such

as the deadly amanita and the fly amanita, are most violent poisons. Many kinds are extremely destructive to grain, garden, and fruit crops, as, for example, the smuts, rusts, mildews, and molds. Numerous species, particularly the pathogenic bacteria, produce diseases in man and animals. Those fungi which transform dead animal and vegetable matter into food for living plants are highly beneficial. See *Bacteria*, *Mushrooms*, *Yeast*.

Garlic (*Allium sativum*). A bulbous-rooted perennial of the lily family, closely allied to the onion, and native to western Asia. Garlic has been cultivated since ancient times, being mentioned by Herodotus and in the Bible. It is grown for the root, which consists of several small bulblets popularly called "cloves." These have a powerful, onion-like odor and a pungent taste. In southern Europe, garlic is very generally used as a flavoring agent in cooking. See *Leek*, *Onion*.

Gentian (*jĕn'shăn*) (*Gentiana*). Herbs of the gentian family, native to cool temperate and arctic regions, and noted for their beautiful blue or sometimes yellow flowers. There are about 300 species, some 40 of which occur in North America. The yellow gentian (*G. lutea*), of alpine Europe, is valued for its medicinal root. The root of the soapwort gentian (*G. saponaria*), a blue-flowered species of the eastern United States, is similarly used. The fringed gentian (*G. crinita*), with a conspicuously fringed, bright blue corolla, is one of the most beautiful American wild flowers. It is found in moist meadows from Quebec to Minnesota and southward to Georgia. The closed gentian (*G. andrewsii*), of similar range, with a closed, somewhat bottle-shaped blue flower, is now cultivated in gardens.

Geranium. A genus of herbs belonging to the family of the same name. There are about 190 species, found in temperate regions, about 60 of which occur in North America. They bear regular flowers, usually pink, red, purple, or white, and palmately lobed or divided leaves, often with a pungent odor.

The Wild Cranesbill (*G. maculatum*), growing from Newfoundland to Manitoba and southward, with rose-purple flowers over an inch broad, is an attractive wild flower of woodlands in spring. The rootstock is used in medicine for its tonic and astringent properties. The Carolina Cranesbill (*G. carolinianum*), found throughout the continent, is a small, stout annual with deeply cleft leaves and bearing clusters of small pinkish flowers.

The hardy, handsome house and garden plants popularly known as geraniums have been developed from various species of *Pelargonium*, introduced from South Africa.

Giant Grubi (*Amorphophallus titanum*). A plant native to Sumatra which has the largest flower known. The flower, resembling a gigantic morning glory with fluted sides and ruffled edges, is from three to four feet across, deep maroon within and a light green outside. The flower is borne on a thick stalk which rises from a fleshy corm.

Ginger (*Zingiber officinale*). A herbaceous plant of the ginger family. It has been cultivated in the East Indies since time immemorial, and is now grown in the West Indies and other tropical countries for its fleshy pungent rootstock. This, when dried, is the ginger of commerce. The unscraped rootstock is known as black ginger and the scraped and peeled rootstock as white ginger. Candied ginger, a delicious sweetmeat, is made of the young rootstock preserved in sugar. Essences and sirups of ginger are used in flavoring. Various preparations are employed as a stimulant.

Ginkgo (*gĭngk'gō*; *jĭngk'gō*) (*Ginkgo biloba*). A beautiful tree, often called maidenhair tree, long grown around temples in China and Japan, now widely planted as an ornamental tree in all civilized countries. In the eastern United States it is cultivated as far north as the Great Lakes. It is slender and slow-growing, with a central shaft and widely spreading, ascending branches, and sometimes attains a height of about 100 feet. In form and appearance the fan-shaped, deciduous leaves strongly resemble those of the maidenhair fern. The filbert-like seed of its vile-smelling, plumlike fruit is parched and eaten by the Chinese.

In cultivation the ginkgo has been a familiar tree for many centuries. Its native country, however, was unknown to scientists until the tree was recently discovered growing wild in remote districts of western China. The ginkgo is the sole surviving representative of the numerous ancient gymnosperms called *Ginkgoales*, which were most abundant during the Jurassic period.

Ginseng (*jĭn'sĕng*) (*Panax*). A genus of small perennial plants of the ginseng family, whose roots are very highly esteemed as a medicine by the Chinese. The native East Asian species (*P. ginseng*), one to two feet high, bears five smooth leaves, inconspicuous flowers, and scarlet fruit. Roots which, when dried, assume the shape of the human form are said to have been sold for their weight in gold. The discovery, in 1716, of the very similar American ginseng (*P. quinquefolium*), native of the Northeastern states and Canada, soon led to a large export to China of the wild roots, which became increasingly scarce and valuable. All attempts to cultivate the American ginseng failed until 1885 when George Stanton grew it successfully at Apulia, N. Y.

Gladiolus. A genus of bulbous plants of the iris family. They are mostly natives of the Cape of Good Hope, whence many handsome-flowered species have been introduced into general cultivation. Southern Europe formerly furnished the world with gladiolus bulbs, but the United States now contributes by far the greater part of the supply. The plural of gladiolus is gladiola.

Goldenrod (*Solidago*). A genus of perennial herbs of the composite family. They bear a profusion of small, bright yellow flowers which blossom in late summer or early autumn. There are about 125 species, mostly native to North America, only one kind being found in Europe. They range in height from a few inches to 6 or 8 feet and grow in a great variety of situations, occurring in forests, swamps, prairies, along streams and roadsides, and on high plains and mountains. By reason of its beauty and wide distribution in the United States, the golden rod is styled the national flower. Several states have chosen it as a floral emblem.

Goldenseal (*Hydrastis canadensis*). A small, erect herb of the crowfoot family, called also orange-root, yellowroot, turmeric root, and puccoon. The plant grows about a foot high with a thick, yellow rootstock and palmately lobed leaves. It bears a solitary, greenish white flower, blossoming in April in its native woodlands in the eastern United States and Canada. Goldenseal is widely used in medicine as a tonic. The plant also yields a yellow dye.

Goldthread (*Coptis trifolia*). A beautiful little plant of the crowfoot family. It has tufted stems, evergreen leaves, white flowers, and a bright yellow, threadlike, bitter rootstock, from which a tonic medicine is extracted. It grows in damp woods and bogs from Newfoundland to Tennessee and northwestward to Alaska.

Gooseberry (*Ribes*). A genus of the saxifrage family embracing many species of prickly shrubs, native to the North Temperate Zone. These bear a nearly round, pulpy berry, usually about one-third of an inch in diameter, light green in color and very acid when immature, but usually purplish brown and sweet when fully ripe. The fruit of several species has been greatly improved by cultivation.

The European gooseberry (*R. grossularia*), which became generally cultivated in Germany and Holland about the year 1500, reaches perfection in England. Since 1890 it has been grown to a limited extent in the United States. The cultivated American gooseberry originated in Massachusetts about 1850 from a seedling of a common native species (*R. oxyacanthoides*). Gooseberries are used chiefly in making jam, preserves, tarts, and pies. See *Currant* (*Black* and *Red*).

Grape (*Vitis*). A genus of the vine family, containing many climbing, woody vines. They have large, usually toothed or lobed and somewhat heart-shaped leaves, small, greenish flowers, and globular, berry-like fruit borne in dense clusters. There are about 50 wild species, widely distributed in temperate countries. Several species, improved by cultivation, yield excellent fruit.

The European grape (*V. vinifera*), commonly called the "vine," native of the Mediterranean region, was one of the first fruits cultivated by man. It was grown by the ancient Egyptians, by the Lake Dwellers of the Bronze age in Italy, and by the Phœnicians, Hebrews, Greeks, and Romans, reaching China as early as 120 B. C. This grape shares leadership with the apple among the chief fruits of the temperate zone. The cultivation of the grape has become extensive in every continent,—table grapes, raisins, currants, and wine being important articles of commerce in many countries. France, Italy, and Spain combined produce about three-fifths of the world's supply of wine. Spain leads in production of raisins in the Old World; California stands first in the New World. In value, the products of the European grape grown in California amount to approximately half the total grape products of the United States.

The American grape is the most important native fruit developed in the New World. About 20 species of wild grapes are found in the United States and Canada. From several of these, various cultivated forms have been produced. By far the most important ones, such as the Concord and Worden, have been derived from the northern fox grape (*V. labrusca*). In fact, this wild grape has furnished more cultivated varieties than all other native species combined. Therefore, when taken together with its many valuable varieties, this species may properly be styled the American grape. Since 1860 the culture of the American grape, for table use and for making grape juice, has become extensive in the eastern United States and Canada, especially in New York, Ohio, Pennsylvania, Michigan, and Ontario.

Besides adding an excellent new fruit, the introduction of the American grape has proved of inestimable value to the entire grape growing industry. Its root is resistant to the phylloxera, a terribly destructive insect pest, which formerly ravaged the choicest vineyards of the Old World. Millions of young American vines have been sent to various parts of the world to be top-grafted with the European grape. By replanting with European grapevines growing upon resistant American graperoots, the vineyards of the most important grape producing countries have been saved from impending destruction.

The American grape differs from the European, both in its manner of growth and in the character of the fruit. While the American grape is capable of enduring much colder climates than the European, the vines are more slender and slow-growing. In order to support the fruit, the American grapevine is usually trellised. The Old World vine, however, when properly pruned, develops a short, stout trunk which easily sustains a heavy load of ripened fruit. The American grape is very juicy, with a readily detachable skin, and the seeds are firmly embedded in the somewhat tough central pulp. The European grape has a firmly adhesive skin, less juicy but more uniformly tender pulp, and easily removable seeds.

By reason of containing much more sugar than the American grape, many Old World varieties can be made into raisins simply by drying them in the sun. Small, seedless varieties thus preserved are known as currants, a corruption of the name Corinth (Greece), where they have long been grown.

Grapefruit (*Citrus decumana*). A small tree of the orange family, native to the East Indies, cultivated upwards of 2000 years in India and Malaysia for its excellent fruit. The tree closely resembles the orange in appearance, but the fruit is much larger and is usually borne in clusters somewhat like bunches of grapes, whence the name, grapefruit. It is extensively grown in most tropical countries, under various names, such as pomelo, pummelo, pompelmous, and shaddock. After its cultivation became established in Florida and California, about 1900, grapefruit soon rose to popularity in the United States. The growing of grapefruit has recently been extended into subtropical sections of southern Arizona, where fruit of excellent quality is produced. See *Citrous Fruits*, *Orange*.

Grasses (*Gramineæ* or *Poaceæ*). A very important family of flowering plants, embracing about 4500 species, widely diffused and abundant throughout the world. Several hundred of these grow in the United States and Canada. All are herbaceous except a few, such as the bamboo, which have woody stems. Most grasses have round or somewhat flattened, usually hollow stems, solid at the joints, and alternate leaves with tubular sheaths, usually split on the side opposite the blade. The fruit is a seedlike grain, called a *caryopsis*, with a groove on one side.

In temperate and cold regions, the true stems of the perennial grasses form a thick, interlacing network below the surface of the ground, which is called turf or sod. From this are sent up annual growths or culms, popularly but inaccurately called stems. In warm regions, the stems of the perennial grasses grow erect, like annual grasses, and, consequently, no true turf is formed. Grasses are of inestimable value, furnishing the chief food plants used by man and by domestic animals. The group includes blue grass, red top, timothy, millet, sorghum cane, Kafir corn, sugar cane, barley, rye, oats, rice, wheat, and corn.

Greasewood (*Sarcobatus vermiculatus*). A much branched, somewhat spiny shrub of the goosefoot family. It grows from 2 to 10 feet high, with fleshy, entire, sessile leaves. Greasewood is a characteristic plant of strongly alkaline and saline soils from Montana to Mexico. The name is given also to certain species of saltbush (*Atriplex*) and to various other plants.

Ground Ivy (*Nepeta hederacea*). A small, creeping perennial herb of the mint family, called also Gill-over-the-ground. It has nearly round or kidney-shaped leaves and bears rather large blue or violet flowers in axillary clusters. This plant, native to Europe, is now widely naturalized in damp, shady places in the eastern United States and Canada.

Ground Pine (*Lycopodium*). The name popularly given to various species of club mosses. They have long trailing stems and numerous narrow, evergreen leaves, usually arranged in several ranks. The erect fruiting spikes produce sulphur-yellow, highly inflammable spores. Several species occur in moist woods in the eastern United States and Canada. Ground pines are extensively used for Christmas decoration. Lycopodium powder, composed of the spores of various species, is used in making fireworks and in medicine.

Guava (*gwä'vȧ*) (*Psidium guayava*). A small tree of the myrtle family, with blunt leaves and white, fragrant flowers, native to tropical America. The guava was in cultivation for its delicious fruit from Mexico to Peru at the time of the Spanish

discovery of those countries, and is now widely grown in tropical regions. Cultivation of certain varieties is also well established in Florida and California. The smooth, yellow fruit, about the size of a hen's egg, is extensively used for making jellies. These are now exported in considerable quantities from the West Indies.

Guayule (*gwä-yōō'lā*) (*Parthenium argentatum*). A small, densely branched, spreading shrub of the composite family, native to western Texas, New Mexico, and northern Mexico. When dried this plant yields about 10 per cent rubber, produced chiefly from the bark. The plant may be successfully grown under cultivation, and when so grown yields a much larger percentage of rubber. The Department of Agriculture in 1942 made test plantings of about 75,000 acres in California, Arizona, and New Mexico with a view to further commercial production.

Hackberry (*Celtis*). Trees and shrubs of the elm family, widely distributed in temperate and tropical regions. There are about 60 species, some 13 of which occur in the United States.

The common hackberry (*C. occidentalis*) is a handsome tree, sometimes 130 feet high, with a trunk 3 feet in diameter. This tree has ovate, sharply serrate, roughish leaves, and bears small, dark purple, thin-fleshed, berry-like, sweet fruit, ripening in autumn. It grows in river valleys from Quebec to Oregon and southward to Florida and Texas. It is much planted as a shade tree. The wood is sparingly used in making furniture.

The Sugarberry (*C. mississippiensis*) is a medium-sized tree, common from Kentucky, Indiana, and Illinois southward. This species is often used as a street tree in the South.

Hawthorn (*Cratægus*). A large genus of shrubs or small trees of the rose family, closely allied to the apple. They are usually spiny, with white or pink clustered flowers, and bear a small red or yellow pome fruit. There are several hundred species and hybrids, chiefly native to the United States, Mexico, and the Andes region. Over 250 species are native to the United States. Those producing conspicuous fruit are often called red haws. Various species are popularly known as thorns; as, for example, the Round-leaved Thorn (*C. chrysocarpa*).

The English hawthorn (*C. oxyacantha*), with its numerous varieties, bearing small, deeply lobed leaves and handsome white flowers, is a valuable hedge and ornamental plant. It is widely cultivated in the eastern United States and Canada, and is becoming sparingly naturalized.

Hazelnut (*Corylus*). A genus of shrubs and small trees, of the birch family, which bear a sweet, edible nut enclosed in two enlarged leaflike bracts. There are about 7 species, all native to the northern hemisphere.

The common hazelnut (*C. americana*) is a shrub 3 to 8 feet tall, with light brown nuts enclosed in bracts commonly broader than high. It grows in thickets from Maine to Saskatchewan and south to Florida and Kansas. The similar beaked hazelnut (*C. rostrata*), with nuts enclosed in bracts prolonged into a somewhat tubular beak, is found from Nova Scotia to British Columbia and south to Kansas. The California hazelnut (*C. californica*) grows commonly 6 to 10 feet high, with nuts enclosed in densely hairy bracts extended into a fringed beak. It occurs along streams, west of the Sierra Nevadas.

The filbert (*C. avellana*), a native of the Old World, is extensively cultivated in Europe for its excellent nuts.

Heliotrope (*Heliotropium*). A genus of herbs or shrubs of the borage family. They have entire leaves and small blue or white flowers, usually in more or less curled spikes. There are about 125 species, natives of warm regions, many of which have fragrant flowers and are highly prized in cultivation. The Peruvian heliotrope (*H. peruvianum*) is a small shrub, about 2 feet high, with lilac-blue flowers. It is widely cultivated for its vanilla-like fragrance. The European heliotrope (*H. europæum*), with small white flowers, is now naturalized in the eastern United States.

Hemlock (*Tsuga*). A genus of tall pyramidal trees of the pine family, native to North America and eastern Asia. Four of the seven known species occur in the United States and Canada. The common hemlock (*T. canadensis*), usually 60 to 70 feet high, with a trunk 2 to 4 feet in diameter, and bearing scattered, linear, petioled leaves and small, pendulous cones, occurs in upland forests from Nova Scotia to Minnesota and south to Georgia and Alabama. The bark is extensively employed in tanning leather, and the wood, while inferior to pine and spruce, is much used for building. The much smaller Carolina hemlock (*T. caroliniana*) occurs in the Blue Ridge mountains from Virginia to Georgia.

The western hemlock (*T. heterophylla*), a graceful and valuable timber tree, often 200 feet high, with a trunk 6 to 10 feet in diameter, occurs near the coast from Alaska to central California. The wood of the western hemlock is far superior in commercial quality to that of all other hemlocks. It is heavy, easy to work, and in other respects compares favorably with pine and spruce. Western hemlock lumber is now used for interior finish and in the manufacture of doors. It lacks entirely the splintery quality of the common eastern hemlock.

The mountain hemlock (*T. mertensiana*), 20 to 90 feet high, with fleshy, densely crowded leaves spreading around the branchlets, grows on high mountains from Alaska to California. The soft, very light wood is not commercially used.

Hemp (*Cannabis sativa*). An erect annual of the mulberry family, native to Siberia. It grows from 4 to 20 feet in height, has palmate, usually four-fingered, finely toothed leaves, and greenish yellow flowers. The leaves and bracts contain a strong narcotic known as marihuana.

Hemp has been cultivated since prehistoric times for the strong, durable fiber contained in its stems, valuable for making rope, other cordage, and coarse cloth. It is now grown in immense quantities in Europe, Russia leading in production. While of local importance in Kentucky, Indiana, and California, hemp production in the United States has greatly declined, owing to the increasing use of jute, manila, and sisal. Hempseed is widely sold as food for cage birds, and hempseed oil is used in cooking.

Various fibers are commonly called hemp, although obtained from totally different plants, such as sunn hemp, sisal hemp, manila hemp, and bowstring hemp. From the flowering tops of the Indian hemp (*Cannabis indica*) is obtained the narcotic intoxicant known as hashish.

Henna (*Lawsonia alba*). A shrub of the loosestrife family, native of tropical Asia. It has been cultivated as a dye plant in India, Arabia, and Egypt, since prehistoric times. The leaves yield an orange dye, extensively used in coloring hair and leather. Women in the Orient employ this dye to stain their nails. This custom dates back some 4000 years in Egypt, as is evidenced by pictures in ancient monuments and by mummies. The sweet scented flowers of the henna are used in perfumery and embalming.

Hickory (*Hicoria* or *Carya*). A genus of timber and nut trees of the walnut family. There are 43 species, varieties, and hybrids, all native to eastern North America. The wood of most species is heavy, strong, close-grained, and highly prized for many uses where strength and hardness are required. The fruit is a hard-shelled nut, usually of the size of a small walnut, and enclosed in a separate valved shell. In most species the nuts are sweet and edible.

The shagbark hickory (*H. ovata*) grows usually from 70 to 90 feet high. It has a straight trunk, 3 to 4 feet in diameter, and sheds its bark in long strips. This tree grows in rich soil from Quebec to Minnesota and southward to Florida and Texas. The wood is very highly valued and the sweet nut is the common hickory nut of the stores. Closely resembling the shagbark hickory, and with similarly valuable wood, is the Big Shellbark, or Kingnut (*H. laciniosa*), found in the Mississippi and Ohio valleys. This tree produces larger nuts than any other hickory.

The Pecan (*H. pecan*), sometimes 170 feet high with a trunk 6 feet in diameter, is native to the Mississippi valley. While the wood is less valuable than that of most hickories, the excellent nuts are a staple article of commerce, and many choice thin-shelled varieties are cultivated.

The Mockernut (*H. alba*), rarely 100 feet high, with close bark, heavy, hard wood, and sweet nuts, occurs on uplands from Ontario to Florida. The Pignut (*H. glabra*) sometimes attains a height of 90 feet. It has light gray bark, strong, tough wood, and a small nut, either bitter or sweet. This species grows on dry hillsides from Maine to Nebraska and southward to Florida and Texas. See *Walnut.*

Holly (*Ilex*). A genus of numerous shrubs and trees of the holly family, several of which have handsome evergreen foliage. There are about 280 species, mostly natives of the New World. Some 15 or more of these are found in the eastern and southeastern United States. A South American species furnishes the maté or Paraguay tea. Several hollies are widely planted for ornament.

The American holly (*I. opaca*) is a slow-growing tree, sometimes 40 to 50 feet high, with handsome, spiny, evergreen leaves and bright red berries, much used for Christmas decorations. It grows in rich woods from Maine to Texas, and is widely planted for ornament in the eastern United States. It is valued for its hard, white, fine-grained wood, used in cabinet work and wood engraving.

The Inkberry (*I. glabra*), a low shrub, from 2 to 4 feet high, with shining evergreen leaves and small black berries, grows in sandy soil, mainly near the coast, from Nova Scotia to Louisiana.

The evergreen leaves of the Dahoon (*I. cassine*), a native of the Southern states, are sometimes used for tea. The leaves of the Yaupon (*I. vomitoria*), another evergreen holly of the South, have long been used as an emetic. The brilliant red berries of both these plants are popular for Christmas decorations. See *Christmas Berry.*

Hollyhock (*Althæa rosea*). A perennial of the mallow family, native to India. It has a tall, unbranched stem, heart-shaped, wrinkled leaves, and large, showy flowers, which vary greatly in color. Numerous varieties are now cultivated for ornament in gardens. In Egypt the hollyhock is cultivated for its leaves, which, when young, are esculent and much used in Egyptian cookery.

Honey Dew Melon. A horticultural variety of the winter muskmelon (*Cucumis inodorus*), closely related to the Cassaba. It was introduced by John Gauger about 1911 into North America from southern France, where it is known as the White Antibes Winter. Mr. Gauger, who believed he had originated the species by cross breeding, gave it the name Honey Dew. The mature melon averages 5 or 6 pounds in weight, is 7 or 8 inches long, and about 6 inches in diameter. The rind is a creamy yellow when ripe, the flesh being a light green blending to white with a sweet taste. American production comes chiefly from the Imperial valley, California, and from Colorado.

Honey Locust (*Gleditsia triacanthos*). A handsome, thorny tree of the pea family, native to alluvial valleys from Ontario to Texas. It grows from 75 to 140 feet high with the trunk and limbs sometimes nearly covered with dense bunches of three-branched, sharp, strong thorns.

The tree bears conspicuous, broad, flat, beanlike pods 12 to 18 inches long, maturing in autumn. The bony seeds within these pods are surrounded by a sweet, jelly-like, edible pulp, whence the name honey locust and honey shucks. From the sugary pulp it is said that the Indians formerly fermented a much prized beverage. The honey locust has been widely planted in the eastern United States for hedges and as an ornamental tree. The red-brown, mahogany-like heartwood is suitable for cabinetwork. A thornless variety of this locust is occasionally found.

A similar southern species, the Water Locust (*G. aquatica*), is peculiar for its short, one-seeded pods. See *Locust Tree.*

Honey Plants. From the viewpoint of the beekeeper, plants that yield nectar accessible to the honeybee are honey plants. Many hundred species of North American plants are nectar secreting, but the truly important honey plants are few in number. In the United States and Canada the honey of commerce is derived mainly from alfalfa and various species of blackberry and basswood.

Among other valuable honey plants are buckwheat, important source of dark honey; white clover and alsike clover, ranking for quality among the best of all honey plants; various goldenrods, for autumn honey; mesquite, main source of honey in Texas; orange and palmetto, very important in Florida; red raspberry, important in the Northern states and in southern Canada; sage (*Salvia mellifera*), of great importance in California; also sourwood (*Oxydendron arboreum*), Spanish needles (*Bidens aristosa*), sweet clover, tupelo, and willowherb (*Epilobium angustifolium*).

The importance of these plants, chiefly wild species, can be understood only when the extent of the honey crop is known. In the United States, this crop amounts annually to more than 200,000,000 pounds.

Honeysuckle (*Lonicera*). A genus of erect or twining shrubs of the honeysuckle family. There are about 160 species, nearly all native to north temperate regions, more than 20 of which are found in North America. Fully half the species are in cultivation as ornamental plants. The trumpet honeysuckle (*L. sempervirens*), a climbing evergreen shrub, native to low grounds from Maine to Texas, is much cultivated for its scarlet or yellow, highly fragrant flowers.

The woodbine honeysuckle (*L. periclymenum*), an Old World species, with pleasantly scented flowers, is often planted in gardens. The Italian honeysuckle (*L. caprifolium*), native of Europe and much resembling the woodbine honeysuckle, has run wild in the eastern United States. The Tartarian honeysuckle (*L. tatarica*), a large, smooth shrub, with pinkish white flowers, native of Asia, has escaped from cultivation from Maine to Ontario and southward, as has the climbing or trailing Japanese honeysuckle (*L. japonica*). In the Atlantic Coast region from New York to North Carolina the latter species has become a nuisance. See *Woodbine.*

Hop (*Humulus lupulus*). A perennial climbing vine of the mulberry family, with hairy stems and rough, deeply lobed leaves, native to northern America, Europe, and Asia. Since the early middle ages the hop has been extensively cultivated for the resinous, leafy bracts which surround the female flower cluster. When properly gathered and cured, these form the hops used in brewing. The first mention of hop gardens was made by Pepin, father of Charlemagne, in 768. Hop growing was introduced into the United States in 1629. While cultivation is confined to certain favorable localities, the United States contributes a substantial part of the world's commercial supply of hops. California, Oregon, and Washington

usually produce about five-sixths of the American crop, the remainder being grown mostly in New York and Wisconsin.

Horehound (*Marrubium*). A genus of perennial, white-woolly herbs of the mint family. They have wrinkled leaves, small, white or purplish flowers in dense axillary clusters, and bitter juice. About 40 species are native to the Old World. The common horehound (*M. vulgare*) has become so thoroughly naturalized in many parts of the United States and Canada as to have the appearance of a native plant. The plant possesses medicinal properties and is widely used as a remedy for coughs, either in an infusion, in a sirup, or in candy. Horehound was known to Pliny and Columella as a medicinal plant. Its present wide distribution throughout the world is thought to be due to emigrants, who, believing in its curative properties, carried it far and wide.

Horse-radish. A perennial herb of the mustard family, native to eastern Europe. It has been cultivated since the middle ages for its pungent root, which is extensively used as a condiment. While the cultivated form is seedless, the plant spreads rapidly by its long roots. It has become widely naturalized in the United States.

Horsetail (*Equisetum*). A genus of flowerless plants, closely related to the ferns and club mosses, called also horsetail rush and scouring rush. Some 25 species are known, widely scattered throughout the world, about half of which are found in the United States and Canada. They have slender, fluted, many-jointed stems, from a few inches to 10 or 15 feet in height, with whorled, similarly jointed branches and leaves.

The common horsetail (*E. arvense*) is dangerously poisonous to horses. In Vermont, where horse raising is extensive, the annual loss of many animals is attributed to this plant.

The living horsetails are nowhere numerous and are of but little economic value, though the rough, silicious stems of some species are used for scouring and polishing. They are, however, of interest as composing a very small remnant of a once exceedingly numerous and varied group of plants which flourished in the Paleozoic and Mesozoic ages. Some of these were treelike in size and made up part of the vegetation from which coal was formed. Fossil horsetails are abundant in the rocks as early as the Devonian period.

Huckleberry. A name popularly given to various small shrubs of the heath family. It is properly applied, however, only to certain species of *Gaylussacia*, particularly to the black huckleberry (*G. baccata*). This shrub grows usually from 1 to 3 feet high, with resinous leaves, green on both sides. It bears small pink or red flowers, and small, sweet but seedy, shining, black fruit. It grows in sandy woods from Newfoundland to Manitoba and southward to Georgia. The various species of *Vaccinium* which have bluish fruit with a grapelike bloom, often called huckleberry, are properly called blueberries. See *Blueberry*.

Hydrangea (*hī-drăn'jē-ȧ*). A genus of ornamental shrubs of the saxifrage family, native to America and eastern Asia. There are about 35 species, 4 of which grow wild in the eastern and southern United States. Many handsome varieties are in cultivation. A dwarf form (*H. hortensiana*) is extensively grown in greenhouses.

Hydroponics. The growing of plants, particularly vegetables, in water; called also tray agriculture, tank farming, and water culture.

Iceland Moss (*Cetraria islandica*). A lichen which grows abundantly in Iceland, Norway, and other northern countries and is much used for food. The plant, which is usually less than four inches in height, has the appearance of a moss. Iceland moss is gathered in large quantities and forms an article of commerce. It is dried and crushed into a powder from which, after its bitter quality has been reduced by soaking, a kind of bread is made. The dried plant is also boiled with water or milk until it becomes a jelly, forming a food for the sick. Preparations of Iceland moss are sometimes used in making paper and in weaving cloth.

Ice Plant (*Mesembryanthemum crystallinum*). A very fleshy, watery herb of the carpetweed family, with trailing stems and showy flowers. It is remarkable for its greenish or reddish foliage, appearing as if frosted with particles of ice which glitter in the sun. The ice plant grows on southern California sea beaches, in the Mohave desert, and in the Canary Islands. Where abundant, the seeds are eaten as food and the ashes obtained by burning the plant in quantity are a source of carbonate of soda, used in soap and glass making. The ice plant is often planted in greenhouses as a curiosity.

Incense Cedar (*Libocedrus decurrens*). A handsome tree of the pine family. It grows at high elevations on the mountains from Oregon to Lower California, frequently attaining a height of 150 feet, with a trunk sometimes 7 feet in diameter. The slender branches and cypress-like leaves form a beautiful feathery crown. Where abundant, incense cedar is a valuable timber tree, the soft, durable, straight-grained, fragrant wood being much used for fence posts and telephone poles. The wood of the largest trees is usually riddled with what appear to be the galleries of a wood-boring insect, but these galleries are caused by a little-known fungus. The tree is planted for ornament in the Middle Atlantic states.

Indian Paintbrush (*Castilleja*). A large genus of herbs of the figwort family, parasitic on the roots of other plants. They have alternate leaves and showy red, yellow, or white flowers, in dense, leafy, bracted spikes,—the conspicuous bracts often more brilliantly colored and larger than the flowers. There are about 50 species, mostly of the New World, about 35 of which occur in the United States and Canada. Several varieties have been successfully cultivated, and a beautiful Rocky Mountain species is the state flower of Wyoming.

Indigo (*Indigofera tinctoria*). A shrub of the pea family, probably native to India, long cultivated in the Orient as a dye plant. The blue dyestuff prepared from it was known to the Romans, who called it *indicum*. This is extracted by steeping with water and fermenting the plant, which is cut just before flowering. Although still important in India and Java, indigo culture has declined, owing to the increasing use of aniline dyes.

Iris. A genus of beautiful herbaceous plants of the iris family (*Iridaceæ*). They have creeping rootstocks, erect stems, equitant leaves, and conspicuously beautiful flowers, many of which are much prized in cultivation. There are about 100 species, mostly of the North Temperate Zone. Of these some 20 occur in North America.

The Blue Flag (*I. versicolor*), 3 feet high, with violet-blue flowers, variegated with yellow and white, is common in marshes from Newfoundland to Manitoba and southward to Florida. An acrid resin from the rootstock is used in medicine. The Western Blue Flag (*I. missouriensis*) grows from 6 to 24 inches high, with very narrow leaves and pale blue, variegated flowers. It abounds in wet soil from South Dakota to Idaho and Arizona.

The Fleur-de-lis (*I. germanica*) is a native of Europe, with large, very showy flowers, deep violet-blue, veined with yellow, brown, and sometimes white. This handsome iris is everywhere planted in gardens. From the rootstocks of this and other European species, the orris root used in perfumery is obtained. The fleur-de-lis is the national flower of France and the emblem of the city of Florence.

Ivy. A name used to designate various climbing, twining, or creeping plants. The English ivy (*Hedera helix*), which belongs to the ginseng family, is a native of Europe. It has been highly prized as an ornamental plant since the days of the Greeks and Romans. This beautiful ivy is now extensively grown for rock and wall cover in the United States. The Boston or Japanese ivy and the Virginia creeper, often called ivy and similarly used, belong to the grape family. The poison ivy belongs to the sumac family, and the ground ivy to the mint family.

Jack-in-the-pulpit (*Arisæma triphyllum*). A fleshy perennial of the arum family, called also Indian turnip, common in moist woods throughout eastern North America. The annual flowering stem, a foot or more high, springs from an intensely acrid, bulb-shaped corm and bears 1 or 2 leaves of 3 leaflets. The small flowers, which appear in early spring, are clustered at the base of an erect, club-like spadix, the "jack." This is surrounded by a hooded, often purple-striped spathe, open at the throat and curving over at the top in a broad flap. The whole floral arrangement is fancifully held to resemble a preacher in an old-fashioned pulpit with a sounding board above it.

By reason of its unusual form and color, the jack-in-the-pulpit is one of the best-known wild flowers in eastern North America. The fruit, which usually lasts until autumn, consists of a mass of bright scarlet berries. When properly cooked, the peppery corm loses its burning taste and becomes a nutritious vegetable. It was formerly used for food by the Indians.

Jasmine (*jăs'mĭn*) (*Jasminum*). Shrubs and climbers of the olive family, natives of southern Asia. There are about 100 species, several of which are much grown in gardens for their fragrant flowers, which yield the oil of jasmine used in perfumery.

Jessamine (*jĕs'ă-mĭn*) (*Gelsemium sempervirens*). A slender climbing vine of the logania family, occurring in woodlands near the Atlantic and Gulf coasts from Virginia to Texas. It has handsome, yellow, trumpet-shaped flowers, which exhale a fragrance similar to the true jasmine. All parts of the plant are extremely poisonous, the roots yielding the powerful drug, gelsemium.

Job's Tears (*Coix lachryma*). A tall, stout cereal of the Old World. It is closely related to corn and sometimes attains a height of 8 feet. It takes its name from the hard, shining, tearlike seeds. These have the appearance of bluish white porcelain and are used similarly to beads in making bracelets, necklaces, and rosaries. The plant is a native of India where it is cultivated to some extent for food. It is grown also in China on account of supposed medicinal properties. In Spain and Portugal, where it has become naturalized, flour is sometimes made from it. In the United States and in various other countries it is grown as a curiosity.

Judas Tree (*Cercis*). A genus of trees and shrubs of the pea family. They bear pink or rose-colored flowers which appear earlier than the broad, simple leaves. There are about 7 species, all native to north temperate regions.

The best-known species of *Cercis* from the Old World is the Judas tree (*C. siliquastrum*), a small tree common in Asia Minor and throughout the Far East. There is a tradition that Judas Iscariot hung himself upon a tree of this species which was standing near Jerusalem, this incident giving rise to the common name of the tree. The Judas tree is frequently planted for ornament in the Middle Atlantic states.

The Redbud (*C. canadensis*) is a widely branching tree, sometimes 50 feet high, with beautiful rose-colored flowers. It grows wild from Ontario to Nebraska and south to Florida and Texas, and is often planted for ornament. The Texas Redbud (*C. reniformis*), a similar tree, but with smaller kidney-shaped leaves, occurs in eastern Texas. The California Redbud (*C. occidentalis*) is a conspicuous shrub or small tree in California foothills from Mt. Shasta southward.

Jujube (*jōō'jōōb*) (*Zizyphus jujuba*). A spiny shrub or small tree of the buckthorn family, believed to be native to Syria. Since ancient times, the jujube has been cultivated in southern Europe for its wholesome, pleasantly flavored fruit. This ranges in size from that of an olive to that of a hen's egg. The tree blossoms in June and ripens its fruit in October or November. If to be eaten fresh, the fruit is gathered when it assumes a reddish brown color; if to be dried, the fruit is left on the tree until it darkens and becomes slightly wrinkled. The jujube was introduced into North Carolina in 1838 and is now sparingly grown in various warmer parts of the United States. It thrives best in the Southwest and in California.

Juniper (*Juniperus*). Pungently aromatic evergreen trees and shrubs of the pine family. They bear closely overlapping, awl-shaped or scalelike leaves, and a fleshy, berry-like fruit,—a modified cone—which is matured in from one to two seasons. There are some 40 species, widely scattered over the northern hemisphere from the arctic circle as far south as Ethiopia. When the trees are of sufficient size, the wood of the various junipers is suitable for many uses. The wood of most species is remarkable for its durability in the ground, that of red cedar being known to have resisted decay for more than 40 years.

About 15 species of juniper occur in North America. The common juniper (*J. communis*), usually a small shrub, is sometimes a tree 30 feet high. The leaves are rigid, awl-shaped, and prickly-pointed. As a shrub, this juniper grows from Greenland to Alaska and south to Pennsylvania and California, and also in the Old World. It attains the size of a tree only in southern Illinois and in certain parts of Europe. The berries of this species are used to flavor gin. Oil of juniper, extracted from the unripe fruit, is used in medicine.

The Red Cedar (*J. virginiana*) grows sometimes 100 feet high, with a trunk diameter of 5 feet. It bears scalelike, four-ranked leaves, and dark blue, sweetish fruit. This valuable tree is native to dry soil from Nova Scotia to South Dakota and southward to Georgia and Texas. The light but very durable, fragrant, red wood is much used for making lead pencils, clothes chests, and interior finish, also for fence posts and telegraph poles. The Rocky Mountain Red Cedar (*J. scopulorum*), a similar red-wooded species, 20 to 30 feet high, grows throughout the Rockies and northwestward to British Columbia. The durable wood makes the tree useful locally for posts and poles. The foliage is usually overcast with a whitish bloom, giving the leaves a bluish cast. On this account, the tree is becoming a popular ornamental with nurserymen of the Middle West.

The most remarkable species of all is the alligator juniper (*J. pachyphlœa*), so called from its distinctly checkered, thick bark. This juniper grows in the mountains from southwestern Texas through the southern Rockies into Mexico. It is a low, thick-trunked tree, sometimes 30 feet high, valuable locally for post timber and for fuel. The rarest of our native junipers is the drooping juniper (*J. flaccida*), a beautiful tree, 15 to 20 feet high, with long, weeping branches. Within the borders of the United States it is found only in the Chisos mountains of southwestern Texas, whence it extends southward into Mexico. Two other southern Rocky Mountain species, forming valuable fuel-wood growths, are the one-seed juniper (*J. monosperma*) and the Utah juniper (*J. utahensis*), the latter bearing the largest berries (half an inch in diameter) of all the junipers.

The Rock Cedar (*J. mexicana*), of Texas and Mexico, usually 20 to 30 feet high, is very similar in general appearance to the red cedar, but its wood is brown. The California juniper (*J. californica*), sometimes 40 feet high, with leaves in threes, bears a reddish fruit, eaten by the Indians.

Two exotic junipers are frequently planted in the United States for ornament. One is the Irish juniper (*J. communis hibernica*), native to the mountains of Ireland. It is a dense, pyramidal shrub, 6 to 10 feet high, with spreading, prickly, three-ranked leaves. The other is the Chinese juniper (*J. chinensis*), a small tree from Japan and China. In appearance it is somewhat similar to the red cedar, but the crown is more dense and of a yellow-green color, and the ends of the branches are drooping. See *Cedar.*

Jute (*Corchorus capsularis*). An annual plant of the linden family. It is native to southern Asia and has been cultivated since ancient times for its coarse fiber, which is the cheapest known. While introduced into many tropical countries and experimentally grown in Florida, the commercial culture of jute is of importance only in India. During the last century, production has increased enormously, both of jute fiber, used for coarse twine and cordage, and of jute cloth, called gunny, used for sacking and burlap. The fiber is made into wrapping paper and sometimes mixed with silk and wool in making cloth. In 1914 the yield of jute fiber in India exceeded four billion pounds. See *Flax, Hemp, Manila Hemp, Olona, Sisal.*

Kafir (*kăf'ĕr*) **Corn.** A variety of nonsaccharine sorghum, native to Africa. This plant has been cultivated for food since ancient times in the Old World. About 1885 it was introduced into the United States by the department of agriculture. Kafir corn is extensively grown in parts of Texas, Oklahoma, Kansas, California, and other dry regions, as a substitute crop for Indian corn. See *Sorghum Cane.*

Kale. A variety of cabbage developed by cultivation, differing from it in having open instead of solid heads of leaves. It is grown as a winter vegetable and as food for cattle. Kale patches are common in yards and gardens in Florida and other parts of the South. See *Cabbage.*

Kalmia. A genus of erect shrubs or small trees of the heath family, with thick, evergreen leaves and showy flowers in naked clusters. There are 6 species, all North American.

The Mountain Laurel (*K. latifolia*), called also calico bush, is a handsome shrub, 3 to 20 feet high, or sometimes a tree 40 feet high, with large, beautiful, pink or white flowers. It grows in rocky woods from New Brunswick to Ontario and south to Florida. The poisonous leaves are dangerous to many animals.

The Sheep Laurel (*K. angustifolia*), called also lambkill or wicky, is a small shrub 3 feet high, with purple or crimson flowers. The leaves have poisonous properties similar to those of the mountain laurel. The sheep laurel occurs from Newfoundland to Hudson bay and southward to Georgia and Michigan. See *Laurel.*

Kangaroo Apple (*Solanum aviculare*). A plant closely related to the potato, native to Peru, New Zealand, and Australia. The mealy, slightly acid fruit, which is eaten either raw or cooked, is used for food by the native peoples.

Kapok (*kā'pŏk*) (*Ceiba pentandra*). A Javanese tree of the silk-cotton-tree family, closely related to the mallows. It yields a silky fiber called kapok, used principally for stuffing pillows, cushions, and mattresses. The elasticity of the fiber, though rendering it unsuitable for spinning, prevents matting when it is used as a filler. Many thousand bales of kapok are exported from Java annually.

Kelp. The name applied to many dark brown seaweeds, especially to the various species of *Fucus* and *Laminaria* which, in northern Europe, are dried and burned for their ashes, also called kelp, formerly the principal source of iodine.

Kohl-rabi (*kōl'rä'bĭ; kōl'rä'bē*). A variety of cabbage, in which, instead of a head of densely packed leaves, there is a globular swelling of the stem, some 3 or 4 inches in diameter, just above the ground. Several leafstalks spring from this swollen part, adding to the peculiar appearance of the plant. The enlarged portion of the stem is cooked as a table vegetable, with uses very similar to those of the turnip. Kohl-rabi is cultivated like cabbage, and, though fairly popular in Europe, is not extensively grown in America. See *Cabbage.*

Kumquat (*kŭm'kwŏt*) (*Fortunella*). A genus of shrubs of the rue family, very closely related to the orange. There are several species, natives of Japan and China, some of which are now cultivated in the Gulf states and in California. The kumquat usually grows from 8 to 12 feet high, and bears white, fragrant flowers followed by oblong, orange-colored fruit, from 1 to 2 inches in diameter. While the delicious, refreshing fruit may be eaten raw as a dessert, it is used chiefly for making jellies, marmalades, and various preserves. See *Citrous Fruits.*

Lady's-slipper (*Cypripedium*). Leafy-stemmed herbs of the orchid family. They bear large, drooping, showy flowers, with a pouchlike lip, fancifully thought to resemble a slipper or a moccasin, whence the names, lady's-slipper and moccasin flower. There are about 20 species, native to north temperate regions. Of these, 9 are found in North America.

The showy lady's-slipper (*C. reginæ*) has large, white flowers, variegated with crimson. This species is one of the most beautiful of American wild flowers. It grows in swamps and woods from Newfoundland to Minnesota and south to Georgia. The yellow lady's-slipper (*C. parviflorum*), with pale yellow flowers marked by purple lines, occurs from Nova Scotia to Minnesota and southward. The small white lady's-slipper (*C. candidum*) is found in bogs in the eastern United States. The Moccasin Flower (*C. acaule*) is a small, almost stemless species with handsome pink flowers. It grows in sandy woods from Newfoundland to Manitoba and south to Tennessee. See *Orchids.*

Larch (*Larix*). A genus of tall trees of the pine family, with slender, deciduous leaves borne in clusters, and small, erect cones. There are 9 species, native to temperate and subarctic regions. Three of these occur in North America.

The American larch, or Tamarack (*L. laricina*), is usually 50 to 60 feet high, with a trunk diameter of 18 or 20 inches. It grows from Newfoundland and Labrador to Alaska and the arctic circle and south to Pennsylvania and Minnesota. This tree frequents swamps in the southern part of its range, and uplands in the northern. The heavy, strong, durable wood is used for fence posts, telegraph poles, and railway ties.

The western larch (*L. occidentalis*) is a valuable timber tree. It sometimes grows 250 feet high, with a naked, tapering trunk, 6 to 8 feet in diameter, surmounted by a short pyramidal head of small branches. It occurs from British Columbia to the Columbia River basin.

The alpine larch (*L. lyallii*), a little-known species, native to high mountain ranges in the northwestern United States and in British Columbia and Alberta, grows from 30 to 40 feet high. The woolly young shoots distinguish it from the western larch, one of the local names for the alpine larch being "woolly larch."

The European larch (*L. decidua*) is much planted for ornament and for timber in the eastern United States.

Larkspur (*Delphinium*). A genus of beautiful plants of the crowfoot family. They have palmately lobed or divided leaves and large, irregular, handsome flowers. There are about 125 species, native to north temperate regions, many of which occur in the United States and Canada. Several beautiful species, some of them extremely poisonous to cattle, grow in the Rocky Mountain region. The field larkspur (*D. ajacis*), native to Europe, and grown in gardens for its showy flowers, is naturalized in the eastern United States.

Laurel (*Laurus*). A genus of graceful shrubs and trees of the laurel family. There are but few species, all natives of the Old World. The best-known is the noble laurel (*L. nobilis*), a beautiful tree with lanceolate, leathery, shining leaves. It was called daphne by the ancient Greeks, and was sacred to Apollo. Heroes in war, illustrious poets, and victors in games, were crowned with wreaths made of the leaves and ripened berries, whence the terms "laureate" and "laureation."

The California laurel (*Umbellularia californica*), found in Oregon and California, is a handsome tree, sometimes 90 feet high, with a trunk 5 feet in diameter. It has lanceolate, aromatic leaves and bears an olive-like fruit. This tree yields the most valuable cabinet wood produced in the Pacific states. When soaked in water, the whitish wood becomes beautifully mottled. See *Kalmia*.

Lavender (*Lavendula vera*). A small plant of the mint family, native to Europe, with narrow leaves and pale lilac-purple flowers. It is widely grown for its aromatic oil, called the oil of lavender, used in medicine and perfumery.

Leaves, Color of. The green color of leaves is due to the presence of chlorophyll, which is necessary to the process of converting carbon dioxide into starch by means of sunlight. This process is called photosynthesis. Chlorophyll is chemically allied to blood in animals, but instead of iron it contains magnesium.

The color in aging leaves is due to carotinoids, which are yellow, and anthocyanins, which are red or purple. These substances are usually present in all leaves, but are masked by the more abundant chlorophyll. As chlorophyll breaks down in the autumn faster than it is built up, its diminishing amount permits the carotinoids and anthocyanins to appear. Leaves having a great preponderance of the former become pure yellow, like those of the tulip tree, willow, and sassafras. When anthocyanins predominate, the leaves become bright red or purple, as in the sumac, sweet gum, and oak. Frost is not necessary to the coloration of leaves in the autumn.

Leek (*Allium porrum*). A biennial plant of the lily family with a stem about 2 feet high, native to southern Europe. It is closely related to the onion, but is much milder to the taste and has a thickened stem base instead of a bulb. It is widely cultivated in Europe as a flavoring plant and has been used in cookery since Greek and Roman times. The leek has long been the national emblem of the Welsh. See *Garlic, Onion*.

Leguminous Plants (*Leguminosæ*). An immense natural group of flowering plants, commonly called the pea, bean, or pulse family. It comprises about 10,000 species, and, excepting the *Compositæ*, is the largest family of flowering plants.

The various species are widely diffused throughout the world but are most numerous in the tropics. Among them are many exceedingly useful plants, such as alfalfa, peas, beans, clovers, peanut, indigo, logwood, brazilwood, gum arabic, gum senegal, laburnum, calabar bean, copal, and cassia, together with many valuable timber trees and an immense number of ornamental plants.

Soil everywhere is usually greatly benefited by the growth of leguminous plants, especially the clovers, peas, beans, and alfalfa. This is due to the fact that nitrogen-fixing bacteria, which enrich soil, almost invariably are found upon their roots. For this reason, leguminous plants are the most valuable of all in the so-called rotation of crops.

Lemon (*Citrus limonia*). A small evergreen tree, 10 to 20 feet high, of the orange family. It is native to India, where cultivation for its valuable acid fruit dates back at least 2500 years. The lemon was grown very early in Iraq and was made known to the ancient Greeks by the Medes. The Arabs extended lemon culture into Africa and Europe about the time of the Crusades. Lemons are now extensively grown in Italy, Spain, and in various tropical and subtropical countries. In the United States, lemon culture is becoming increasingly important in Florida and southern California. Besides the world-wide use of the fruit as food and drink, citric acid, obtained from the juice, is employed in dyeing and calico printing; and lemon oil, extracted from the rind, is widely used for flavoring. See *Citrous Fruits, Lime*.

Lentil (*Lens esculenta*). A small annual of the pea family, native to western Asia and southern Europe, which produces flattened, lens-shaped, nutritious seeds. The lentil is one of the most anciently cultivated of the food plants used by man. It has been grown for more than 5000 years. Although less popular than peas and beans, lentils are extensively grown in Europe and Asia, and constitute a commercial crop in Egypt. Some varieties are sparingly cultivated in New Mexico and Arizona. The lenses used in optical instruments were so named from the resemblance of a double convex lens to the seed of this plant, *lens* being the Latin name of the lentil.

Lettuce (*lĕt'ĭs*) (*Lactuca sativa*). An annual or biennial of the composite family, with tender leaves and a milky juice. It is native to Mediterranean countries and was cultivated as a salad plant by the ancient Greeks and Romans. Lettuce is now grown in gardens throughout the world wherever the climate permits. Among the scores of varieties are those in which the leaves form a cabbage-like head, the cutting varieties in which the leaves are loosely arranged, and the romaine varieties in which the outer leaves are tied above the head in order to blanch the inner ones.

Lichens (*lī'kĕnz*). A group of flowerless plants, represented in all lands where vegetation exists. They grow on bare rocks, tree trunks, and on the surface of the ground, deriving their food from the air and water. They have no true roots, stems, or leaves, but are composed of variously-shaped expansions of vegetable tissue, known as thalli.

When somewhat leaflike in form, as is the case with many which grow on bark or wood, lichens are called *foliose*. If hardened and somewhat shell-like in texture, as, for example, those which cover rocks with various gray-green patterns, they are called *crustaceous*. If somewhat shrublike, as in case of those which occur in long bearded forms on trees or which densely carpet barren ground, they are called *fruticose*.

A lichen consists of two plants, a fungus and an alga, living together in a peculiar relation, called *symbiosis*. In this unique partnership the function of the blue or green alga is to produce the food for both plants, while the function of the fungus is to absorb water and afford protection for its companion. Some 4000 species of lichens have been described. They are most abundant in polar regions and on high mountains, where they cover vast areas of otherwise practically barren land. Lichens are common also in moist, temperate countries, and some occur in the tropics.

Some lichens, as Iceland moss, are used for human food, and others afford pasturage for the reindeer, caribou, and muskox. Litmus and other dyes are obtained from lichens. See *Algæ, Fungi, Iceland Moss, Reindeer Moss*.

Licorice (*lĭk'ô-rĭs*) (*Glycerrhiza glabra*). A perennial herb of the pea family, native to southern Europe and western Asia. It is cultivated for its

long, sweet, gummy root, which yields the licorice of commerce. The plant grows about 4 feet high and bears pinnate leaves, usually pale violet flowers in clusters, and burlike pods or fruits.

Licorice root is grown in several countries of the Old World, but the finest grades come from Italy and Spain. Pieces of the dried root, of about the length and thickness of a lead pencil, are sold for chewing. The extracted sweetish principle, when boiled down with starch and made into sticks or lozenges, is a popular remedy for coughs and colds. Licorice extract is also very widely used in flavoring tobacco, wines, liquors, cooling drinks, candy, and chewing gum, and to disguise the unpleasant taste of medicines. Usually over a half million dollars' worth of licorice root and extract is imported into the United States each year. Licorice grows readily in Louisiana and California but the crop has not been commercially profitable.

The American wild licorice (*G. lepidota*), the only native species, occurs in prairies from Hudson bay to Chihuahua, and westward to Washington. While an abundant and a hardy grower, the root lacks the characteristic sweetness of that of the Old World plant.

Lignum-vitæ (*lĭg'nŭm-vī'tē*) (*Guaiacum officinale*). A small tree of the caltrop or bean caper family, about 25 feet high and a foot in diameter, native to tropical America. It is noted for its extremely hard, heavy, dark colored, oily wood, which instantly sinks in water. As it weighs over 70 pounds to the cubic foot, it is 50 per cent heavier than ordinary oak and about three times as heavy as white pine. By reason of its great toughness and other wearing qualities, lignum-vitæ is extensively used for stern bushings in shipbuilding and also for tool handles, pulleys, bed and chair castors, and bowling balls. Gum guaiacum, a resin extracted from the wood, is valued in medicine. A species of lignum-vitæ (*G. sanctum*) occurs in southern Florida, where it is a small tree with white bark. The wood of this species has the essential characteristics of the preceding.

Lilac (*lī'lăk*) (*Syringa*). Smooth shrubs of the olive family. They have entire leaves and four-lobed flowers borne in dense terminal clusters. There are about 7 species, native to Asia and eastern Europe.

The common lilac (*S. vulgaris*), which bears pink-purple, fragrant flowers, is a native of Persia. It is one of the most popular of ornamental shrubs, both in Europe and in North America. The white lilac (*S. vulgaris alba*), with white, very fragrant flowers, the oldest variety of the common lilac, is much planted in the United States and Canada. Another delicately fragrant species, with pale lilac flowers, is the Persian lilac (*S. persica*), which grows wild from the Caucasus to Afghanistan. It is frequently planted in the Eastern States.

The Japanese lilac (*S. japonica*), which attains the size of a tree and bears yellowish flowers, is sometimes planted in New England. See *Syringa*.

Lily (*Lilium*). Tall, bulbous plants of the lily family (*Liliaceæ*). They usually have leafy stems and large, erect or drooping, showy flowers. There are about 45 species, natives of north temperate regions. Of these, about 15 occur in the United States and Canada.

The red lily (*L. philadelphicum*) has lanceolate leaves and erect, reddish orange flowers, 2½ to 4 inches high. It is found in the eastern United States and Canada. The western red lily (*L. umbellatum*) is very similar but has linear leaves and smaller flowers. It ranges from Ontario to British Columbia and Colorado. The southern red lily (*L. catesbæi*) has alternate, linear leaves and erect, solitary, scarlet flowers, 3 to 5 inches high. It occurs from Kentucky and Missouri to Florida.

The Canada lily (*L. canadense*), sometimes 5 feet high, has whorled leaves and from 1 to 16 nodding, yellow or red flowers. It grows in meadows from Nova Scotia to Minnesota and southward. The Turk's-cap lily (*L. superbum*) grows sometimes 8 feet high, with a large panicle of orange-yellow, nodding flowers, 2½ to 4 inches long. It is found from New Brunswick to Minnesota and southward to Tennessee. The Humboldt lily (*L. humboldtii*) grows from 6 to 12 feet high. This handsome species, with leaves in whorls of 10 to 20 each, and large, reddish orange flowers, is native to southern California.

The tiger lily (*L. tigrinum*) is a native of China, with orange colored flowers spotted with purple. It is widely cultivated in gardens and has become naturalized in many parts of the United States. The European orange lily (*L. bulbiferum*), with large, erect, showy flowers, and the white or Madonna lily (*L. candidum*), with large, erect, pure white flowers, both natives of the Old World, are much prized in gardens. The white trumpet lily (*L. longiflorum*), native to Japan, vigorous forms of which are known as Easter lily or Bermuda lily, is much grown in greenhouses.

The name "lily" is popularly applied to many plants which are not true lilies, such as mariposa lily (*Calochortus*), spider lily (*Tradescantia*), atamasco lily (*Atamosco*), water lily (*Nymphæa*), and snake lily (*Iris*). The "lily of the field" mentioned in the Bible is believed by some to be the beautiful dark red windflower (*Anemone coronaria*), native to Palestine and adjacent regions.

Lily of the Valley (*Convallaria majalis*). A beautiful ornamental plant of the lily family. It is a native of Asia, Europe, and the Allegheny region of the United States, and is now widely cultivated in various countries. From an underground rootstock the plant sends up two ovate or lance-shaped leaves and a slender raceme of small, white, drooping, bell-shaped flowers. All parts of the plant contain an acrid, bitter juice from which is extracted the poisonous alkaloid, convallarin.

Lime (*Citrus medica acida*). A small evergreen tree, rarely over 8 feet high, usually regarded as a variety of the lemon, widely grown in tropical countries. The tree bears a smooth, nearly round, intensely acid fruit, much smaller than a lemon, extensively used as a source of citric acid and for lime juice in beverages. The limes of the American markets are grown chiefly in Florida and the West Indies. See *Citrous Fruits, Lemon*.

Linden (*Tilia*). Forest trees of the linden or basswood family. They have sharply toothed leaves, small yellow or whitish flowers, and fibrous inner bark. There are about 20 species common in temperate regions, except western America and the Himalayas. Some 29 species and varieties occur in the eastern United States. The soft, straight-grained wood is used in cabinetmaking and for sounding boards of pianos. The tough inner bark is made into mats, cords, fish nets, and shoes. The flowers yield honey of unsurpassed flavor and delicacy, also lime-flower oil used in perfumery. Many species are extensively planted for shade and ornament.

The American linden, or Basswood (*T. glabra*), 60 to 125 feet high, with a trunk 2 to 5 feet in diameter, grows in rich woods from New Brunswick to Manitoba and south to Texas. It is much planted for ornament in the eastern United States, as is the White Basswood (*T. heterophylla*) of the southeastern United States. The so-called European linden, or Lime Tree (*T. europæa*), often grown in lawns and parks in the United States, may include two distinct species,—*Tilia vulgaris*, the tree bordering the famous avenue "Unter den Linden" in Berlin, and the Dutch linden (*T. platyphyllos*).

Litchi (*lē'chē'*) (*Litchi chinensis*). A large evergreen tree of the soapberry family, native to China, India, and the Philippines. It is extensively grown in many tropical countries for its excellent fruit, reputed to be one of the most delicious

known. The fruit consists of a nut about an inch in diameter, with a thin, rough, brittle shell surrounding a sweet pulp which encloses a hard, smooth seed. The pulp is eaten fresh, dried, or preserved. The dried fruit, called litchi nuts, is an article of commerce. The litchi has been sparingly introduced into Florida and California.

Live-forever (*Sempervivum*). Fleshy perennials of the orpine or stonecrop family, with thick, succulent leaves, usually in basal rosettes, erect flowering stems, and showy flowers. There are 40 species, mostly of the Old World. The common live-forever, called also houseleek (*S. tectorum*), is native to the Alps. It is widely grown in gardens, especially on rockwork, and has become naturalized in Massachusetts, New Jersey, and elsewhere. Broken portions of the stem, or leaves, preserve their vitality remarkably, taking root after long exposure, whence the name "live-forever."

Liverworts (*Hepaticæ*). One of the two primary divisions of the Bryophytes, or moss plants, the other division including the true mosses (*Musci*). The liverworts are moisture loving plants, some floating on the water, others growing on trees, damp earth, or rocks. The plant usually consists of a prostrate, flattened, green thallus, which develops rootlike structures (rhizoids) from its lower surface, and reproductive organs from its upper surface. There are three groups or orders: *Marchantiales*, with flat, green thallus disks, often reproducing by means of gemmæ or budding; *Jungermanniales*, frequently mistaken for mosses, in which the thallus bears two rows of small foliage leaves; and *Anthoceratales*, simple in structure, but with greatly elongated spore cases, which split into two valves.

Locust Tree (*Robinia*). A genus of trees or shrubs of the pea family. They have compound leaves and bear large clusters of showy flowers. There are about 8 species, all natives of North America and Mexico.

The common locust tree (*R. pseudacacia*) sometimes grows 80 feet high, with a trunk diameter of 3½ feet. It is sparingly found wild from Pennsylvania south to northern Georgia. Formerly much planted for ornament, this tree has become widely naturalized in the eastern United States. The exceedingly strong, heavy, durable wood is used in shipbuilding, for fence posts, and for treenails. Two forms of this species are popularly recognized, the yellow and the black locust. Botanically, they are not distinguishable, but the heartwood of one form is yellowish, "yellow locust," and that of the other is olive-brown, "black locust."

Two other species of *Robinia* are known, the New Mexican locust (*R. neo-mexicana*), of the southern Rockies, and the clammy locust (*R villosa*), of North Carolina, now widely naturalized in the eastern United States by cultivation. Both are small trees, useful only for ornament. See *Honey Locust.*

Loganberry. A valuable bramble fruit originated by Judge J. H. Logan, of Santa Cruz, California, in 1881. It is the result of a cross between a variety of the wild blackberry of California (*Rubus vitifolus*) and a cultivated red raspberry. When thoroughly ripe, the loganberry is of a purplish red color and very large, being one of the largest berries grown. In flavor and habits it shows the characteristics of both the blackberry and the raspberry. The loganberry is a fruit of constantly increasing commercial importance. It is grown from British Columbia to southern California, and especially in western Oregon, where its culture has become an extensive industry.

Loquat (*lō'kwŏt; -kwät*) (*Eriobotrya japonica*). A small tree of the rose family, native to Japan and China, now introduced into many subtropical countries. It grows about 12 feet high, with thick, clustered, evergreen leaves and fragrant, woolly, white flowers which blossom in the autumn. The oval or pear-shaped, yellow, subacid fruit, about an inch in diameter, ripens in early spring. In the Gulf States and in California, the loquat has become a popular home fruit, used chiefly for desserts and for making jellies. The large, pleasant tasting seeds are sometimes employed in cookery, especially for flavoring tarts and cakes.

Lotus. The name given by the Greeks to several different plants, the fruit of which was used for food, particularly a species of jujube (*Zizyphus lotus*) and the date plum (*Diospyros lotus*). The name was applied also to several beautiful species of water lily, especially the blue water lily (*Nymphæa cærulea*) and the Nile water lily (*Nymphæa lotus*), still highly prized by the Egyptians. The sacred bean of Hindu and Chinese mythology is *Nelumbo lotus.* In the United States the yellow water lily, or water chinquapin (*Nelumbo lutea*), much esteemed by the Indians, is called lotus.

Lupine (*lū'pīn*) (*Lupinus*). Herbs, or rarely shrubs, of the pea family. They have alternate, digitate leaves, and showy, variously colored, pealike flowers in terminal clusters. There are over 100 species, native to temperate and warm regions, 70 of which occur in western North America, largely in California. The ancient Greeks and Egyptians grew lupines (*L. albus* and *L. termis*) for fodder and used the seeds for food. Many handsome species are cultivated for ornament. The Blue Lupine (*L. perennis*), the only native eastern species, grows in sandy soil from Maine to Minnesota and southward. The bitter seeds were used for food by the Indians.

Madder (*Rubia tinctorum*). A small perennial of the madder family, with weak stems and glossy leaves, beset with sharp prickles. It grows wild east and north of the Mediterranean. For twenty centuries it has been cultivated in Europe, the East Indies, and China, as a dye plant, yielding the valuable red dye, sometimes called Turkey-red. Since the introduction of aniline dyes, madder culture has been practically abandoned.

Madroña (*mà-drō'nyà*) (*Arbutus menziesii*). A large, handsome tree of the heath family, native to the Pacific coast from British Columbia to Mexico and to the Sierras of California. The madroña grows from 80 to 100 feet high, with a trunk diameter of from 4 to 7 feet. It bears large, lustrous, dark green leaves, often nearly white below, small, heathlike flowers, and bright orange-red fruit. The heavy, close-grained wood is sometimes utilized for furniture but mainly for making a special quality of charcoal used in the manufacture of gunpowder.

Two southwestern species are the Mexican madroña (*A. xalapensis*), 20 feet high, growing from western Texas into Mexico, and the Arizona madroña (*A. arizonica*), 40 to 50 feet high, which occurs in the mountains of southern Arizona and adjacent parts of Mexico. Both are beautiful trees with thick, glossy leaves, the former with brilliant orange-red fruit, and the latter with deep red fruit.

Magnolia. A genus of trees or shrubs of the magnolia family (*Magnoliaceæ*). They have aromatic bark, large, thick, entire leaves, handsome, fragrant flowers, conelike fruit, and fleshy, pendulous seeds. There are about 25 species, all ornamental, and natives of warm temperate regions. Seven species grow naturally in the United States, one of which, the cucumber tree, is an important timber tree.

The Large-leaf Umbrella Tree (*M. macrophylla*) grows from 30 to 50 feet high. It bears leaves 20 to 30 inches long and 10 inches wide and white flowers a foot in diameter. This tree is found native from North Carolina to Arkansas and southward. The Umbrella Tree (*M. tripetala*), 30 to 40 feet high, has leaves 20 inches long and creamy white flowers 5 inches deep. It grows wild from Pennsylvania to Arkansas.

The mountain or cucumber magnolia (*M. acuminata*), called also cucumber tree, grows from 60 to 90 feet in height. It has oval leaves about 8 inches long, and greenish yellow flowers 2 inches high. The reddish fruit somewhat resembles a small cucumber. This magnolia occurs from New York and Ontario southward to Alabama and Arkansas. The excellent close-grained wood is used for flooring and in cabinetmaking.

The laurel magnolia, or Sweet Bay (*M. virginiana*), 50 to 70 feet high, bears lustrous leaves 6 inches long, and creamy white, fragrant flowers 3 inches across. It is native to coast swamps from Massachusetts to Texas, and is widely planted for ornament.

Mahogany (*Swietenia mohagoni*). A valuable timber tree, of the mahogany family, native to tropical America, growing from southern Florida to Peru. In height it ranges from 60 to 100 feet and sometimes attains a diameter of 6 feet. It has pinnate leaves and bears panicles of small white, yellow, or reddish flowers. The rich, reddish brown wood is fine grained and capable of taking a high polish. For this reason, mahogany is one of the most highly prized materials used in cabinet work and for veneers, being very extensively employed in making furniture.

The wood of several much less valuable kinds of trees also is called mahogany. In the western United States two or three species of *Cercocarpus*, small trees of the rose family, with an exceedingly hard, red-brown wood, are known as mountain mahogany. The Kentucky coffee tree (*Gymnocladus dioicus*), of the eastern United States, is sometimes called mahogany.

Maidenhair (*Adiantum*). A genus of graceful ferns with divided leaves and dark, slender, polished, shiny stems or stipes. There are about 175 species, chiefly tropical American, 3 of which grow in the United States. The common maidenhair (*A. pedatum*), one of the most beautiful of ferns, occurs in moist woods almost throughout North America. The Venus's-hair fern (*A. capillus-veneris*), more slender, and with black stipes, is found from Virginia to Florida and westward to California. The similar western maidenhair (*A. emarginatum*) is confined to the Pacific states. The so-called maidenhair tree, planted for ornament, is *Ginkgo biloba*, a native of China. See *Ginkgo*.

Mango (*Mangifera indica*). A tree of the sumac family, sometimes 40 feet high, with large, shining leaves and yellow or reddish flowers. It is a native of India, where it has been cultivated since very ancient times for its valuable fruit. In different varieties this ranges from the size of a plum to that of an apple, sometimes weighing a pound or more. The sweet or slightly acid ripe fruit is much prized as a dessert, and the unripe fruit is used for pickles and sauces. The nourishing seeds are sometimes roasted for food by native peoples. Mangoes are now grown in many tropical and subtropical countries, particularly in the West Indies, and, to a limited extent, in southern Florida and in California.

Mangrove (*Rhizophora mangle*). A small, bushy tree of the mangrove family. With its spreading branches and numerous aerial roots, it forms almost impenetrable thickets on the shores of Florida and many other subtropical and tropical countries. It is an important factor in protecting low tidal shores and in extending them into the ocean.

Manila Hemp (*Musa textilis*). A small, tree-like banana, native to the Philippine Islands. Though valueless for fruit, it is extensively cultivated as a fiber plant, particularly in Luzon. The stems yield an excellent fiber, called manila hemp, or abaca, of great value for cordage, fabrics, and paper making. This fiber has become an important article of export from the Philippines.

Manzanita (*măn'zȧ-nē'tȧ*) (*Arctostaphylos* or *Uva-Ursi*). A genus of shrubs or small trees of the heath family, with thick, evergreen leaves and small, white or pink flowers. They bear a small drupelike fruit, somewhat resembling a tiny apple, whence the Spanish name "manzanita." Many handsome species occur in the chaparral belt of the California mountains.

Maple (*Acer*). Trees or rarely shrubs, of the maple family, usually with watery and sometimes with sugary sap. They bear palmately lobed or pinnate leaves, small, usually inconspicuous flowers, and a winged fruit consisting of two samaras, joined at the base, each one-seeded. There are more than 100 species, widely distributed over the northern hemisphere. Of these, about 25 species and varieties are North American.

The sugar or rock maple (*A. saccharum*) is a large, handsome tree, sometimes 100 to 120 feet high, with a trunk often 3 to 4 feet in diameter. This tree, distinguished by its smooth, heart-shaped, lobed leaves and gray-brown bark, grows in rich woods from Newfoundland to Manitoba and southward to Florida and Texas. It is also widely planted for ornament, particularly on roads and streets. This species is the most valuable North American maple. The hard, fine-grained wood is much used in making furniture, in shipbuilding, in turnery, and for flooring and fuel. A beautiful bird's-eye form of the wood occurs and is highly prized for furniture. The sap, with that of the next species, is the chief source of maple sugar and sirup.

The black maple (*A. nigrum*), sometimes 80 feet high, very similar to the sugar maple and used for the same purposes, occurs from Montreal to South Dakota and southward. The leaves are thick, dull green above and somewhat hairy below, and the bark on old trees becomes almost black. The large-tooth maple (*A. saccharum grandidentatum*), conspicuous in mountain canyons of western Texas, New Mexico, and Arizona, is brilliantly colored in autumn.

The silver or soft maple (*A. saccharinum*) is a rapidly growing tree, 90 to 120 feet high. It has pale green, deeply lobed leaves which are silvery white below. This maple is found native from New Brunswick to South Dakota and south to Florida and Oklahoma. While the wood is soft and brittle, the tree is very widely planted for quick shade. A good quality of sugar, similar to that of the sugar maple, is sometimes made from its sap.

The red maple (*A. rubrum*), 80 to 120 feet high, has a tall and rather slender trunk, upright branches, and reddish branchlets. It grows in low or moist grounds from Quebec to Iowa and southward to Texas. The close-grained, light brown or reddish wood is much used for making chairs, woodenware, flooring, and for gunstocks. Excellent sugar and sirup are sometimes made from the sap.

The Box Elder, or ash-leaved maple (*A. negundo*), is a widely branching tree, sometimes 50 to 70 feet high. It is distinguished by its leaves, which are composed of from 3 to 5 leaflets. The wood is soft and brittle. This maple grows along streams from Vermont to Utah and southward to Florida and eastern Arizona. Sugar is sometimes made from its sap, and the tree is much planted for quick shade. The variety *californicum* is the California box elder, a broad-topped tree, 30 to 45 feet high, with leaves of three leaflets. Three or four garden varieties of this tree are cultivated.

The mountain maple (*A. spicatum*) is a bushy tree, sometimes 30 feet high. It bears three-lobed leaves and conspicuous clusters of flowers which appear after the leaves. This tree occurs from Quebec to Saskatchewan and southward in the mountains to Georgia. The striped maple, or Moosewood (*A. pennsylvanicum*), is usually shrubby but grows sometimes 30 to 40 feet high. The leaves have three long-pointed lobes at the summit, and

the bark is marked lengthwise by broad, pale stripes. It occurs native from Quebec to Minnesota and southward in the Blue Ridge mountains to South Carolina.

The broad-leaved maple (*A. macrophyllum*) is a handsome and valuable timber tree, 80 to 100 feet high. It bears bright yellow, fragrant flowers in long clusters, and dark green leaves sometimes 12 inches wide. This tree grows along streams near the coast from Alaska to southern California. The hard, straight-grained wood is used for the same purposes as that of the sugar maple. The vine maple (*A. circinatum*), usually a small tree, is often vinelike or even prostrate. It bears deeply lobed leaves and reddish flowers in pendent clusters. The range of this maple is from British Columbia to northern California. The dwarf maple (*A. glabrum*) is a low tree, but often shrubby, with small, upright branches, reddish twigs, and greenish flowers appearing just after the leaves. It grows in the mountains at 5000 to 6000 feet altitude, from New Mexico to Alaska.

Several foreign species are planted for ornament in the United States and Canada. The Norway maple (*A. platanoides*), of Norway and Switzerland, sometimes 100 feet high, with a dense crown and dark green leaves, is extensively grown in the East and in the Middle West. It is similar in foliage to the sugar maple, from which it is distinguished by a milky juice. A handsome red-leaved variety (*schwedleri*) is very widely planted.

The sycamore maple, or Plane Tree (*A. pseudoplatanus*), is an important timber tree in central and southern Europe and in Asia. It grows from 70 to 90 feet high and has sycamore-like leaves. This exotic maple is sparingly planted in America, as are several small cut-leaved varieties of the Japanese maple (*A. japonica*).

Marsh Mallow (*Althæa officinalis*). An erect, velvety hairy, herbaceous plant of the mallow family, 2 to 4 feet high, with ovate, three-lobed leaves. It is native to Europe and has become widely naturalized in the United States. The very mucilaginous roots are used in confectionery and in medicine. In France, its leaves, when boiled as a potherb, are much eaten.

Marsh Marigold (*Caltha*). A genus of beautiful marsh plants of the crowfoot family. They have fleshy stems, heart-shaped leaves, and handsome, yellow, white, or pink flowers. There are about 15 species, some 8 of which occur in North America. The common marsh marigold (*C. palustris*), often wrongly called cowslip, is abundant in northern Europe and Asia. It occurs frequently also in swamps and meadows from Newfoundland to Saskatchewan and southward to South Carolina and Nebraska. The marsh marigold is a conspicuous wild flower of early spring, at which season the leafy portion of the plant is often used as a potherb.

Maté (*mä'tā*; *mät'â*) (*Ilex paraguariensis*). A small tree, a holly species, native to Paraguay and southern Brazil. The dried leaves and shoots are used in South America for making a tealike beverage, also called maté. Gathering, drying, and preparing the leaves for the market is an important industry in parts of Paraguay and Brazil. From these countries several million pounds of cured maté leaves, called also Paraguay tea, are exported annually to other parts of South America. The stimulating effects of maté are due to the caffeine which it contains. As ordinarily used, maté is a milder beverage than tea or coffee. See *Cocoa*, *Coffee*, *Tea*.

May Apple (*Podophyllum*). A genus of erect herbs of the barberry family, with horizontal, poisonous rootstocks, large, shield-shaped, palmately lobed leaves, and solitary white flowers. There are four species, one of which is North American. The wild may apple, or mandrake (*P. peltatum*), has peltate leaves about a foot in diameter. The single, large, nodding flower, 2 inches broad, generally appears immediately between two leaves. This plant abounds in low woods from Quebec to Minnesota, southward to Florida and Texas, and also grows wild in Japan. The yellowish, fleshy fruit, about 2 inches long, is edible, though insipid. A purgative resin (podophyllin), much used in medicine, is extracted from the root.

Mayflower. A name given to various plants which blossom in May. In England the hawthorn (*Cratægus oxyacantha*) is commonly called may or mayflower; the cuckoo-flower (*Cardamine pratensis*) and the marsh marigold (*Caltha palustris*) are likewise so named. In New England the trailing arbutus (*Epigæa repens*) is usually known as mayflower, but, in other sections of the United States, the spring beauty (*Claytonia virginica*), the wood anemone (*Anemone quinquifolia*), the pasque flower (*Pulsatilla patens*), the pink azalea (*Azalea nudiflora*), and other plants are sometimes given the name. In New York State the hepatica, or liverleaf (*Hepatica triloba*), is called mayflower.

Mesquite (*měz-kēt'*) (*Prosopis*). A genus of thorny trees and shrubs of the pea family. They bear divided leaves, greenish white flowers in small dense clusters, and long, straight or sometimes twisted pods containing somewhat beanlike seeds. There are about 17 species widely distributed in warm arid regions. Of these, 3 are found in the southwestern United States.

The common mesquite (*P. juliflora*), usually 10 to 15 feet high, has a thick taproot which frequently penetrates to a depth of 50 or more feet. It grows from southern Kansas to southern California and southward to Chile and Argentina. The extremely heavy, close-grained, reddish wood is highly prized for fence posts, railway ties, fuel, and for many other uses. The long, beanlike pods, rich in sugar, supply Mexicans and Indians with nutritious food and are greedily eaten by domestic animals, especially by horses and by burros.

The screw-pod mesquite (*P. pubescens*) is a shrub or small tree, 10 to 25 feet high, somewhat similar to the common mesquite but with spirally coiled, screwlike pods. The screw-pod mesquite occurs from western Texas to Nevada, California, and southward. Both the foregoing are characteristic desert shrubs. Even when the bushy stem is only 2 or 3 feet high, the long, straight taproot may penetrate to the water level 60 feet or more below the surface. These woody roots are used for fuel in regions where no wood of fuel size grows above the ground.

Millet. The name given to various annual grasses cultivated for forage and for food, the most important being certain species of *Setaria*, called foxtail millets.

Common millet (*S. miliacea*), a native of Egypt and Arabia, has been planted since prehistoric times, and was known to the ancient Greeks and Romans. It is an important forage plant in Europe, Asia, and North America, being grown for hay or for soiling and silo purposes in every state in the United States and in the lower provinces of Canada.

Italian millet (*S. italica*), native to eastern Asia, has likewise been cultivated since remote antiquity. It is said to have been planted in China, by royal edict, as early as 2700 B. C. It is now widely grown in Europe, Asia, and America for forage. In the Old World, particularly in China and Japan, the seeds are much used for human food. In Europe and America the nutritious seeds are fed chiefly to poultry and other birds. See *Cereals*, *Grasses*.

Mints (*Labiatæ* or *Menthaceæ*). Aromatic herbs or shrubs of the mint family, mostly with four-sided stems, opposite leaves, and often strongly scented flowers. The family consists of about 3200 species of wide distribution throughout temperate and tropical regions. The foliage of various

mints contains fragrant essential oils, valued as stimulants, for flavoring purposes, and in perfumery. Peppermint, spearmint, and pennyroyal are very widely used, while lavender, spike, thyme, marjoram, basil, and sage furnish well-known oils and flavors. Patchouli, rosemary, and lavender are used in making perfumes. Horehound, ground ivy, dittany, balm, and various other mints enter into household remedies.

Mistletoe (*Phoradendron*). Small shrubs of the mistletoe family (*Loranthaceæ*), parasitic on trees. They have fleshy, evergreen leaves, brittle twigs, small flowers, and pearl-white, viscid, berry-like fruit. There are 157 known species, mostly American, 8 of which occur in the United States. Some of these species, in time, kill the trees which serve as their hosts.

The American mistletoe (*P. flavescens*) has dark green leaves and small, white berries. It grows on deciduous trees, particularly the tupelo, elm, and red maple, from New Jersey to Missouri and southward to Florida and New Mexico. The California mistletoe (*P. villosum*), with similar leaves, forms bushlike clusters on oaks in Pacific Coast valleys.

The European mistletoe (*Viscum album*), long used in Christmas festivities, is closely related to the American species. It is an evergreen bush, about 4 feet in height or length, with crowded branches and small, white, very sticky berries. While parasitic on many kinds of trees, in England and France it grows most abundantly on the apple. When it grew upon the oak, which was but rarely, the mistletoe was an object of veneration by the ancient Druids.

Moonflower (*Calonyction aculeatum*). A climbing plant of the convolvulus family, highly prized for its large, pure white, fragrant flowers which open in the evening and close before noon of the next day. Several handsome varieties are in cultivation.

Morning-glory (*Ipomœa purpurea*). A hardy climbing plant of the convolvulus family, native to Mexico. Many varieties are widely grown throughout the United States. The large, funnel-shaped, variously colored flowers open in the early morning and close during the heat of the day. In many localities it has become naturalized as a weed.

Mosses (*Musci*). A well-marked group of plants, standing next below the fern plants in development. They comprise, with the somewhat less highly organized liverworts, the primary division or subkingdom of plants known as bryophytes. The mosses are small, green plants with structures closely resembling and corresponding to the roots, stems, and leaves of the ferns and seed plants. They are adapted to an immense range of conditions, from almost aquatic to nearly arid, but are most common in cool and arctic regions. There are two chief divisions of mosses, the *Sphagnum* forms, which include the peat-forming mosses, and the *Bryum* forms, which embrace the true mosses.

While peat is of local importance, and various species of *Sphagnum* are used in packing and for surgeons' dressings, the mosses on the whole possess but slight economic value. See *Liverworts*.

Mountain Ash (*Sorbus*). Erect, handsome, ornamental trees of the rose family, closely related to the apple. They bear pinnately divided leaves, white flowers in large flat clusters, and bright red, berry-like fruit. There are about 10 species native to north temperate regions. Of these, 4 occur in North America.

The American mountain ash (*S. americana*), sometimes 30 feet high, grows from Newfoundland to Manitoba, southward to Michigan and along the Appalachian mountains to North Carolina. Various forms are cultivated for the brilliantly colored fruit which ripens in autumn. The western mountain ash (*S. americana sitchensis*) is a small tree or shrub with bright green leaves and large, handsome fruit. It occurs in moist ground from Labrador to Alaska and south to Maine, Michigan, and Utah. When planted for ornament it becomes a tree from 30 to 40 feet high.

The European mountain ash (*S. aucuparia*), called also rowan tree, is very similar to the American species. It is often cultivated in Canada and in the northern United States, where it has become sparingly naturalized.

Mulberry (*Morus*). A genus of trees of the mulberry family, growing in temperate regions. There are about 10 well-marked species with numerous varieties or races, widely distributed throughout America, Europe, and Asia.

The white mulberry (*M. alba*) is a native of Asia but has been naturalized in Europe and in the United States. Generally it is a short, low-branched tree. Its leaves form the favorite food of the silkworm. The tree was extensively planted in the United States in the first half of the 19th century, when an attempt was made to introduce silk culture. The fruits are too dry to be palatable. In Europe the foliage is fed to goats and sheep, and the wood is used for barrel staves. The inner bark furnishes a coarse fiber, a dye is obtained from the roots, and the root bark has medicinal value.

The black mulberry (*M. nigra*) came originally from Persia, but it has long been cultivated in Europe and America for its agreeable, black berries. The juice of the ripe berries has medicinal properties. Sometimes the leaves are fed to silkworms.

The red mulberry (*M. rubra*) is a native American tree found wild from Massachusetts to Nebraska and southward to Florida and Texas. This is the largest of the mulberry trees. Several varieties produce pleasant, reddish black berries, juicy and slightly acid. The dark yellow wood is coarse-grained, tough, and very durable. It is employed for fence posts, for making barrels, churns, and shoe lasts.

Mushrooms. Numerous fungi belonging to two large orders which include the agarics with related forms (*Hymenomycetes*) and the puffballs and their allies (*Gasteromycetes*). Together, these embrace some 40,000 species, widely distributed throughout the world.

Formerly the term mushroom was more generally given to the comparatively small number of forms then known to be edible, while the poisonous kinds, supposed to be exceedingly numerous, were called toadstools. However, since it has been discovered that the dangerous kinds are very few in number while the wholesome or harmless kinds may be counted by thousands, the name mushroom is becoming more and more frequently used for the entire group. Instead of referring to the deadly amanita and the fly agaric, the two most venomous American species, as toadstools, it is more common to call them "poisonous mushrooms," and to call the wholesome field agarics, the morels, and the puffballs "edible mushrooms."

Unfortunately, the poisonous kinds are very widely distributed and closely resemble some of the best edible species. Because of these facts, no one who is not an expert in distinguishing them should gather or use mushrooms for food.

Among the edible mushrooms are many which are greatly esteemed as table delicacies. Their food value, which is often vastly overestimated, is about equal to that of ordinary vegetables. The common mushroom (*Agaricus campestris*), found in fields and pastures, cultivated in Europe since the middle ages, is now widely grown for the market in the United States and other countries. The morels (*Morchella*), common in many parts of the United States and Europe, are highly prized for food, as are many other species, such as the ink cap (*Coprinus*), the parasol mushroom (*Lepiota*), the chanterelle (*Cantharellus*), the fairy ring mushroom (*Marasmius*), and various puffballs (*Lycoperdon*). A highly valued European species is the truffle (*Tuber*), which grows beneath the surface of the ground. See *Fungi*.

Muskmelon (*Cucumis melo*). An annual vine of the gourd family, native to India and Guinea, much prized for its fleshy fruit. In the Old World it has been cultivated for upwards of 2000 years, being depicted in an ancient Roman painting excavated at Herculaneum. In the United States the hard-shelled varieties, with furrowed rind and yellow flesh, are called "cantaloupes," and the soft-shelled varieties, with smooth, netted-veined rind and greenish flesh, are known as "nutmeg" melons. Both kinds, and also the recently introduced winter muskmelon, called the "cassaba" or "pineapple melon," are extensively grown. Muskmelons as a whole rank about fifth in acreage devoted to vegetables. See *Cassaba*.

Mustard (*Brassica*). A genus of plants belonging to the mustard family, with yellow flowers and narrow, beaked pods, containing small, pungent, oil-bearing seeds. Black mustard (*B. nigra*), native to Mediterranean countries, has been cultivated in Europe since ancient times for mustard oil. White mustard (*B. alba*), native to the same region, is grown in Europe, and sparingly in America, as a salad plant, as a condiment, and as a source of mustard oil. The ground seeds are used in medicine as a counterirritant, as a stimulant, and as an emetic.

The foregoing and various related species have become widely distributed as troublesome weeds, including the charlock (*B. arvensis*), hedge mustard (*Sisymbrium officinale*), tumble mustard (*S. altissimum*), hare's-ear mustard (*Conringia orientalis*), and garlic mustard (*Alliaria officinalis*). Hedge mustard is especially detested by truck gardeners because it harbors the clubroot fungus, injurious to cabbage and turnips.

Narcissus. A genus of bulbous plants of the amaryllis family. They bear one or more showy flowers on leafless scapes, the leaves being linear and basal. There are about 20 species, natives of the Old World, mostly blooming in early spring, several of which are very highly prized in cultivation.

The Daffodil (*N. pseudo-narcissus*), native to Europe, has a two-edged scape about a foot high, and bears a solitary, bright yellow flower. This plant has escaped from cultivation in the eastern United States. The poet's narcissus (*N. poeticus*), also native to Europe, with white flowers, has likewise become locally naturalized. The Jonquil (*N. jonquilla*) is much grown for its fragrant yellow flowers, used in making perfumes.

Nettle (*Urtica*). A genus of herbs of the nettle family. They have stinging hairs, opposite leaves, and very small axillary flowers. There are about 30 species, very widely distributed, several of which occur in the United States and Canada.

The tall nettle (*U. gracilis*) grows from 2 to 7 feet in height, with erect branches. It occurs in dry soil from Newfoundland to British Columbia and southward to Louisiana and Colorado. The stinging nettle (*U. dioica*), native to Europe, has a stout stem, 2 to 4 feet tall, densely beset with stinging hairs. This plant has become naturalized from Newfoundland to Colorado. The dwarf nettle (*U. urens*), 6 to 18 inches high, also naturalized from Europe, with stinging-bristly branches, is found almost throughout North America. Various related plants with more or less stinging hairs are also called nettles.

From the fiber obtained from the stems of various Old World nettles many kinds of cordage and cloth are made. The roots and leaves of certain species yield beautiful yellow and green dyes. In India the tubers produced by a native nettle are used for food.

Nutmeg (*Myristica fragrans*). A small evergreen tree of the nutmeg family, about 25 feet high, with shining leaves. It is a native of the Molucca islands, and has long been cultivated in the East Indies as a spice plant. It bears a golden yellow, pearlike fruit, the flesh of which is preserved and eaten as a sweetmeat. The seed is the nutmeg of commerce; from the seed-covering, mace is made. Upon being pressed, nutmegs yield a yellow fat, called nutmeg butter, or oil of mace. From this is obtained the oil of nutmeg, used in flavoring. Nutmeg culture has been successfully established in the West Indies and in Brazil.

Oak (*Quercus*). An important genus of trees or shrubs of the beech family. They bear lobed, toothed, or entire leaves, both deciduous and evergreen, small flowers, and a characteristic nutlike fruit, called an acorn. There are about 220 species, natives of the northern hemisphere. Of these, 138 species, varieties, and hybrids are found in North America. There are two distinct groups, white oaks and black oaks. Those of the first group mature their fruit in one season; those of the second group require two seasons.

Economically, the oaks are among the most valuable of hardwood trees. For many uses the strong, heavy, durable wood of various species is unsurpassed, especially in shipbuilding, mechanical construction, interior finish, floors, and for furniture. The bark of some species is widely used in tanning, while that of others yields dyestuffs and cork. The acorns of several oaks are articles of human food, particularly among the Indians, and since time immemorial have been used for fattening swine. In some regions, as on the Pacific coast of North America, the timber from native oaks is mostly of inferior quality. But in eastern North America and in Europe, the oak, on account of the staunch quality of its wood, is everywhere regarded as a symbol of strength and dependableness.

The white oak (*Q. alba*), a magnificent forest tree, sometimes 150 feet high, with a trunk diameter of 8 feet, is the most valuable American timber oak. It grows from Maine to Minnesota and southward to Florida and Texas.

Other eastern and southern oaks valuable for their timber include the post oak (*Q. stellata*), bur oak (*Q. macrocarpa*), chestnut oak (*Q. montana*), yellow oak (*Q. muhlenbergii*), swamp white oak (*Q. bicolor*), basket oak (*Q. prinus*), red oak (*Q. rubra*), overcup oak (*Q. lyrata*), and water oak (*Q. nigra*). In the same area, but of less importance for timber, are the scarlet oak (*Q. coccinea*), the Texas oak (*Q. texana*), the pin oak (*Q. palustris*), and the shingle oak (*Q. imbricaria*).

The bark of the black oak, or Quercitron (*Q. velutina*), a very common oak from Maine to Minnesota and southward, is used in tanning, as the source of the yellow dye called quercitron, and in medicine. The shingle or laurel oak (*Q. imbricaria*), usually 50 to 60 feet high, has lance-shaped, entire leaves. It grows from Pennsylvania to Wisconsin and southward to Georgia.

The southern live oak (*Q. virginiana*) is a widely branching tree, 40 to 60 feet high, with evergreen, usually entire, leaves. It grows from Virginia to Florida, Texas, Central America, and Cuba. The very heavy, tough wood was formerly much used in shipbuilding.

The maul oak (*Q. chrysolepis*), sometimes 60 feet high, with a trunk diameter of 5 feet, native to the Sierra Nevadas and the Coast Ranges, is the most useful timber oak of California. The Oregon oak (*Q. garryana*), sometimes 55 feet high, with a trunk diameter of 5 feet, occurs from British Columbia to California. Next to the maul oak, it is the most valuable western American timber oak.

The valley oak, or weeping oak (*Q. lobata*), grows from 40 to 75 feet tall, with a round-topped crown which is often broader than high. It is the most characteristic tree of the great California valleys. Not less conspicuous is the California blue oak (*Q. douglasii*) which covers the western foothills of the Sierras; its heavy cross-grained wood is used only for fuel. Its large acorns, and those also of the valley oak, are much used for feeding hogs.

The coast live oak (*Q. agrifolia*) grows usually from 20 to 40 feet high, with widespreading limbs and entire or spiny-toothed evergreen leaves. This tree is very abundant in the southern Coast Ranges of California. The scrub live oak (*Q. dumosa*), 2 to 8 feet high, with small spiny-toothed leaves, is a common chaparral shrub on the Pacific Coast. The most important tree of the oak group in California is the tan oak (*Lithocarpus densiflora*), which yields large quantities of excellent tanbark.

Various native species are often planted for ornament in the United States, as is also the European oak.

The British or European oak (*Q. robur*) is the most important European timber oak. It is native to nearly all parts of Europe, except the far north, and is the only oak growing wild in Great Britain. This is the oak tree celebrated in history and myth. It does not reach the height attained by several American oaks but it surpasses most of them in girth and is very long-lived. Occasionally, it attains immense size and great age. An oak tree known to be 800 years old, in Gloucestershire, England, measured 47 feet in circumference at 5 feet above the ground.

Other important European and West Asian oaks are the holm or evergreen oak (*Q. ilex*), the Turkey oak (*Q. cerris*), the Valonia oak (*Q. ægilops*), the gall oak (*Q. lusitanica*), and the cork oak (*Q. suber*). See *Cork Tree.*

Oat (*Avena sativa*). An annual plant of the grass family, unknown in the wild state but probably native to eastern temperate Europe. It has been cultivated for about 4000 years, having been grown by the Lake Dwellers of the Bronze age, and used for food by the Germans at the time of Pliny. While not adapted to hot countries, the oat is a cereal of the first rank in northern regions. The world crop usually totals between four and five billion bushels, with the United States and Russia as the leading producers. The wild oat (*A. fatua*), usually regarded as a weed, has become an abundant and valuable pasture grass in California. See *Cereals, Grasses.*

Ocotillo (*ō'kō-tēl'yō*) (*Fouquieria splendens*). A thorny shrub of the tamarisk family, sometimes called candlewood. It branches at the base into several slender, intensely spiny stems, 10 to 25 feet high. These are leafy only near the top, and bear at their upper ends narrow clusters of bright scarlet flowers. The ocotillo is a characteristic shrub of rocky mesas and deserts from western Texas to California, and from its thorny appearance is often mistakenly called a cactus. Mexicans weave ocotillo stems into fences for confining chickens and pigs.

Oil Palm (*Elæis guineënsis*). A small tree, 20 to 30 feet high, native to west tropical Africa. The fruit is an immense cluster of orange colored, plumlike drupes, with a hard stone and an oily pulp. Palm oil, obtained from the fruit, is exported in large quantities from western Africa. The tree is now naturalized and cultivated in Brazil and the West Indies. See *Palm.*

Okra (*Hibiscus esculentus*). A soft-stemmed annual of the mallow family, called also gumbo. It is closely related to the shrubby althea of the gardens. Okra grows from 3 to 5 feet high, has crenate leaves, and bears sulphur colored flowers. These are followed by somewhat pyramid-shaped fruiting capsules or seed pods. In tropical countries, and also in the southern United States, the unripe, somewhat gummy seed pods are used in thickening soups. Okra is a native of tropical Africa, where it has been cultivated for many centuries. It reached Egypt about the year 1200, and is now widely grown in warm regions.

Olive (*Olea europea*). A small tree, with a low trunk, willow-like leaves, and yellow flowers, belonging to the olive family. It is a native of Asia Minor and bears a pulpy fruit with an oil-yielding seed of great economic value. Olive oil, widely used for salad dressings and in cooking, takes the place of butter in many countries and is used in medicine as "sweet oil." The pickled fruit, both ripe and green, is also an important article of commerce.

The olive was grown by the ancient Egyptians. It is mentioned in Homer's *Iliad* and in the Bible. Pliny states that the Romans began planting it about 600 B. C. It is much cultivated in dry countries, notably in southern Europe, Asia Minor, South Africa, and Australia. In the United States, olive culture has become established only in California, where it was introduced by the Spanish missionaries about 1770. Since time immemorial the olive branch has been regarded by many of the leading peoples as an emblem of peace.

Olona (*Touchardia latifolia*). A valuable fiber plant of the hemp group, indigenous only to the Hawaiian islands where it has long been cultivated by the native peoples. It is an erect shrub of the nettle family, with slender branches, large, thick leaves, and small flowers in globose clusters. The bark of the young branches contains a bast fiber which, weight for weight, is the strongest known, its tensile strength being about three times that of the best manila or about eight times that of hemp. Olona fiber is remarkably pliable and is easily woven by hand into cloth or cordage. It also possesses extraordinary durability in water. Fish nets and lines made from it are handed down from generation to generation as precious objects and are serviceable after a century of use. See *Hemp, Manila Hemp, Sisal.*

Onion (*Allium cepa*). A biennial plant of the lily family, with slender, hollow leaves, native to southwestern Asia. Since prehistoric times the onion has been cultivated for its pungent, bulbous root, used as a vegetable. It was grown by the ancient Egyptians, by the Greeks and Romans, and is now widely cultivated throughout the world. In the United States it is grown in every state, New York and Ohio usually leading in production. Bermuda onions, Spanish onions, and other foreign varieties are now extensively produced in the southern United States, particularly in Texas and California.

The wild onion (*A. cernuum*), which occurs from New York to British Columbia and southward to Kentucky and New Mexico, sometimes becomes a pestiferous weed. It invades pastures, and cattle feeding upon it produce milk with a marked onion-like flavor. See *Garlic, Leek.*

Orange (*Citrus aurantium*). A small evergreen tree of the orange family, with dark green, oval leaves, white, fragrant flowers, and large, golden yellow, pleasantly flavored fruit. Flowers and fruits in all stages are often found almost continuously on the same tree, but the great mass of fruit ripens at one time or season each year. The orange is a native of southern China, where its cultivation seems to have begun during the middle ages and thereafter spread to India. After about 1500, orange culture rapidly spread throughout warm regions.

The orange is now the most important citrus fruit, and is very extensively grown in Mediterranean countries, India, Japan, the East Indies, Jamaica, and Brazil. In the United States, California and Florida are the leading producers, though some oranges are grown in Louisiana, Texas, and Arizona. Important varieties in the United States are the seedless *navels*, grown in California, and the bronze colored *russets*, grown in Florida. The small, rich flavored *mandarin* orange has recently been introduced from China.

The chief use of the orange is as a dessert fruit. A refreshing drink is made of orange juice, and orange peel is used in making marmalades, in flavoring, and, when candied, as a confection. Bridal

wreaths are made from orange flowers. Orange-flower water and orange-leaf oil are ingredients in perfumes. The fine-grained, yellow wood is valued for turnery and inlaid work.

A deadly fungus disease, known as citrus canker, introduced on orange plants received from Japan, recently spread through the orange groves from Florida to eastern Texas. For several years it threatened to wipe out the orange industry of Florida. The states involved, as well as the Federal government, spent millions of dollars in stamping out this dread disease. See *Citrous Fruits, Tangerine.*

Orchids (*ôr'kĭdz*) (*Orchidaceæ*). A large group of perennial herbs comprising the orchid family. They have corms, bulbs or tuberous roots, sheathing, entire leaves, and irregularly shaped flowers. The flowers are composed of six segments and possess many curiously developed structures to aid in pollination by insects. There are more than 5000 species occurring throughout the world, except in arctic or very arid regions, but most numerous in the tropics. In cool temperate regions orchids grow in the soil, but in the tropics an immense number are epiphytes, perching on trees. Many produce strikingly beautiful flowers, which are highly prized for greenhouse cultivation. Among native North American orchids are the lady's-slippers, pogonias, lady's-tresses, twayblades, rattlesnake plantains, and the coralroot.

Oregon Grape (*Mahonia aquifolium*). A handsome small shrub of the barberry family, with prickly, shining, pinnate, evergreen leaves, yellow flowers, and clustered, acid, blue fruit, somewhat resembling small grapes. It grows wild from western Nebraska to British Columbia and Arizona, and is sparingly cultivated as an ornamental plant. It is called also ash-leaf barberry, holly-leaf barberry, or trailing mahonia, and is the state flower of Oregon.

Osage Orange (*Maclura pomifera*). A thorny tree of the mulberry family, sometimes 50 to 60 feet high, native to rich soil from Missouri and Kansas to eastern Texas. It has a milky sap, dark green, glossy leaves, and bears a hard, yellow, uneven-surfaced, inedible fruit, 4 to 5 inches in diameter, ripening in autumn. The exceedingly strong, heavy, elastic, lemon-yellow wood, prized for railway ties, fence posts, and wheel stock, was used by the Osages and other Indians for bows, whence the name *bois d'arc.* This tree has been widely planted for hedges, and the foliage is used to some extent as food for silkworms. The bark contains a flaxlike fiber, and the root yields a yellow dye, similar to that from fustic.

Palm (*Palmæ* or *Palmaceæ*). The palms form a great natural group or family containing about 150 genera and 1200 species. Nearly all are confined to the tropics where they form a striking and characteristic part of the vegetation.

A typical palm tree has a columnar, buttressed trunk, sometimes more than 100 feet high, crowned with a rosette of huge leaves. However, some palms have branching stems and others are only a few feet in height. Various rattan palms have rope-like stems and climb to heights of several hundred feet by means of hooked prickles.

The leaves are either *palmate,* as in the fan palms, or *pinnate* or feather-like, as in the date palm and the coconut palm. Some fan palms have leaves 30 feet long and 5 feet broad, while certain feather-leaved palms have leaves 50 feet long and 8 feet broad. The flowers grow in enormous clusters,—a single coco palm sometimes producing upwards of a half million blossoms. As to fruits, palms vary immensely. More or less fleshy berries and drupes are the most common forms. Many palm fruits are enclosed in a fibrous husk and often contain a hard nut.

With the exception of the grasses, the palms excel all other families of plants in economic importance. Sugar, wine, starch, oil, wax, and resins are obtained from various species. Others yield valuable fruits, fibers, and timber. Among the most valuable are the coconut palm, the date palm, and the oil palm. A few palms are native in temperate regions, one species (*Chamærops humilis*) growing in southern Europe.

In the southern United States, 10 species of native palms attain the size of trees; of these, 7 are confined to Florida. The Cabbage Palmetto (*Sabal palmetto*) often grows 30 to 40 feet high. The deeply divided leaves are 7 to 8 feet broad. This species grows along the coast from North Carolina to western Florida. The Texas Palmetto (*Inodes texana*), a beautiful, large palm, grows exclusively in the extreme southeast corner of Texas and southward into Mexico. It is much planted for ornament in Texas as far north as San Antonio. The royal palm (*Roystonia regia*) grows from 80 to 100 feet high. The handsome, closely pinnate leaves are 10 feet in length. This palm occurs sparingly in southern Florida and is a common tree in the West Indies. It is widely planted for ornament in tropical countries.

The desert palm, California fan palm, or Washington palm (*Washingtonia filamentosa*) grows from 20 to 75 feet high, with a trunk diameter of from 1 to 3 feet. The palmate leaves, 3 to 6 feet long, bear copious fibers or filaments at the ends of the leaf divisions. This interesting palm grows wild on the western margins of the Colorado desert in southern California, sometimes forming small groves near the mouths of canyons. It is now extensively cultivated for ornament in California, southern Europe, and other warm temperate regions. See *Coconut, Date Palm, Oil Palm.*

Palo Verde (*pä'lô vĕr'dā*) (*Cercidium floridum*). A small, intricately branched tree of the pea family. It grows from 15 to 20 feet high, with a short trunk, smooth, green bark, and minute leaves, which fall soon after appearing, leaving the tree leafless for most of the year. The bright yellow flowers are borne in axillary clusters and are followed by flattened, short, beanlike pods, 3 inches long. The palo verde is a characteristic tree along sandy washes in the Colorado desert of southern California, eastward into southern Arizona, and southward to Mexico.

Papaw (*pà-pâ'*; *pâ'pâ'*) (*Asimina triloba*). A shrub or low tree of the custard apple family. It grows from 10 to 40 feet high in deep, rich soil from Ontario and southern Michigan southward to Florida and Texas. The conspicuous leaves are from 10 to 12 inches long and from 4 to 6 inches wide. The plant bears dark red flowers, nearly 2 inches across, and banana-shaped, sweet, edible fruit, ripening in autumn. See *Papaya.*

Papaya (*pä-pä'yä*) (*Carica papaya*). A palm-like tree of the passion flower family, called also papaw, native to tropical America. It attains a height of 12 to 15 feet, bearing at the summit a crown of large, seven-lobed leaves, with the flowers and fruit below. The papaya is widely cultivated in tropical countries for its orange-yellow, melon-shaped fruit, 8 to 10 inches long, which the tree begins to bear in about a year after planting. The pleasantly flavored, fleshy fruit is eaten raw, cooked, or pickled. See *Papaw.*

Papyrus (*pà-pī'rŭs*) (*Cyperus papyrus*). A stout, reedlike sedge of the Nile valley. It grows from 3 to 10 feet high, and bears a large umbel of drooping flower clusters at the summit of the stem. From the pith of this plant, the ancient Egyptians prepared a kind of paper which they used extensively for manuscripts. Some of these manuscripts, called papyri, now existing are believed to be about 5000 years old. Shortly after the time of Alexander the Great, papyrus paper became the writing material of the Greeks. Later it was extensively used by the Romans for several centuries.

Parasitic (*păr'ă-sĭt'ĭk*) **Plants.** True plant parasites live in part or entirely within the tissues of other plants or animals, and derive their nutriment chiefly from them. Many species of fungi, including the rusts, smuts, mildews, leaf curl, blights, and tree-destroying, bracket-like forms, are parasitic upon other plants. Other fungi, such as the *Trichophyton*, grow in the human skin, producing the diseases known as ringworm, barber's itch, and similar affections. Many kinds of bacteria are always present in the skin and in the digestive organs of various animals. Among the higher, or seed plants, the dodder and rafflesia are true parasites. The mistletoes, which possess more or less green foliage, are only partly parasitic. Epiphytic plants, which merely perch on other plants, as do various orchids, are often wrongly called parasitic plants. See *Epiphytes*.

Parsley (*Petroselinum sativum*). A biennial plant of the carrot or parsley family. It is a native of southern Europe, and has been planted in gardens since the time of Charlemagne. While now widely grown in Europe and the United States as a flavoring plant and for garnishings, it is a relatively unimportant minor vegetable. Apiol, or oil of parsley, obtained from the seed, is used in medicine.

Parsnip (*Pastinaca sativa*). A biennial of the parsley or carrot family, native to northern Asia and Europe. It has been cultivated since the early middle ages for its thick, white, mucilaginous roots, used as a winter vegetable and for feeding cattle. The wild form, with a hard, acrid, somewhat poisonous root, occurs as a weed in the eastern United States and Canada.

Passion Flower (*Passiflora*). A genus of climbing, tendril-bearing vines with mostly alternate leaves and large, showy flowers. There are about 300 species, natives chiefly of tropical America, of which some 10 occur in the southern United States.

These plants were named passion flowers by early Spanish missionaries in America from a fancied resemblance of the parts of the flower to the instruments of Christ's Crucifixion. The fringe or corona was supposed to represent the crown of thorns, the three styles were the nails of the cross, and the five anthers were the marks of the wounds. Omitting Peter who denied and Judas who betrayed, the five sepals and the five petals were regarded as symbolizing the apostles.

The Passion Vine (*P. incarnata*) climbs to a height of from 10 to 30 feet. It has 3-lobed leaves and white flowers with a purple crown. The large, yellow, edible berry is sometimes called maypops. This vine grows from Virginia to Missouri and southward to Florida and Texas. Several tropical species of passion flower produce highly perfumed, delicate, dessert fruits, such as the granadilla, various curubas, the water lemon, and the sweet calabash.

Pea (*Pisum*). An important group of leguminous plants, of great value for food and forage. They are usually tendril-bearing, more or less climbing annuals, with pinnate leaves, white or reddish flowers, followed by straight pods bearing several rounded seeds.

The garden pea (*P. sativum*), a native of western Asia, has been cultivated since remote antiquity for its delicious unripe seeds, used as a table vegetable. It was grown by the Lake Dwellers of the Bronze age and by the ancient Greeks. While the garden pea is chiefly used as a green vegetable, the canning of peas has become an important industry. The numerous varieties belong mostly to two chief types,—those bearing *smooth* seeds, usually low growing, early fruiting plants, and those bearing *wrinkled* seeds, mostly tall, twining, late fruiting plants. A variety with tender, edible pods is called the sugar pea.

The field pea (*P. arvense*), a native of Italy, appears to have been first cultivated by the Greeks and Romans. It is now grown on a large scale in Europe for its dry seeds widely used as food, and for its green parts used to some extent for fodder. While widely grown for food in Canada, the field pea is not extensively cultivated in the United States, although it is locally planted as a forage and soiling crop. See *Leguminous Plants*.

Peach (*Prunus persica*). A small and freely branching tree of the rose family, closely related to the plum. It bears long, lance-shaped, somewhat drooping leaves, and handsome pink flowers which usually appear in advance of the leaves in early spring. Double-flowered forms with variously colored flowers are planted for ornament. The stone fruit, commonly somewhat smaller than an apple, varies greatly in size, color, and downiness of skin. It has a delicious fleshy pulp, containing, when fully ripe, about 9 per cent of sugar. The peach is used in large quantities as a table fruit, and is also extensively canned, dried, or otherwise preserved.

The peach is believed to be a native of China, where it has been cultivated since prehistoric times. About the year 100 it was introduced by way of Persia to the Greeks and Romans, who called it the Persian apple. It is now widely grown in warm temperate regions, particularly in Asia, Europe, and North America. Peaches, unexcelled in quality and productiveness, are produced in various sections from Connecticut to California and southward to Texas and Florida. In the United States the peach ranks second only to the apple as an orchard fruit. California, Georgia, New York, and Ohio are the states which usually lead in production.

Some 300 varieties of the peach are grown in North America. Popularly, these are grouped in two classes, *freestones* and *clingstones*, although these freely merge into each other. According to Price, all the numerous varieties may be separated into five races, the Peen-To, the North China, the South China, the Spanish, and the Persian. The greater part of those commonly grown for the market belong to the Persian strains. Various smooth-skinned varieties are known as *nectarines*. See *Almond, Apricot, Plum*.

Peanut (*Arachis hypogœa*). An annual plant of the pea family, native to Brazil, called also ground nut, earth nut, pindar, and goober. It has a stout, hairy stem, 1 to 2 feet high, spreading branches, and leaves of 3 somewhat beanlike leaflets. The bright yellow flowers are followed by wrinkled pods containing 1 to 4 nutlike, edible seeds. In its manner of fruiting, the peanut is remarkable. When the petals have fallen, the flower stalk bends downward, pushing the growing pods into the ground, where they develop and ripen below the surface.

In South America, the peanut has been cultivated since prehistoric times for its nutritious seeds. About 1500 it was introduced into Africa where it is extensively grown by the native peoples. Its cultivation has now spread to all warm regions. In the United States, the peanut is a crop of increasing commercial importance as far north as Virginia.

While rich in food elements—fats, carbohydrates, and protein—peanuts are eaten chiefly as a confection, or semiluxury, rather than as a regular article of diet. Large and increasing quantities are made into peanut oil and peanut butter and regularly used for food.

Pear (*Pyrus communis*). A small tree of the rose family, closely related to the apple. It bears glossy, pointed leaves, white flowers in umbel-like clusters, and an oblong pome fruit, usually much larger at its outer or blossom end. The fruit is sweeter, juicier, and more melting than the apple, from which it differs also in having grit cells. Among dessert fruits the pear ranks high, and it is extensively used for canning and preserving.

The pear is a native of Europe. It was cultivated by the Lake Dwellers of the Bronze age, and is mentioned by ancient writers, including Homer, Theophrastus, and Pliny. While the pear is widely

grown in temperate countries, its cultivation is most important in France and in the United States. It usually stands fourth among American orchard fruits, being outranked by the apple, the peach, and the plum. Pears are most extensively grown in California, New York, Washington, Michigan, and Georgia. See *Apple*, *Quince*.

Peony (*pē'ō-nĭ*) (*Pæonia*). Large, herbaceous or somewhat shrubby plants of the crowfoot family, mostly native to the Old World. Several species are widely cultivated for their large, beautiful flowers. The common peony (*P. officinalis*), native to southern Europe, is the most widely grown species. It produces large, red, pink, or white flowers in early summer. The white peony (*P. albiflora*), native to Siberia, is much cultivated for its white or pink, fragrant flowers. The tree peony (*P. moutan*), 3 or 4 feet high, is a native of Japan. It produces very large flowers of many colors. The wild peony (*P. brownii*), a fleshy plant about a foot high, with brownish red, leathery flowers, grows in the foothills of the Sierra Nevada and the Coast Ranges.

Pepper (*Piper nigrum*). A climbing shrub of the pepper family, native to India. It bears small red berries, which, when dried, form the black pepper of commerce. White pepper is the seed from which the skin and fleshy parts of the fruit have been removed. The plant has been cultivated since remotely ancient times. Hippocrates, the great Greek physician, used pepper as a medicine about 400 B. C. During the middle ages pepper was one of the most highly esteemed and costly of spices. It is still the most widely used of all spices and is grown in large quantities in the East and West Indies and other tropical countries.

Red pepper (*Capsicum annuum*) is a small annual of the nightshade or potato family, native to Brazil, much planted in gardens in temperate as well as in warm regions. Large-fruited kinds furnish peppers for pickling, while the seeds yield the red pepper, or cayenne pepper, also called "capsicum." Mild forms of red pepper, called "paprika," yield the various condiments known by that name.

Peppermint (*Mentha piperita*). An aromatic plant of the mint family, native to Europe. It is a small perennial which grows 1 or 2 feet high, with oval, pointed, dark green leaves, and small, bluish white flowers, clustered in spikes. The pungent, volatile oil, obtained from the dried leaves by pressure and distillation, has long been used for flavoring candies and in medicine. Hippocrates, the famous Greek physician, who lived about 450 B. C., praised the virtues of this mint, as did Aristotle, Theophrastus, and other great writers of antiquity.

Commercial cultivation for producing peppermint oil is chiefly carried on in Japan and the United States. Michigan, which for a long period grew most of the American crop, was, in 1925, surpassed by Indiana, while Oregon ranked third.

Pepper Tree (*Schinus molle*). An evergreen tree, about 20 feet high, known also as the Peruvian mastic tree and the pea tree. It belongs to the sumac family and is a native of tropical South America. It bears long, resinous, drooping branches, small, narrow, pinnate leaves, and yellowish white flowers. The fruits, which are bright red and aromatic, are borne in graceful pendent clusters. They are about the size of peppercorns and, in Chile, are used as a substitute for pepper. Its rounded top and drooping branches make the pepper tree desirable as an ornamental for lawns and parks.

Introduced into California, the pepper tree quickly became popular there. But orange growers found that it was used as a host plant by certain scale insects very injurious to orange orchards. Further planting of pepper trees was then discouraged, and, in orange growing districts, thousands of the planted trees were cut down.

Perennials. Those plants whose duration of life continues for more than two growing periods are called perennials. They are thus distinguished from annuals, which have one growing period, and from biennials, which have two growing periods.

Persimmon (*pĕr-sĭm'ŭn*) (*Diospyros*). A genus of trees or shrubs of the ebony family. They have very hard, sometimes exceedingly valuable wood, broad leaves, and a juicy, berry-like fruit. There are about 160 species, mostly natives of the tropics, 2 of which occur in the southern United States.

The common persimmon (*D. virginiana*), usually from 30 to 50 feet high with a trunk one foot in diameter, sometimes attains a height of 100 feet. The large, thick, ovate leaves are dark green above and pale beneath. This handsome tree grows wild from Connecticut to Iowa and southward to Florida and Texas. The plumlike, reddish yellow fruit is about an inch long. When ripe, it is usually sweet and edible, especially after frost has acted upon it, but is very astringent when green. The heavy, dark-colored wood is used in turnery. The Texas persimmon (*D. texana*) is a small, densely branched tree common in western Texas and adjacent Mexico.

The Japanese persimmon (*D. kaki*), 10 to 40 feet high, is highly prized and extensively cultivated in China, Korea, and Japan. The excellent fruit, which is several times larger than that of the native American species, somewhat resembles the tomato in appearance and the apricot in flavor. Japanese persimmons are now successfully grown in the southern United States from Virginia to California. See *Ebony*.

Petunia (*pē-tū'nĭ-ā*). A genus of hairy, somewhat sticky, branching herbs of the potato family. They have entire leaves, and bear solitary white, violet, or purple flowers. There are about 12 species, all natives of South America. The white petunia (*P. axillaris*) and the violet petunia (*P. violacea*), native to Brazil, are widely cultivated in innumerable varieties for their beautiful flowers. Both of these species have become somewhat naturalized in the eastern United States.

Phlox (*flŏks*). A genus of perennial herbs of the phlox family. They have opposite, entire leaves and bear large purple, red, or white flowers in terminal clusters. There are about 40 species, native to North America and northern Asia, many of which are widely cultivated in gardens. Some 35 species occur wild in various parts of North America.

The garden phlox (*P. paniculata*) grows from 2 to 6 feet high, with floral clusters, often a foot long, composed of pink, purple, or white flowers. It is native to woods from Pennsylvania to Illinois and southward. This phlox is much planted in gardens in the northern and eastern states, where it freely escapes and runs wild.

The Wild Sweet William (*P. maculata*), 1 to 3 feet high, usually bears pink flowers. It occurs in moist woods from Connecticut to Minnesota and southward to Florida, and is often cultivated.

Pine (*Pinus*). A genus of handsome, cone bearing trees of the pine family. The evergreen, narrow, linear or needle-shaped leaves are usually borne singly or in bundles of 2, 3, or 5, surrounded by a basal sheath. The fruit is a woody cone, maturing at the end of the second or, rarely, of the third season. There are about 100 species, natives of the northern hemisphere, of which some 35 are found in North America.

Pines grow in various situations from sea level to altitudes of 10,000 feet throughout the North Temperate Zone. A few occur on mountains in the tropics. In size they range from small shrubs to lofty trees. The wood is white or yellow, straight-grained, and that of some species is very durable. It varies greatly in hardness and is always more or less resinous. The pines form by far the most numerous group of coniferous trees and are immensely valuable for lumber, pitch, tar, turpentine,

and various resins. Economically, they are the most important group of timber trees, their nearest rivals being the oaks. The pines fall naturally into two groups,—white pines, with little resin in the wood and with 5 leaves in a cluster, and pitch pines, with more or less heavy resinous wood and with 2 or 3, exceptionally 4, leaves in a cluster.

The white pine (*P. strobus*), in England called Weymouth pine, is one of the most valuable timber trees of North America. It often grows 100 feet high, with a straight stem 3 to 5 feet in diameter. The slender leaves are borne in clusters of fives. The range of this pine is from Newfoundland to Manitoba and southward to northern Georgia. The wood is white, practically free from resin, and remarkably straight-grained. The western white pine (*P. monticola*), occurring from northwestern Montana to California, is a similar tree in size and in the value of its wood.

The sugar pine (*P. lambertiana*), a magnificent Pacific Coast species, is the largest of American pines. This handsome tree occasionally attains a height of 150 to 300 feet and a trunk diameter of 12 feet. It bears rigid leaves, 4 inches long, in 5-leaved clusters, and cones 11 to 24 inches in length. The sugar pine grows on mountains from Oregon to Lower California, being most abundant on the west slopes of the California Sierras. It is highly valued for lumber.

The long-leaved pine (*P. palustris*), called also yellow or Georgia pine, ranks high in value among American timber pines, where strength is a requisite quality. It grows near the coast from Virginia to Texas, attaining a height of 120 feet and a trunk diameter of 3 feet, with leaves sometimes 14 inches long in 3-leaved clusters. The hard, very strong, yellowish, resinous wood is used for construction. The long-leaved pine is one of the two southern pines that yield the turpentine and rosin of commerce in the United States. The slash pine (*P. caribæa*) is second only to the long-leaved pine in the production of naval stores. The timber, however, is less valuable because of its coarser grain.

The red pine (*P. resinosa*), wrongly called Norway pine, is found from Nova Scotia to Manitoba and south to Minnesota and Pennsylvania. It usually grows 70 to 80 feet high, with a trunk 2 or 3 feet in diameter, dark green leaves, in 2-leaved clusters, and red-brown bark. The close-grained, pale red wood is highly valued for construction timber.

The western yellow pine (*P. ponderosa*), called also bull pine, is the most abundant and valuable western timber species. It is found throughout a wide range from western Nebraska to British Columbia and Lower California. It is an imposing tree, sometimes 150 to 230 feet high, with a trunk 5 to 8 feet in diameter. The cinnamon-red bark is usually broken into large squarish plates.

The lodgepole pine (*P. contorta*) is a slender tree, usually 70 to 80 feet high. It bears yellow-green leaves, 2 inches long, in 2-leaved clusters, and small prickly cones. This is a common species of pine from the valley of the Yukon in Alaska, southeastward through the high Rockies to New Mexico and Arizona and in the Cascades and Sierras to southern California. The lodgepole pine takes its name from its former use by the Indians in building their tepees or lodges. It is much used for ties and for telegraph and telephone poles.

Of the Old World pines the so-called Scotch pine (*P. sylvestris*) is the most important. This is a 2-leaved species which occurs in immense forests in Europe. It is the chief timber pine of that continent and the only species of pine native to Great Britain. In the eastern United States it is often grown for ornament. Planted in the Nebraska national forest, naturally a treeless, sandy waste, the Scotch pine is proving useful in reforesting that section of western Nebraska.

The Austrian pine (*P. austriaca*), a 2-leaved species common in southern Austria, is a handsome timber pine sometimes 120 feet high. It is planted for ornament and increasingly for forest purposes in the eastern United States. See *Piñon.*

Pineapple (*Ananas sativus*). A perennial plant of the bromelia family, native to tropical America. It grows from 2 to 4 feet in height, producing at the base a rosette of stiff, sword-shaped leaves. From the center of the rosette rises the single, large, fleshy, scaly-coated fruit 4 to 10 inches long. The fruit is surmounted by a cluster of leaves similar to those forming the basal rosette. In appearance, the fruit, which weighs from 4 to 20 pounds, resembles a huge pine cone, whence the name pineapple.

At the time of the Spanish discovery of that region, cultivation of the pineapple was well established in tropical America. Since then it has extended to many warm countries, especially Hawaii and Puerto Rico. The fruit is shipped long distances to market, and quantities are canned.

Piñon (*pē-nyōn′*; *pĭn′yŏn*) (*Pinus*). The Spanish name for two species of nut pines native to the southwestern United States and northern Mexico. They bear large, sweet, edible, oily seeds, ½ to ¾ of an inch long, much used for food by the Indians and the Mexicans, and now often sold in the markets. Both species are small, usually bushy trees, with one or two short, incurved leaves in each leaf sheath. The more important of these is the Rocky Mountain piñon (*P. edulis*), a 2-leaved species which forms large open forests from Colorado and Utah south to Mexico. The single-leaf piñon (*P. monophylla*) grows on desert slopes from Utah to California and southward. The wood of the piñons is locally used for mine-props and for light traffic railway ties. See *Pine.*

Pistachio (*pĭs-tā′shĭ-ō*; *pĭs-tä′-*) (*Pistacia vera*). A tree of the sumac family, native to Persia and Syria, and anciently cultivated in western Asia. It is now widely grown in Mediterranean countries, and also to some extent in southern California, for its small, thin-shelled nuts. These are often called green almonds and are highly prized for flavoring, for oil, and for coloring confectionery and ice cream. A native wild species, recently discovered in southwestern Texas, is the Texas Pistach Tree (*P. texana*).

Pitcher Plant (*Sarracenia*). A genus of peculiar insectivorous marsh herbs of the pitcher plant family. They have urn-shaped leaves and large, nodding flowers. There are about 8 species, natives of eastern and southern North America. The hollow leaves secrete a fluid in which various insects are trapped, decomposed, and finally transformed into plant food.

The common pitcher plant, or Sidesaddle Flower (*S. purpurea*), has purple-veined leaves, sometimes a foot long, and bears a single, large, purple or yellow flower. This interesting plant grows in peaty bogs from Labrador to Alberta and southward to Florida and Iowa. Mosquitoes sometimes breed in the water contained in the pitchers. The Trumpetleaf, or Watercup (*S. flava*), called also trumpets, has trumpet-shaped leaves 1 to 3 feet long, and bears a solitary yellow flower 2 to 3 inches wide. This striking species occurs in bogs from Virginia to Louisiana.

Many species of *Nepenthes*, natives of eastern Asia and the East Indies, bear a pitcher-like organ at the end of the leaves. These plants are now widely cultivated in greenhouses, and are commonly called pitcher plants. In these Old World species the pitcher-like organs usually have lids to keep out the rain, and are provided with downwardly pointing hairs which permit insects to crawl inside but prevent their escape. Some species secrete a sort of digestive fluid which acts upon the bodies of the entrapped insects.

In Australia there is a pitcher plant (*Cephalotes follicularis*) less well known but quite as interesting as the lid-bearing Nepenthes. See *Sundew, Venus's Flytrap.*

Plane Tree (*Platanus*). A genus of large trees with exfoliating bark, native to temperate regions, so named because of their broad leaves and spreading form. There are about 8 species, 3 of which are North American.

The American plane (*P. occidentalis*), commonly called Sycamore, grows sometimes 170 feet high with a basal diameter of 14 feet. It is probably the largest deciduous tree in the United States. It occurs along streams from New Hampshire to Ontario and Nebraska and southward to Florida and eastern Texas. The wood, long a favorite material for tobacco boxes, oxen-yokes, and butchers' blocks, is now largely used for cheap furniture and occasionally for interior finishing. The similar but smaller California sycamore (*P. racemosa*) grows from the Sacramento valley southward to Lower California. The still smaller Mexican sycamore (*P. wrightii*) occurs in southern New Mexico and Arizona.

The handsome Oriental plane (*P. orientalis*) was planted for shade by the ancient Greeks and Romans. The London plane (*P. acerifolia*), a supposed hybrid, is the tree that is frequently grown for ornament in the eastern United States and in California, Oregon, and Washington.

Plum or **Prune** (*Prunus domestica*). A small tree of the rose family, closely related to the cherry, peach, and apricot. It grows usually from 10 to 20 feet in height, and bears a profusion of white blossoms, which appear in early spring, before or with the oval, pointed leaves. The fruit is thick-fleshed, with a flattened, pointed stone and with a smooth skin covered with a whitish bloom.

The plum is a native of southwestern Asia where it has been cultivated since ancient times. The Romans prized the fruit highly. It is now widely grown in temperate regions, and, in the United States, ranks next to the apple and peach as an orchard fruit. Among the best-known varieties are the damson, greengage, Lombard, and Burbank, and various kinds of prunes.

Commercially, the prune is by far the most important variety of the European or *domestica* plum. It contains so large an amount of sugar that the fruit may be dried in the open air without first removing the skins or stones. France, Spain, Turkey, Portugal, Germany, and Jugoslavia produce prunes as do also various parts of South America and Australia. Prune growing was introduced into California in 1856 and the first large orchard was planted at San Jose in 1870. The Pacific states now produce more prunes than the whole of Europe.

The Japanese plum (*P. salicina*), supposed to be a native of China, ranks next in importance to the European plum. It was introduced into the United States in 1870 and has become popular, especially in the South. Many of the orchard plums grown in the eastern United States are selected varieties of native American species, chiefly of the common wild plum (*P. americana*), the Canada wild plum (*P. nigra*), the wild goose plum (*P. hortulana*), and the Chickasaw plum (*P. angustifolia*). There are several other native species, including the beach plum (*P. maritima*), a small shrub found on or near sea beaches from New Brunswick to Virginia, and also the sand plum (*P. pumila*), of the Great Lakes region, a straggling shrub which grows on sandy or rocky shores. See *Cherry*, *Peach*.

Poison Ivy (*Rhus* or *Toxicodendron*). The name popularly given to several small shrubs of the sumac family, the entire herbage of which is more or less poisonous to the touch. They usually bear dark green, trifoliate leaves, small, greenish flowers, and a whitish, berry-like fruit.

The common poison ivy (*R. toxicodendron*) is found from Nova Scotia to British Columbia and south to Florida and Texas. When young, it is a low, woody plant but later becomes a high climbing vine. It bears dark green leaves composed of 3 ovate, entire or slightly toothed leaflets.

The Poison Oak (*R. quercifolia*), of the Southern States, is a small branching shrub, 3 feet high, with 3 somewhat hairy, lobed or deeply toothed leaflets. The Western Poison Oak (*R. obtusiloba*), common throughout California, usually an erect shrub, 4 to 5 feet high, has 3 roundish, variously lobed leaflets, similar to oak leaves but smaller.

The Poison Sumac, Poison Elder, or Poison Dogwood (*R. vernix*), a shrub or small tree, sometimes 25 feet high, grows in swamps throughout eastern North America. It has somewhat ashlike or elderlike, pinnate leaves, composed of from 7 to 13 smooth, pointed leaflets.

The foliage and other parts of each of the foregoing will cause the painful inflammation of the skin known as ivy poisoning. An efficient remedy is to bathe the affected parts with a 5 per cent solution of potassium permanganate. To prevent poisoning when exposure is anticipated, the skin should be washed with a strong solution of ferrous sulphate in water, which should be allowed to dry on the skin. See *Ground Ivy*, *Sumac*, *Virginia Creeper*.

Pollen. The male element of flowering plants. A fine granular or powdery yellow substance, produced and borne within the blossom by the delicate filaments called stamens. Pollination is the transfer of the pollen from the male stamen to the female pistil. The pollen is carried by the wind, by insects such as bees and butterflies, by birds, notably the hummingbird, by snails, or, in the case of some plants, by water. Fertilization occurs when the pollen grain, having germinated, produces a tube which penetrates down through the flower pistil to the ovule or egg at the bottom. This usually takes only a few days or a few hours, but often a much longer period elapses. In this way the seed originates.

Pomegranate (*pŏm'grăn'ât*; *pŭm'-*) (*Punica granatum*). A thorny shrub or small tree of the myrtle family, native to western Asia. It bears glossy leaves, red, waxlike flowers, and a large, globular, yellow or rose-colored fruit. This is sometimes 5 inches in diameter, with a leathery rind enclosing numerous seeds, each separately encased in a juicy pulp. For its sweet or subacid fruit the pomegranate has been widely cultivated in warm regions throughout historic times. It is depicted in ancient Assyrian and Egyptian sculptures, and is believed to have been introduced into southern Europe by the Carthaginians. The pomegranate is sparingly grown in southern Florida, Texas, California, and tropical America.

Poplar (*Populus*). Large, fast-growing trees of the willow family. There are about 37 species, natives of the northern hemisphere. Of these, some 31 species and varieties grow in North America. While of little value for lumber, several species are used for pulp wood, for making woodenware, and are extensively planted for ornament.

The Aspen, or Quaking Asp (*P. tremuloides*), sometimes 100 feet high, with tremulous leaves, grows from the Arctic circle to Mexico, and from Labrador to California. It has a greater range than any other North American tree. The Large-toothed Aspen (*P. grandidentata*), 60 feet high, occurs in the eastern United States and Canada.

The Common Cottonwood, or necklace poplar (*P. deltoides*), sometimes 100 feet high, with a trunk diameter of 8 feet, grows from Quebec to Alberta and south to Florida and New Mexico. The Swamp Cottonwood (*P. heterophylla*), 80 or 90 feet high, with large downy leaves, abundant in the Gulf states, furnishes the lumber known as black poplar.

The balsam poplar, or Tacamahac (*P. tacamahacca*), 80 feet high, with very resinous buds, grows from Newfoundland to Oregon and northward to the Arctic circle. The Balm of Gilead (*P. candicans*), grown as a shade tree, is a cultivated variety of the balsam poplar. The Black Cottonwood (*P. trichocarpa*), often 200 feet high, with a trunk 8 feet in diameter, grows from Alaska to southern California. It is the largest broad-leaved tree native

to the Pacific coast of North America. The wood is much used for barrel staves and woodenware and for pulp.

The white poplar (*P. alba*), of the Old World, the black poplar (*P. nigra*), native of Asia, and the Lombardy poplar (*P. nigra*, var. *italica*), of southern Europe, are much planted for ornamental purposes. Most poplars have thick, handsome foliage, little subject to insect attack, and are very useful as quick-growing shade trees. However, as the penetrating, broomlike roots frequently destroy sewers, the planting of poplars in cities is often discouraged or forbidden.

Poppy (*Papaver somniferum*). An annual, bristly herb of the poppy family, with large, showy, red, yellow, or white flowers. It is a native of the Mediterranean region, where it has been cultivated since remote antiquity, having been grown by the ancient Swiss Lake Dwellers and by the Greeks and Romans. Its seeds are used for food and for making poppy oil, used like olive oil. The dried sap is the source of opium from which morphine is obtained. Cultivation for the production of opium is very extensive in India, China, Turkey, and Egypt. In the United States the poppy is known chiefly as a garden flower.

Potato (*Solanum tuberosum*). A perennial plant of the potato family, native to the mountains of tropical America from Chile to Mexico. It grows from 1 to 3 feet high, with smooth, herbaceous stems and somewhat fleshy, divided leaves. At the top of the stems it bears white or purple flowers, about an inch wide, and a small, globular, purplish fruit or seed ball, about equal to a gooseberry in size. The plant produces, entirely distinct from the roots, numerous tubers or underground stems. These contain accumulations of starch which serve as food for the new plants which grow from the buds or eyes. Under cultivation the tubers become much enlarged, forming a staple article of food in temperate regions.

The potato was in wide cultivation from Chile to Colombia at the period of the Spanish conquest. It was introduced into Europe by the Spaniards early in the 16th century, into England by Sir Walter Raleigh in 1585, and into Virginia about the same date. Next to Indian corn, the potato is the most important contribution of the Americas to the food plants of the world.

The total annual production exceeds five billion bushels, Germany, Russia, Austria, France, Great Britain, and the United States being the chief producing countries.

Privet (*Ligustrum*). A genus of shrubs or small trees of the olive family. They have opposite, entire leaves and white flowers borne in terminal clusters. There are about 35 species, all found in the Old World. The common privet (*L. vulgare*), native to Europe and Asia and long cultivated for ornament, has become naturalized in the eastern United States. The so-called California privet (*L. ovalifolium*), native to Japan, is one of the best varieties for hedges.

Pumpkin (*Cucurbita pepo*). An annual vine of the gourd family with rough, slightly lobed leaves and large yellow flowers. It is a native of temperate North America and was in wide cultivation by the Indians at the period of earliest discovery by Europeans. The vine sometimes exceeds 20 feet in length and its fleshy, deep yellow fruit normally weighs from 15 to 40 pounds. It is planted extensively as a food for cattle and as a vegetable used in making pumpkin pies. A fixed oil, obtained from pumpkin seeds, is used in medicine for expelling tapeworms.

Quassia (*kwŏsh'ĭ-ȧ*; *kwăsh'-*). A group of trees and shrubs of the ailanthus family, natives of warm regions. The extremely bitter root and wood of certain kinds, especially *Quassia amara* of tropical America, are used in medicine.

Quince (*Cydonia oblonga*). A shrub or small tree of the rose family, closely allied to the apple. It has crooked branches and bears large, solitary white or pink flowers. The hard, acid fruit, which in appearance resembles a large yellow apple, cannot be eaten raw. It is, however, widely used in Europe and America for flavoring and for making preserves, marmalades, and jellies.

The quince is a native of Iran and has been in cultivation since a very ancient period, being mentioned in the writings of Plutarch and Pliny. It is a minor orchard fruit and is not grown in large quantities. The largest American orchards are located in western New York. See *Apple*, *Pear*.

Radish (*răd'ĭsh*) (*Raphanus sativus*). A small annual or perennial plant of the mustard family, with lobed leaves and pink flowers. It is a native of temperate Asia and since very ancient times has been cultivated in gardens from China to Europe for its pungent, fleshy root, eaten raw as a relish. Mention is made of the radish in Chinese records dating back to about 1100 B. C. It is now in universal use as a table vegetable throughout the United States and is widely grown in many other countries. In California, the radish, like the mustard in the Eastern States, has become a common field and roadside weed.

Rafflesia (*rȧ-flē'zhĭ-ȧ*; *-zĭ-ȧ*). Remarkable parasitic plants of the East Indies, which attack various vines of the grape family. The only visible part of a rafflesia consists of a huge flower. A species native to Sumatra (*R. arnoldii*) bears a flower three feet in diameter, expanding from a mammoth bud that develops directly from the woody stem of the plant upon which the parasite lives. The flower has the appearance of decomposing flesh and exhales a carrion-like odor which attracts carrion insects. These bear pollen from one plant to another and thereby probably produce cross-fertilization.

Ragweed (*Ambrosia*). A genus of mostly troublesome weeds of the composite family. Their copious wind-borne pollen is the principal excitant of hay fever in late summer and autumn. The chief offender, the common ragweed (*A. artemisiifolia*), with finely cut leaves, infests waste places and cultivated ground. The giant ragweed (*A. trifida*), with large 3-parted leaves, grows in moist, low ground.

Ramie (*răm'ē*) (*Bœhmeria nivea*). An East Indian shrub, 5 to 8 feet high, often called China grass, though it is not a grass but a nettle. Its erect stems furnish a valuable fiber which is stronger than hemp and nearly equal to silk in fineness, pliability, and luster. While experimentally grown in the United States, it is extensively produced only in India and in China. The fiber is highly esteemed for cordage, nets, various fabrics, and in making bank note paper. See *Hemp*, *Manila Hemp*, *Nettle*, *Olona*.

Raspberry, Black (*Rubus occidentalis*). A small, thorny shrub of the rose family, native to the eastern United States and Canada. It bears deep green, trifoliate leaves which are woolly whitened beneath, large white flowers, and a black, juicy, well flavored, somewhat cap-shaped berry. When ripe, this readily separates from the fruiting receptacle, whence the popular name "black cap." Since its introduction into cultivation in 1832, the black raspberry has become an important bush fruit of the United States, ranking third to the strawberry among the so-called small fruits. It is marketed fresh as a table fruit and is extensively canned and preserved. The yellow-fruited raspberry (*R. occidentalis*, forma *pallidus*) occurs wild.

Raspberry, Red (*Rubus idœus*). A small, prickly shrub of the rose family, native to northern Europe and Asia. It has been long and extensively cultivated in Europe for its excellent fruit, but as

yet is rather sparingly grown in the United States. A variety of the native American red raspberry (*R. strigosus*), almost equal in quality and somewhat hardier, is the form most cultivated in America. It is highly prized for making jams and preserves.

Red Snow (*Sphærella nivalis*). A microscopic, one-celled plant, belonging to the algæ, which forms crimson patches on the snow in arctic and alpine regions. The plant thus produces the so-called "red snow" noted by travelers in Greenland and various other frigid districts. See *Algæ*.

Reindeer Moss (*Cladonia rangiferina*). An erect branching lichen, a few inches in height, which covers vast areas of ground in arctic regions. It is the principal food of the reindeer, and forms pasturage for other arctic animals, such as the barren ground caribou and the muskox. In parts of Norway fresh, crisp reindeer moss is sometimes eaten as human food. See *Lichens*.

Resurrection Plant (*Anastatica hierochuntica*). A small herb of the mustard family, native to Arabia, called also Jericho rose. When the seeds have ripened and the foliage has become dry, the branches roll up so that the plant assumes a globular form. Upon being moistened, the branches and leaves unfold, become greenish, and assume for a time the appearance of the growing plant. Various mosslike selaginellas which display similar qualities are sometimes called resurrection plants.

Rhododendron. A large genus of trees and shrubs of the heath family, found in northern temperate regions. There are about 200 species, many of which are noted for their beautiful flowers and evergreen foliage. Several species, together with very numerous hybrids, are highly prized in cultivation.

The great rhododendron (*R. maximum*), called also great laurel and rose bay, and the similarly handsome Mountain Rose Bay (*R. catawbiense*) are abundant in the Allegheny and the Appalachian region. They have large, dark green, shining leaves, and umbellate clusters of pale red or white blossoms, spotted with red or yellow. The great rhododendron, which has been adopted as the floral emblem of West Virginia, is often cultivated, as is also the mountain rose bay.

The western rhododendron (*R. californicum*) is an elegant shrub, 6 to 10 feet high, with shining, leathery leaves, sometimes 6 inches long, and beautiful rose-colored flowers. It grows in open woods from British Columbia to California and is the state flower of Washington. See *Azalea*.

Rhubarb (*Rheum rhaponticum*). A fleshy perennial of the buckwheat family, native to China, commonly called pieplant or wine plant. It has very thick rootstocks from which rise large heart-shaped leaves on flattened, fleshy leafstalks, from 1 to 3 feet long. Rhubarb has been long and extensively cultivated in the Old World as a vegetable, as an ornamental foliage plant, and for the medicinal properties of the root. In the United States it is grown chiefly for its acid leafstalks which are stewed for sauces and pies, made into preserves, and sometimes used in making rhubarb wine.

Rice (*Oryza sativa*). An annual plant of the grass family, 2 to 5 feet high. It is a native of India and has been cultivated since remote antiquity as a cereal grain. Rice is mentioned in Chinese records dating back to about 2800 B. C. It is grown in immense quantities in southeastern Asia, where it affords sustenance to about a third of the human race. Rice is also produced in many other warm and moist regions. Usually, rice is produced only where the land can be flooded during the growing season, but in some districts flooding is not required.

In the United States the cultivation of rice began in the Carolinas about 1700. It is now a crop of importance in Louisiana, Texas, Arkansas, California, Hawaii, and the Philippines. Canada rice (*Zizania aquatica*), the wild rice of North American swamps, while producing a grain of good quality, is not adapted for cultivation. It is, however, important as food for wild ducks. See *Cereals, Grasses*.

Rose (*Rosa*). Erect or climbing shrubs with prickly stems, pinnate leaves, and large, handsome, usually fragrant flowers, which vary in color from red to pink, yellow, and white. There are numerous wild species, all natives of the northern hemisphere, many of which have been long cultivated.

Centuries of floriculture have developed an immense number of varieties which are widely grown in temperate regions. Many of these are greatly prized for their remarkable beauty of form and color and for their delicate fragrance, especially in Europe and America. Just as the chrysanthemum is the favorite flower of the Orient, the rose holds the place of highest esteem in the Western world. It is the most important of cultivated flowers, and is probably grown in more gardens than any other plant. Except for ornamental purposes, roses are of slight commercial importance. The fruit of some varieties is made into preserves, and attar of roses, used in perfumery, and rose water are made from the flowers.

There are two chief groups of cultivated roses,—those which flower but once a year, usually early in summer, sometimes called early roses, and those which bloom more than once, including the perpetual, summer, and autumn roses. Among the summer-flowering roses are the brier, evergreen, damask, French, multiflora, alba, and Provence roses. Among the perpetual varieties are the tea, moss, musk, Bourbon, China, Ayrshire, hybrid tea, hybrid perpetual, and perpetual brier roses. Popular florists' varieties, used for cut flowers, are the red American beauty, the crimson liberty, the cherry-red Ulrich Brunner, the yellow pearl of the garden, the white bride, and the pink bridesmaid roses.

Some 20 species of wild roses grow in North America. The prairie rose (*R. setigera*) has climbing stems, leaves of 3 leaflets, and rose-pink flowers which soon turn white. It is found native from Ontario to Wisconsin and south to Florida and Texas, and is naturalized as far east as Connecticut. The prickly rose (*R. acicularis*), with very spiny stems, leaves of from 5 to 9 leaflets, and large solitary flowers, grows from Quebec to Alaska and south to Colorado. The smooth rose (*R. blanda*), usually lacking prickles, with flowers 3 inches broad, grows from Newfoundland to Saskatchewan and south to New Jersey and Missouri. In its range it is usually the most common wild rose.

The pasture rose (*R. virginiana*), sometimes 6 feet high, with slender spines, few or solitary flowers, which are sometimes double, is found from Newfoundland to Wisconsin and south to Louisiana. It is the commonest wild rose of the eastern United States and Canada. The swamp rose (*R. palustris*), sometimes 8 feet high, with stout recurved spines and clustered flowers, occurs from Nova Scotia to Minnesota and south to Florida and Mississippi. The California rose (*R. californica*), 3 to 5 feet high, sparsely prickled, with flowers in terminal clusters, often forms thickets along creeks on the Pacific coast.

The Cherokee rose (*R. sinica* or *R. lævigata*) is a native of China and Japan now widely cultivated in mild climates. In the southern United States this rose has become thoroughly naturalized, often running wild along roadsides. It is a handsome, high-climbing species, with slender, prickly branches, smooth, shining leaves, usually of 3 leaflets, and large, solitary, white or rarely rose-colored flowers.

Rose Family (*Rosaceæ*). A large natural group of herbs, shrubs, and trees, comprising about 1800 species, very widely distributed throughout the world. It contains many of the most valuable fruits and a large number of the most highly prized

flowering plants, ornamental shrubs, and trees in cultivation. The list of fruits belonging to this family includes the almond, apple, apricot, nectarine, peach, pear, plum, quince, blackberry, loganberry, raspberry, and strawberry. The list of ornamental plants contains the flowering almond, cherry laurel, mountain ash, hawthorn, medlar, and innumerable kinds of roses.

Some authorities regard this large group as comprising three plant families, namely, the apple family (*Malaceæ* or *Pomaceæ*), the peach family (*Amygdalaceæ*, *Drupaceæ*, or *Prunaceæ*), and the rose family proper (*Rosaceæ*). In this division the apple family consists of trees or shrubs which produce a pome fruit, such as the apple, crab apple, pear, mountain ash, and hawthorn. The peach family consists of trees or shrubs which produce a stone fruit, such as the peach, cherry, and plum. The rose family, as thus restricted, comprises herbs, shrubs, or trees which usually produce dry fruits, though some of these fruits are modified into berries, as the blackberry, raspberry, and strawberry, and into fleshy hips, as in case of the rose.

Rubber Tree (*Hevea braziliensis*). A tree of the spurge family, with leaves of three leaflets, small greenish flowers, and capsular, three-sided fruits. It is native to the Amazon valley, but is successfully grown in other tropical regions. In 1940, 97 per cent of the world's rubber came from Malaya and the East Indies and less than two per cent from the Amazon. Rubber is produced from the milky juice, or latex, of this tree. This juice is not the true sap, but a secretion which does not seem to be necessary to the life of the plant. The rubber tree grown as an ornamental house plant is an East Indian species of fig (*Ficus elasticus*). See *Rubber*.

Rye (*Secale cereale*). An annual plant of the grass family, native to northeastern Europe. It is the least ancient of the important cereals. This grain was unknown to the ancient Greeks and Romans, but probably was cultivated north of the Danube before the beginning of the Christian era.

Rye is the hardiest of the cereals, withstanding a wide range of climatic conditions. Besides its cultivation as a food crop, it is sometimes grown as a cover crop and for green manuring. The long, smooth, flexible straw is used in making hats, mats, and paper, for stuffing mattresses and horse collars, and for various packing purposes. In Europe, rye straw is used for thatching houses.

As a food, rye is less nutritious than wheat but superior to barley. It is the chief ingredient in the black bread which is a staple food of northern Europe. In the United States, rye flour is mixed with wheat flour in making rye bread. Among the cereals rye stands fifth, being outranked by wheat, corn, rice, and oats. Russia produces about half of the world's crop of rye, and Germany and Poland grow most of the remainder. See *Cereals*, *Grasses*.

Sagebrush. The name given to various shrubby species of *Artemisia*, of the composite family, native to the plateau regions of the Rocky mountains and westward. They have somewhat hoary leaves, contain a bitter juice, and emit a sagelike odor. The common sagebrush (*A. tridentata*) usually grows from 2 to 5 feet high but sometimes reaches 12 feet. The small, silvery, wedge-shaped leaves are mostly three-toothed at the upper end. This shrub is immensely abundant on high, dry plains, being especially so in Nevada, which is called the sagebrush state. Unlike the greasewood and other shrubs characteristic of alkaline plains, sagebrush usually grows on fertile soils, needing only sufficient water to insure crop production.

Saguaro (*sä-gwä'rō*) (*Carnegiea gigantea*), called also suwarro, giant cactus, or monument cactus. A columnar tree of the cactus family, 15 to 60 or more feet high, with a stout woody trunk attaining a diameter of 2 feet, sometimes unbranched, when it has the appearance of a fluted column. Usually there are 2 or 3 candelabra-like branches above the middle; more rarely there are many branches which rise like organ pipes from near the base. There are no foliage leaves, the ribbed green bark functioning in their stead. Large white flowers are borne along the ribs of the stem. These are followed by crimson, edible fruit.

The saguaro is one of the most remarkable trees in America, its singular appearance making it an extraordinary feature in the desert landscapes of southern Arizona and Sonora, Mexico. It is found also in limited areas in southeastern California See *Cactus*.

Salad Plants. Vegetables whose green parts are used raw as articles of human food. There are three groups, the piquant or warm, the bitter, and the neutral salads. The piquant salads include cress, nasturtium, water cress, and mustard. With the bitter salads are grouped endive, chicory, dandelion, celery, and lettuce. The neutral salads include corn salad and bland forms of lettuce.

Sandalwood (*Santalum album*). A small tree of the sandalwood family, native of India. It is much prized for its close-grained, persistently fragrant wood, extensively used for making chests, boxes, and small ornamental articles. Various somewhat similar woods are also called sandalwood.

Sand Lily (*Leucocrinum montanum*). A small stemless plant of the lily family, with long narrow leaves and delicate white flowers, somewhat resembling those of the narcissus. It is abundant on high plains and foothills of the Rocky Mountain region.

Sapodilla (*săp'ō-dĭl'ä*) (*Achras sapota*). A large evergreen tree of the sapodilla family, with hard, reddish, durable wood and evergreen foliage. It is a native of Central America and tropical South America, where it was in wide cultivation for its luscious, apple-shaped fruit at the time of the Spanish discovery. It is now much grown in other tropical regions. The tree also yields chicle, extensively used for making chewing gum.

Sassafras. Handsome trees of the laurel family, with aromatic foliage and bark. There are only two known species, one North American, the other Asiatic. The sassafras or Ague Tree (*S. variifolium*), usually a shrub or a small tree from 20 to 50 feet high, sometimes attains a height of 125 feet and a trunk diameter of 7 feet. It has a rough bark, entire, mitten-shaped, or three-lobed leaves, all forms of which are often borne upon the same twig, and yellow flowers followed by small dark blue fruit. Sassafras grows in sandy soil from Maine to Michigan and Kansas and southward to Florida and Texas. The fleshy, pungent bark of the root, used in household medicine for making sassafras tea, yields the oil of sassafras employed in flavoring and in perfumery. See *Spicebush*.

Seed Dispersal. The dispersal of seeds is accomplished by four chief agencies: wind, mechanical propulsion, animals, and water. Seeds scattered by the wind include those with fluffy tufts, such as the dandelion or thistle; winged seeds, as the maple and elm; and the tumbleweeds, the stem and branches of which may be rolled along by the wind. The touch-me-not and many other pod-bearing plants scatter their seeds mechanically when the dry pod bursts. Others, such as the burdock, attach themselves to animals by hooks and other clinging devices. Many adhere with mud to the feet of wading birds and may thus be conveyed thousands of miles. Water is instrumental in dispersing many seeds having structures adapted for floating. Walnuts, for example, are frequently carried by streams, and coconuts drift over great expanses of water.

Seed Plants (*Spermatophyta*). The highest of the four great primary divisions of the plant kingdom. They differ from the other groups by the production of seeds. The seed plants, called also spermatophytes, are grouped in two distinct divisions of very unequal size,—the Angiosperms,

which produce seeds inclosed in vessels or seed cases, and the Gymnosperms, which produce naked seeds.

The angiosperms embrace the true flowering plants, characterized by the ordinary conspicuous flower. There are about 140,000 known species of angiosperms. These comprise most of the conspicuous vegetation of the world. They are divided into two very distinct groups, Dicotyledons and Monocotyledons.

Dicotyledons have two or more seed leaves or cotyledons in the seed, net-veined leaves, five- or four-parted flowers, and wood fibers arranged in a ring around the pith. Examples are the common trees, such as the oak, elm, and maple, and familiar herbaceous plants, such as buttercups, roses, peas, violets, mints, and sunflowers.

Monocotyledons have one seed leaf or cotyledon in the seed, parallel-veined leaves, three-parted flowers, and wood fibers scattered throughout the pith. Typical monocotyledons are the pondweeds, aroids, grasses, palms, orchids, and lilies.

The gymnosperms, which number about 500 living species, include the conifers, the cycads, the gnetums, and the ginkgo.

Sego Lily (*Calochortus nuttallii*). A small plant of the lily family, closely allied to the tulip. It has a slender stem springing from a coated bulb, narrow leaves, and strikingly beautiful white flowers streaked with lilac and variously dotted with yellow and purple. It grows in dry soil from South Dakota to New Mexico and west to California and Washington. The early followers of Brigham Young are said to have regarded the edible roots of this plant much as the Jews looked upon the manna which saved them from starvation in the wilderness. The sego lily has figured largely in the history of the Mormon Church in Utah, where it has been formally adopted as the state flower.

Sensitive Plants. Certain species of mimosa, with finely divided leaves, whose leaflets, when lightly touched, fold together in pairs. Upon ruder treatment many nearby leaflets similarly fall together, and, in a short time, the leafstalk itself droops, so that the entire leaf has a withered appearance. If left at rest, the leafstalk soon rises and the leaflets again unfold. The sensitive pea (*Cassia nictitans*), which grows from Maine to Kansas and Texas, and the sensitive brier (*Schrankia uncinata*), of the Southern states, also exhibit similar behavior.

Sequoia (*sē-kwoi'ȧ*). A genus of mammoth evergreen trees of the pine family. They have immense columnar trunks which bear short branches near the top, small oval cones, exceedingly thick bark, and extraordinarily durable, light, reddish wood. There are only two living species, both of imposing stature and narrow geographic range.

The California Big Tree (*Sequoia gigantea* or *S. washingtoniana*) grows in limited areas, or groves, some 26 in number. These are found along the western slope of the Sierra Nevada, at 5000 to 8000 feet altitude, from Placer county to Tulare county, a distance of about 250 miles. Mature trees are about 275 feet high and from 30 to 35 feet in diameter at the flaring, buttressed base, above which the diameter is about 25 feet. The largest standing specimen measures 325 feet in height. A shattered fallen tree, known as the "Father of the Forest," is estimated to have been more than 400 feet high. The red-brown, fibrous bark is from 1 to 2 feet thick. While fanciful estimates of much greater longevity have been made, lumbered specimens show annual rings indicating an age of from 1100 to 2400 years. Although soft and coarse-grained, the reddish wood is extensively made into lumber on account of its remarkable lasting qualities.

The California Redwood (*Sequoia sempervirens*) is a similar but more slender tree. It attains a height of from 200 to 340 feet, with a trunk diameter of 10 to 15 feet, rarely 28 feet, at the thickened base. This tree grows only within the summer fog belt near the ocean from the vicinity of Monterey, California, to the southern borders of Oregon, in an area about 450 miles long and from 1 to 40 miles wide. The age of mature trees is from 500 to 1300 years. This redwood is of great value as a timber tree. The light, soft, straight-grained wood, free from resin and remarkably durable, is suitable for an immense variety of uses, from shingles to interior finishing lumber.

The scientific name *Sequoia* was given in honor of Sequoyah, the noted Indian chief who invented the Cherokee alphabet. See *Big Trees*.

Serviceberry (*Amelanchier*). A genus of shrubs or trees, natives of north temperate regions, closely related to the apple. There are about 25 species, chiefly North American. The best-known is the American serviceberry (*A. canadensis*), called also shadbush and juneberry, found in dry woodlands from Nova Scotia to Minnesota and southward to Florida and Louisiana. It is a medium-sized tree, often cultivated for its early flowers. These appear usually about the time of the shad runs. The sweet, reddish purple fruits vary in size—some being as small as currants while others are as large as cherries. Tool handles and parts of machines are often made of the hard, brown wood.

Sesame (*sĕs'ȧ-mē*) (*Sesamum indicum*). An annual hairy herb of the pedalium family. It is a native of the Sunda islands, where it has been cultivated since ancient times for its oil-bearing seeds. Sesame was introduced into India about 1000 B.C., into Egypt about 500 B.C., and is now widely grown in many tropical countries. The bland, long-keeping oil obtained from its seeds is used for food, like olive oil, and as a cosmetic. The Hindus make a highly nutritious meal from the parched and ground seeds.

Shamrock. A species of hop clover (*Trifolium minus*) is generally regarded as the true shamrock, or national floral emblem of Ireland. Various other plants with small leaves divided into three leaflets, such as the white clover (*Trifolium repens*), the bird's-foot clover (*Lotus corniculatus*), and the wood sorrel (*Oxalis*), are associated with the national badge. It is said that St. Patrick made use of the shamrock to illustrate the doctrine of the Trinity.

Sisal (*Agave sisalina*). A fleshy-leaved perennial of the amaryllis family, closely related to the century plant, native to tropical America. It has long been cultivated in Mexico for its fiber, which is second only to manila hemp in quality. Large quantities are now grown in Yucatan for export to the United States. It is extensively made into binding twine used in harvesting grain, and into various kinds of cordage, coarse cloth, and bags. See *Century Plant*, *Flax*, *Hemp*, *Manila Hemp*, *Olona*, *Ramie*.

Soap Plants. Various plants, belonging to many different families, which contain the poisonous principle, *saponin*. The bruised stems, bark, roots, leaves, or fruits of such plants form a lather in water and may be used like soap for cleansing purposes. Among these are the common soapwort or bouncing Bet (*Saponaria officinalis*), found along roadsides in Europe and America, and the somewhat similar cowherb (*Vaccaria*). The leaves and roots are the parts used for washing, but the reddish bark of the root sometimes stains white articles.

In the southwestern United States and adjoining parts of Mexico, several plants, called by the general name *amole*, are used for soap. Well-known examples are the small agave (*A. heteracantha*) and the soaproot (*Ornithogalum pomeridianum*). The latter plant, which belongs to the lily family, has a bulb from 1 to 4 inches in diameter, which is the part used for cleansing. In California the Indians throw the finely pounded bulb into small ponds,

stupefying the fish so that they may be easily captured. Among other western soap plants are the zygadene (*Zygadenus fremontii*) and the mountain lily (*Leucocrinum montanum*) which are used by the Indians, especially for washing the hair.

Sorghum Cane (*Sorghum saccharatum*). A tall annual of the grass family. It is a native of tropical Africa, cultivated since remote antiquity in Egypt, India, and China. Ages of husbandry have developed many valuable varieties, now widely grown throughout the world. These fall in two groups: (1) the *saccharine*, embracing the sorghum canes grown for making molasses and sirup and for fodder; (2) the *nonsaccharine*, including Kafir corn, durra, rice corn, Jerusalem corn, and broom corn, grown for grain, fodder, and broom fiber.

Spanish Moss (*Tillandsia usneoides*). A peculiar perching plant of the pineapple family, called also New Orleans moss. It has threadlike, grayish stems, covered with small scales, and small, solitary flowers. The plant hangs in festoons from various trees in the Southern States, especially from the live oak. From the fibery stems of the Spanish moss is obtained much of the so-called "hair" extensively employed in making mattresses and furniture. The stems of the plant are also widely used for packing.

Spicebush (*Benzoin æstivale*). A small, graceful shrub of the laurel family, closely related to the sassafras. The spicebush, called also feverbush, is common in moist woods in the eastern United States and Canada. It grows from 4 to 20 feet high, with fragrant twigs and foliage, and bears small, bright yellow flowers and scarlet berries. See *Sassafras*.

Spinach (*Spinacia oleracea*). A small, fleshy-leaved annual of the goosefoot family. It is a native of western Asia, and was anciently cultivated by the Medes and Persians. The plant was introduced into China about 150 B. C., and into Europe about the 15th century. It is now in wide and increasing use as a potherb.

The so-called New Zealand spinach (*Tetragonia expansa*) is a small annual of the carpetweed family, native to seacoasts of Australasia. This plant was first brought to England from New Zealand in 1771 by Captain Cook. It has proved valuable as a salad plant in dry, hot climates, and is sparingly grown in the United States.

Spiræa (*spī-rē'ȧ*). Handsome shrubs of the rose family, usually with small, finely toothed leaves and white or pink flowers borne in clusters. There are about 70 species, natives of north temperate regions, of which about 20 are North American. The Meadowsweet (*S. latifolia*), with white flowers, grows from Newfoundland to Saskatchewan and south to Virginia. The Hardhack (*S. tomentosa*), with woolly leaves and pink flowers, is frequent in swamps from Nova Scotia to Manitoba and south to Georgia. Several hardy foreign species with showy flowers, as, for example, the Bridal Wreath (*S. hypericifolia*), are very widely cultivated.

Spruce (*Picea*). A genus of evergreen coniferous trees with linear, four-sided, spreading leaves, and pendulous cones. There are about 18 species, natives of north temperate and subarctic regions. Eight of these are North American.

The white spruce (*P. canadensis* or *P. glauca*) sometimes attains a height of 150 feet and a trunk diameter of 4 feet. It grows from the northern limit of forests in Alaska southeastward to New York and Montana. This tree is highly valued for lumber and for pulp wood.

The Engelmann white spruce (*P. engelmanni*) often reaches a height of 150 feet and a trunk diameter of 5 feet. This species forms great forests from Alberta and British Columbia southward to New Mexico and Oregon. The wood is extensively used for ties and lumber.

The tideland or Sitka spruce (*P. sitchensis*), usually about 100 feet high, with a trunk 3 feet in diameter, occasionally grows 200 feet high, with a trunk 16 feet in diameter. This giant spruce occurs along the coast from Alaska to northern California. The wood is highly valued for lumber and during the World War was used extensively in making wings for airplanes.

The black spruce (*P. mariana*), commonly 20 to 30 feet high, grows sometimes 100 feet high. It is native to swamps from the Arctic circle southward to Alberta, Michigan, and North Carolina, attaining its largest size in Saskatchewan. This tree is the source of spruce gum, and the wood is used in making paper pulp.

The red spruce (*P. rubens*), usually about 80 feet high, grows from Nova Scotia south to North Carolina. It is used for lumber, sounding boards, and paper pulp. The blue spruce (*P. parryana*), 80 to 150 feet high, grows near streams on high mountains in Colorado, Utah, and Wyoming. Varieties with very blue foliage are widely planted for ornament in America and Europe, the Koster blue spruce being the most popular form.

The Norway spruce (*P. excelsa*) is a handsome, rapidly growing tree, sometimes 150 feet high, with large cones. It is the most important timber spruce of Europe and is widely planted for ornament in the eastern United States and Canada.

The demand for pulp wood has caused the denudation, in the northeastern United States and in the adjacent portions of Canada, of great areas that were formerly covered by dense spruce forests. See *Douglas Fir*.

Squash (*Cucurbita*). A tendril-bearing, vinelike plant, the large fleshy fruit of which is a much used garden vegetable. There are several species, natives of warm climates but widely grown as annuals in all temperate regions. They have large, rough leaves, on long, hollow, juicy stalks, and large yellow flowers. The hard fruits, which in structure are immense berries, occur in a great variety of forms and sizes.

The summer squashes (*C. pepo*) are usually varieties with small fruits, maturing early in the season. These include the scallop, called also "simlin" and "symbling" in southern markets, the pattypan, and the crookneck squashes. The winter squashes mature late in autumn, just before frost. If gathered when fully ripe and handled without bruising, they may be safely stored in dry, cool cellars for several months. The Canada crookneck (*C. moschata*), the China squash, and the cushaw squash belong to another important group.

Strawberry (*Fragaria*). A group of perennial trailing herbs of the rose family, natives of temperate regions, and extensively grown for their fruit. Strawberries are low-growing plants with slender runners which root at the joints, forming new plants. They have divided leaves of three-toothed leaflets, and white flowers. The numerous seeds (akenes) are borne on the surface of a red, greatly enlarged, fleshy receptacle. This fleshy portion forms the edible part of the fruit, the so-called berry.

Garden strawberries are mostly crosses or hybrid forms derived from three wild species,—the European strawberry (*F. vesca*), the American strawberry (*F. virginiana*), and the Chile strawberry (*F. chiloënsis*). Cultivation of the strawberry has been established in Europe for about 500 years. In America, the culture of this fruit dates from the introduction of Hovey's strawberry in 1834. Strawberries are now grown from Florida to Alaska, and constitute the leading small fruit crop of the United States.

Sugar Cane (*Saccharum officinarum*). A perennial of the grass family. It grows from 8 to 12 feet high, with many-jointed stems containing a sweet, juicy pith. The plant is now unknown in the wild state but is believed to have been a native

of the East Indies. Until the recent great development of the sugar beet, sugar cane was the only extensive source of sugar. Anciently cultivated in India, it was brought to Europe during the Crusades, and is now grown in all warm regions, especially in the East and West Indies, Brazil, Mexico, Hawaii, and Louisiana. The plant, which rarely bears seeds, is reproduced by cuttings. A plantation lasts from six to ten years. See *Grasses, Sorghum Cane, Sugar.*

Sumac (*sū'măk*; *shōō'măk*) (*Rhus*). A group of trees or shrubs of the sumac family, many of which are of commercial value. More than 100 species are found in temperate and warm regions, some 15 occurring in North America.

The staghorn sumac (*R. hirta*), of the eastern United States and Canada, with crooked branches, sometimes grows 40 feet high. The dried and powdered leaves were once used in tanning leather, as were both the leaves and bark of the mountain sumac (*R. copallina*) which grows from Maine to Minnesota and south to Florida and Texas. The smooth sumac (*R. glabra*), a small shrub, common from Minnesota eastward and southward, was also sometimes used in tanning.

Among the most important Old World sumacs are the Venetian sumac (*R. cotinus*), called also smoke tree, cultivated for its wood and leaves used in dyeing and tanning; the elm-leaved sumac (*R. coriaria*), valued for its very acid fruit, used as a condiment; the Japanese Varnish Tree (*R. vernicifera*), from which lacquer and candle oil are obtained, and the Australian sumac (*R. rhodanthema*), which yields a very highly prized cabinet wood. See *Poison Ivy.*

Sundew (*Drosera*). A genus of small insectivorous plants of the sundew family. About 85 species are known. Of these, 7 are North American. They are low, bog herbs with small leaves spread out around the base of the slender flower stem. This bears a one-sided cluster of small, usually whitish or pinkish flowers. The leaves are everywhere clothed with viscid, glandular hairs. When irritated, these sticky hairs fold up, entrapping insects and digesting them through the action of enzymes secreted by the plant. The glands of the leaves exude drops of a clear glutinous fluid. These glitter in the sunshine like dewdrops, whence the name sundew. See *Pitcher Plant, Venus's Flytrap.*

Sunflower (*Helianthus*). A genus of tall, mostly perennial herbs of the composite family, comprising some 60 species, nearly all native to the United States. These plants are so named because of their gorgeous flower heads which are encircled by long, bright yellow, petal-like rays. When blossoming, the flowers of some species turn toward the sun.

The common sunflower (*H. annuus*) is a robust annual, long cultivated as a food plant by the American Indians. It is now extensively grown in India, Egypt, and Russia for its oil-bearing seeds. In the United States, the sunflower, though often planted for ornament, is only sparingly grown for seed production and for green fodder.

The Jerusalem Artichoke (*H. tuberosus*), native to the Ohio valley, was formerly widely cultivated by the Indians. It is now grown for its immense tubers, which, in the United States, are used chiefly for feeding swine and, in France, for making alcohol.

Sweet Flag (*Acorus calamus*). An erect plant of the arum family, with long, aromatic rootstocks and sword-shaped leaves. It grows in swamps in Asia, Europe, and eastern North America. The pleasant-scented root is used in confectionery, in perfumery, and in medicine.

Sweet Gum (*Liquidambar styraciflua*). A tall forest tree allied to the witch-hazel family, called also red gum, star-leaved gum, liquidambar, bilsted, and alligator tree. It occurs from Connecticut to Missouri and south to Guatemala, and is remarkable for the fragrant balsam, or gum, it exudes. The wood is hard and takes a high polish but is liable to check and warp. As an ornamental tree the sweet gum has few superiors.

Sweet Pea (*Lathyrus odoratus*). A highly prized garden annual of the pea family, native to Europe. It has been cultivated since ancient times for its beautiful fragrant flowers. Centuries of garden culture have developed an immense variety of sweet peas, differing greatly in form, size, color, and fragrance.

Sweet Potato (*Ipomœa batatas*). A creeping perennial vine of the convolvulus family. It is closely related to the morning-glory and is highly prized for its sweet, edible root. The plant is unknown in the wild state and authorities are not agreed as to whether it was originally native to tropical America or to the East Indies. The sweet potato was anciently grown in China, was in cultivation in the West Indies before the Spanish discovery of America, and is now the most widely used vegetable in tropical and subtropical countries. In the United States it ranks next to the potato among root vegetables. It is an important crop in the South and is grown for home use as far north as New Jersey and southern New York.

Syringa (*sĭ-rĭng'gà*) (*Philadelphus*). Shrubs of the saxifrage family, called also mock orange. There are about 50 species, 25 of which occur in North America. They are mostly of medium size, 6 to 10 feet high, with simple, petioled, opposite leaves, and large, white, orange-like flowers.

The garden syringa (*P. coronarius*), a native of Europe, with sweet-scented, clustered flowers 1 to 1½ inches broad, is extensively planted for ornament in the eastern United States and Canada. The scentless syringa (*P. inodorus*), native of hilly thickets from Virginia to Mississippi, with odorless, usually solitary flowers about 1 inch broad, is widely planted as a garden shrub, as is also the large-flowered kind (*P. grandiflorus*), which grows wild from Virginia to Florida and Missouri. The western syringa (*P. lewisii*), a mountain species, 3 to 6 feet high, with reddish branches and flowers 1½ inches broad, grows on stream banks and hills from Montana and British Columbia to Oregon. This beautiful syringa has been chosen the state flower of Idaho. See *Lilac.*

Tallow Tree. The name given to various trees which yield an oily or resinous substance suit ble for making candles and soap. Among the best-known is the Chinese tallow tree (*Sapium sebiferum*). By crushing and boiling the seeds a hard, white, vegetable tallow is obtained. Since time immemorial in China this substance has been a standard candle making material. The leaves yield a black dye and the stems produce a resin-like copal used in making varnishes. This handsome tree is now cultivated and somewhat naturalized in the Carolinas and the Gulf states. In China the wood is used for furniture and for printing blocks. See *Candleberry.*

Tamarind (*Tamarindus indica*). A handsome tree of the pea family, 70 to 80 feet high, native to India, now extensively cultivated in tropical countries for its fruit. It bears large seed pods which are filled with an acidulous juicy pulp, especially prized for making cooling drinks. The pods and also various preparations of the pulp with sugar or sirup are articles of commerce in many warm regions. In India the tree is grown not only for the fruit pulp but also for the astringent seeds, for the leaves which yield dyestuffs, and for the wood used as timber. The tamarind is grown to some extent in southern Florida where it has become sparingly naturalized.

Tangerine (*Citrus nobilis*). A small, hardy, early variety of the orange, derived from the mandarin orange. The fruit differs from the common orange in its flatter shape and very tender rind

which separates upon the slightest pressure. When fully ripe the tangerine has a peculiarly luscious flavor and a fine fragrance. Small quantities of tangerines are grown in Florida and California. See *Citrous Fruits, Orange.*

Taro (*tä'rō*) (*Colocasia antiquorum*). A perennial of the arum family, native to India and Polynesia. It has been cultivated since ancient times for its large tuberous roots, 12 to 16 inches long, which are a staple food in the Pacific islands. Taro reached China about 100 B. C. and has long been grown in India and Egypt. In Hawaii the cooked root is fermented, the resulting product being called poi. The young leaves are used as a potherb, like spinach or chard.

Tea (*Thea sinensis*). A small evergreen tree of the tea family, native to southeastern Asia. The young leaves of this plant, when properly gathered and cured, become the tea of commerce. In its natural state the tea tree grows sometimes 30 feet in height. It bears long, narrow, somewhat willow-like, leathery leaves and beautiful cream-white or rose-tinted flowers, followed by woody capsules or pods, each containing three round seeds.

To increase the leaf production, the tree is pruned to the form of a much branching shrub from 2 to 4 feet high. The first crop is ready to pick in the third year after planting, and the full crop, sometimes 400 pounds per acre, is established about 5 years after planting. The difference in color and taste between *green* and *black* teas is due to the mode of preparation. In making black tea the leaves are wilted and allowed to ferment before they are subjected to a firing or quick drying process. In making green tea the leaves, as soon as gathered, are withered by steaming in perforated pans, thus retaining the green color, and then are roasted in pans for five minutes. They are next dropped on bamboo mats and rolled by hand, after which they are dried quickly over charcoal fires. Old leaves are often deficient in color and are treated with prussian blue or indigo.

In China, the culture of the tea plant is prehistoric, being mentioned in records dating back to 2700 B. C. In Japan, tea culture dates from the early middle ages. In India and Ceylon, however, tea growing, which has become very extensive, was not begun until about 1870. Japan, including Formosa, produces the most tea; China ranks second in production; and India and Ceylon, third.

The stimulant and tonic properties of tea are due to the presence of theine, an alkaloid identical in chemical composition with caffeine, the active principle in coffee, cocoa, and maté. Tea is used by a greater number of people than is any other beverage. China, Japan, England, Russia, the United States, Canada, and Australia are the leading tea consuming countries. In England several times as much tea as coffee is consumed; in the United States these proportions are reversed. See *Cacao, Camellia, Coffee, Maté.*

Teak (*Tectona grandis*). A valuable timber tree, belonging to the verbena family, native to southeastern Asia. It is a magnificent tree, sometimes 150 feet high and 8 feet in diameter, with large leaves 10 inches long, small, white flowers, and oily seeds encased in hard, bony nuts. The handsome, durable, golden brown wood is so heavy that it sinks in water unless well seasoned. It somewhat resembles mahogany to which it ranks next in market value among commercial hard woods. Teak is extensively used for furniture, wood carving, house building, and shipbuilding. While the immense natural forests have been largely exhausted, teak plantations under British governmental protection have been established in India and Burma.

Tea Oil Tree (*Camellia sasanqua*). A shrub of the tea family, native to China, where it is extensively cultivated. The oil pressed from its seeds is widely used in Chinese cookery. The seed cake remaining after the removal of the wholesome, edible oil, contains the poisonous principle, saponin. As this lathers water, the seed cake is used as a mild soap for washing delicate fabrics. When the bruised seeds or seed cakes are thrown into fish ponds or rivers, the poisonous saponin stupefies fish, so that they rise to the surface and are readily caught. Gardeners' varieties of this beautiful tree are planted for ornament in the United States. By horticulturists, the tea oil tree and several species of *Thea,* now in extensive cultivation, are commonly known as camellias. See *Camellia.*

Thistle. The common name for various prickly or spiny plants of the composite family, many of which are widely distributed as weeds. Of these, the Canada thistle (*Cirsium arvensis*), native of Europe, is one of the most troublesome. The milk thistle (*Silybum marianum*) is a coarse biennial now found from the Atlantic to the Pacific. The white-blotched leaves are sometimes used as a salad or boiled as a potherb. The Scotch thistle (*Onopordon acanthium*), with cottony or woolly leaves, common in the Atlantic states, is said to be the emblem of Scotland. The blessed thistle (*Cnicus benedictus*), with yellow flowers, native of Asia, formerly of high repute for medicinal purposes, has become established in the United States.

Besides the foregoing introduced kinds, there are many native species, such as the common pasture or bull thistle and the tall swamp thistle, which rarely, if ever, become abundant as weeds.

Timothy Grass (*Phleum pratense*). A valuable cultivated grass, native to Europe, sometimes called cat's-tail. It has an erect, slender stem, from 1 to 3 feet high. This bears at the top a dense, cylindrical spike of closely packed flowers, resembling in form that of the common cat-tail of the marshes, but much smaller. This grass was named for Timothy Hanson, who is said to have brought the seed into the Carolinas about 1720. It is often planted with clover and now forms an important part of the hay crop of the eastern United States and Canada.

Tobacco (*Nicotiana tabacum*). A large-leaved annual of the potato family. It is a native of the Peruvian region, now extensively cultivated in many parts of the world. The plant grows from 2 to 5 feet in height, has ovate or lanceolate, pointed leaves, 1 to 3½ feet long, and bears clusters of showy, white or pink, tubular flowers. The leaves, after being prepared by drying and various curing and manufacturing processes, are used for smoking, chewing, and as snuff. Usually the leaves are dried separately or on the stalk, tied in bundles, and placed together in heaps to induce the fermentation by which the various aromas and flavors are developed.

Tobacco for smoking has been in almost universal use among the Indians since ancient times. Tobacco pipes, which are abundant in Aztec tombs, are found also in the remains of the Mound Builders. Tobacco was introduced into France in 1559 by Jean Nicot, whence the scientific name of the plant, *Nicotiana,* and the name of its active principle, *nicotine.* In 1585 Sir Francis Drake took tobacco to England, where Sir Walter Raleigh soon after made pipe smoking fashionable. In America, tobacco culture began with the earliest settlement of Virginia.

The United States is the chief tobacco raising country, producing over a third of the world's crop. Cuba produces the best cigar tobacco, though most Havana cigars are made in Florida by Cubans from raw material imported from the island.

Tomato (*tō-mā'tō*; *tō-mä'tō*) (*Lycopersicon esculentum*). An annual plant of the potato family, native to the Andean region. The fleshy, acidulous fruit is highly prized as a vegetable. Varieties were in cultivation in Peru at the time of the Spanish discovery of that country. The tomato was formerly called the love apple and was long regarded as

poisonous. It is now widely cultivated in temperate regions and is grown more extensively than any other vegetable for canning.

Trumpet Vine (*Campsis radicans*). A climbing shrubby vine of the bignonia family, native to the southern United States. It sometimes grows 40 feet in length, has pinnate leaves, and bears scarlet or orange-yellow, trumpet-shaped flowers 2½ inches long. These are followed by fruiting pods 6 inches long, containing winged seeds. The trumpet vine is highly prized in cultivation, and was once the state flower of Kentucky.

Tulip (*Tulipa*). Hardy, bulbous, early blooming plants of the lily family. They have broad leaves and large, solitary, brilliantly colored flowers. There are about 45 species, natives of Asia and southern Europe. Most cultivated varieties have been derived from a West Asian species (*T. gesneriana*) which was brought to Germany by Gesner in 1559. Nearly 2000 varieties, presenting an immense range of forms and colors, are now catalogued.

Tulip Tree (*Liriodendron tulipifera*). A handsome and valuable tree of the magnolia family, known also as yellow poplar and whitewood. Its columnar trunk attains a height of 60 to 190 feet and a maximum diameter of 10 feet. It bears large, smooth, more or less deeply lobed leaves, and showy, tulip-like, greenish yellow flowers, about 2 inches deep and orange colored within. The fruit, a dry light brown cone, some 3 inches long, sheds its winged seeds in the autumn. This tree, now widely planted for ornament, grows native in rich soil from New England to Lake Michigan and southward to Florida and Louisiana. The soft yellowish wood is much used for cabinet making and interior finish. In Indiana the tulip tree is the state tree.

Tumbleweeds. Various annuals, abundant in prairie regions, which scatter their seeds when the dry matured plants, after being uprooted, are rolled or tumbled from field to field by the wind. Among these are the Russian thistle, the tumbling pigweed, the winged pigweed, and the bugseed.

Tung Tree (*Aleurites cordata*). A tree of Chinese origin producing an oil used in making varnishes, paints, and plastics. The oil comes from five large oil-rich seeds embedded in each fruit, which is about the size of a small apple. The leaves are heart-shaped, tung being a Chinese word for heart. The flowers, borne in close clusters, are bell-shaped, marked with pink or deep yellow in the throat. The tree reaches a height of 40 feet, spreading to about the same width. It begins to produce when five years old. The cultivation of tung trees is a rapidly growing industry along the northern coast of the Gulf of Mexico and eastward to the Atlantic.

Tupelo (*tū'pē-lō*) (*Nyssa*). A genus of large trees or, rarely, shrubs of the dogwood family, natives of America and Asia. Seven species are known, four occurring in the United States.

The Water Gum (*N. biflora*), known also as water tupelo and black gum, is a swamp tree growing near the coast from New Jersey to Louisiana. Its maximum height, 120 feet, is attained in southern Louisiana. The yellowish white wood, though soft, is very tough and difficult to split on account of its twisted grain.

The Black Gum (*N. sylvatica*), called also tupelo gum, sour gum, yellow gum, pepperidge, and stinkwood, is found in rich swampy soil from Maine to Ontario and southward to Texas and Florida. In the mountain regions of Georgia and Tennessee it reaches a height of 110 feet with a trunk diameter of 4 feet. This tree is esteemed for ornamental planting, but it requires moist land.

Tupelo Gum (*N. aquatica*), a swamp-loving tree, called also cotton tupelo, ranges from Virginia to Florida and westward to Texas. It attains a maximum height of about 100 feet and a trunk diameter of 4 feet. The wood is used for crates and boxes.

The Ogeechee Lime (*N. ogeche*), called also Ogeechee plum, gopher plum, and sour tupelo, is a slender tree inhabiting swamps in South Carolina and Florida. It occasionally attains a height of 60 feet, with a trunk diameter of 2 feet. The fruits, which resemble olives in size and shape, are bright red, thick fleshed, juicy, and sour. They are sometimes preserved in sugar. The wood is coarse-grained and weak, but difficult to split.

Turnip (*Brassica rapa*). A biennial plant of the mustard family, very closely related to the cabbage. It has a flattened, white-fleshed root, crowned with a close tuft of hairy leaves. During the second season, a flowering stem, a foot or more high, rises from the center of the leaves. This bears yellow, mustard-like flowers and tiny seeds. The wholesome, edible root is widely used in cool countries as a spring and autumn vegetable and also for feeding dairy cattle and other live stock.

The Swedish turnip, or rutabaga (*B. campestris*), has a somewhat globular, yellow-fleshed root with a more or less elongated neck, bearing smooth, cabbage-like leaves. It is extensively grown in northern regions as a winter vegetable and as a stock food.

Both the common turnip and the rutabaga are believed to be natives of eastern Europe or western Asia, where they have been cultivated since prehistoric times.

Upas (*ū'pȧs*) **Tree** (*Antiaris toxicaria*). A tree of the mulberry family, native to Java, the Philippine Islands, and adjoining regions. The intensely poisonous, milky juice is used by the Malays for tipping arrows. According to a widely repeated myth, there is a poison-vale in Java in which the exhalations from the upas trees are so virulent as to destroy all animal life. It is now believed that the presence of noxious gases in volcanic valleys on the island caused the destruction long wrongly ascribed to the upas tree.

Vanilla. A robust, high-climbing orchid, native to the tropics. It has bright green, fleshy leaves, large, fragrant, greenish white flowers, and a pod-like fruit, opening along the side. The slender, bean-like pods, about 8 inches long, contain a sweet, aromatic, oily pulp and small black seeds. From these fruits, after careful drying, is extracted the vanilla widely used in flavoring and in perfumery. The vanilla of commerce is obtained chiefly from *Vanilla planifolia*, found wild from Mexico to Peru and also widely cultivated. See *Orchids*.

Venus's Flytrap (*Dionæa muscipula*). A remarkable insectivorous plant of the sundew family. It grows wild only in the sandy savannas of North Carolina. The plant bears a slender scape of white flowers. This flowering stem is encircled at the base with hairy, traplike leaves which close suddenly upon insects alighting on them. By means of secretions from the glandular surface of the leaf, portions of the insects thus caught are assimilated as food. This process requires about 14 days, after which the hinged, jawlike portion of the leaf reopens and is ready to capture another insect. After functioning in this manner a few times, the leaf withers and dies. See *Pitcher Plant, Sundew*.

Verbena. A genus of herbs or sometimes shrubs of the vervain family. They have mostly opposite leaves and variously colored flowers. There are about 100 species. With the exception of one species found in Europe, all the verbenas are natives of the New World. Of these, more than 20 occur wild in the United States and Canada. Many coarser-leaved kinds, with narrow spikes of small flowers, usually called vervain, are common weeds. The large-flowered kinds have many handsome representatives in cultivation. The sweet-scented verbena (*V. teucrioides*), native to Brazil, is widely grown for its pinkish white flowers, which are fragrant at night.

Viburnum (*vī-bûr'nŭm*). A large genus of shrubs or trees of the honeysuckle family. They have entire, toothed or lobed leaves, and white, or rarely pink, flowers in dense compound clusters. There are about 100 species, widely distributed throughout the world, comprising many beautiful shrubs cultivated for ornament.

Some 20 species are found in the United States and Canada. Among the best known are the high Bush Cranberry (*V. opulus*), which grows across the continent, and also in Europe and Asia. The red, edible, acid fruit somewhat resembles the cranberry. The Snowball or Guelder Rose of the gardens is a cultivated form with large globular clusters of sterile flowers. The sweet viburnum, called also nannyberry, or wild raisin (*V. lentago*), is a handsome shrub or small tree. It bears beautiful, fragrant flowers, and bluish black, sweet, edible fruit. This species is found from Quebec to Saskatchewan and southward to Georgia, Kansas, and Colorado. The very similar Black Haw (*V. prunifolium*) has a more southern range.

The Wayfaring Tree (*V. lantana*), of Europe, is often cultivated in America. The very similar Hobblebush, or Witch Hobble (*V. alnifolium*), with large round leaves, grows from New Brunswick to Michigan and southward. The Dockmackie (*V. acerifolium*), the Arrowwood (*V. dentatum*), and the Witherod (*V. cassinoides*), of similar range to hobblebush, are handsome shrubs. The Laurustinus (*V. tinus*), prized by the ancient Romans, is a highly valued ornamental plant, suitable for hedges. It is widely grown in California and other mild climates.

Violet (*Viola*). Small herbs of the violet family, which bear delicately beautiful flowers that appear in early spring. In many species, these showy blossoms are succeeded later by inconspicuous flowers which never open, but which produce abundant seeds. In color the flowers range from pure white to various shades of yellow, blue, violet, pink, or purple, and are often variously streaked or tinted. There are two chief groups,—the leafy-stemmed violets and the stemless violets.

Violets usually grow in moist situations and are among the best known and most highly prized plants of our native flora. Many kinds are planted in gardens, and two species, the Pansy (*V. tricolor*) and the sweet violet (*V. odorata*), both natives of the Old World, are very extensively cultivated. The bird's-foot violet (*V. pedata*), which grows wild from Massachusetts to Minnesota and south to Florida and Louisiana, is the parent of several handsome garden varieties.

The early blue violet (*V. palmata*) is the wild okra of the Southern states. Its mucilaginous leaves are largely used by the colored population in making soups.

There are about 300 species of violets, widely distributed throughout the world. Of these, about 75 species are native to North America, north of Mexico, nearly 50 being found wild in the northeastern United States and Canada.

Virginia Creeper (*Psedera quinquefolia* long known as *Ampelopsis quinquefolia*). A handsome, woody vine of the grape family. It has climbing or trailing stems, large, palmately divided leaves, and dark blue, berry-like fruit. It grows wild from Quebec to Saskatchewan and southward to Cuba and Mexico, and is often planted for ornament. The Virginia creeper is sometimes wrongly called woodbine and is often mistaken for poison ivy. From the latter it is easily distinguished by observing the leaves. The leaves of the poison ivy consist of *three* leaflets, while the leaves of the Virginia creeper have *five* leaflets. See *Poison Ivy*.

Wahoo (*wä-hōō'*; *wä'hōō*) (*Euonymus atropurpureus*). A shrub or small tree of the staff-tree family, 6 to 25 feet high, called also burning bush or spindle tree. This tree grows in woodlands from Ontario to Florida and westward to Oklahoma and Nebraska. It bears clusters of small purple flowers, followed by deeply lobed fruiting arils which enclose the seeds. The bright red fruit, which persists after the leaves have fallen, is used for winter decoration. See *Climbing Bittersweet*.

Walnut (*Juglans*). Handsome trees of the walnut family, with dark-colored wood. They have compound leaves, which emit a balsamic odor when bruised, and bear hard-shelled nuts enclosed in fleshy husks. Ten species are found in North and South America, Europe, and Asia, all of which produce sweet, edible nuts. Four species are native to the United States.

The black walnut (*J. nigra*) is a magnificent tree, sometimes 150 feet high, with a trunk diameter of 4 to 6 feet. It occurs in rich soils from Massachusetts to Minnesota and southward to Florida and Texas. It has been lumbered almost to extinction for its exceedingly valuable wood. This is used for furniture, interior finishings, gunstocks, and shipbuilding.

The Butternut, or white walnut (*J. cinerea*), is usually a short-trunked, widely branching tree, from 50 to 75 feet high. It grows from New Brunswick to South Dakota and southward to Georgia and Arkansas. The soft, light brown wood is used for interior finishings of houses and for furniture. The bark and husks of the fruit furnished the yellow dye for woolens used in making the "butternut jeans" of pioneer days.

The rock or Mexican walnut (*J. rupestris*) is a small tree or shrub of stony stream banks from Texas and Arizona, south to Mexico. It bears a deeply grooved, hard-shelled, very sweet nut, the size of a hickory nut. The West Texas form of this species (var. *minor*) has nuts about the size of a large pea. The California walnut (*J. californica*), a graceful tree with a smooth, round nut, grows from the Sacramento valley to the Santa Ana mountains. Horticulturally, it plays a very important part in the walnut growing industry. On the Pacific coast this native species is universally used as a stock on which to graft the finer varieties of the English walnut, thereby greatly increasing the hardiness and productivity of the latter.

The English walnut (*J. regia*), a native of Asia, was cultivated in ancient times in Iran. Thence it was early brought to southern Europe, later to England, and, in the 19th century, to America. The nut was greatly esteemed by the ancient Greeks and Romans, the classic name *Juglans* meaning "Jupiter's acorn" or "nut of the gods." Centuries of cultivation have produced many excellent varieties of the nut, which is now commercially grown in immense quantities in various countries. In California, where cultivation of the English walnut is becoming very extensive, the crop normally exceeds 50 million pounds per annum. The wood of the English walnut is of great value for gunstocks and in veneering.

Water Hyacinth (*Eichhornia speciosa*). A floating aquatic of the pickerel weed family. It is a native of tropical South America, widely cultivated in Europe and elsewhere as an ornamental plant. Its large leaves form rosettes which sometimes rise 2 feet above the surface. From the center of the leaves springs a cluster of showy flowers. The plant multiplies with great rapidity. Within a few years after its introduction, it sometimes chokes large streams so as to impede navigation. The obstruction of the St. John's and other rivers in Florida and of various inland waters in California and in South America, illustrates the danger of planting the water hyacinth to beautify streams.

Water Lily (*Castalia*). A genus of aquatic perennial herbs of the water lily family. They have roundish, shield-shaped, or heart-shaped leaves which float on the surface of the water. Both leaves and flowers grow from thick rootstocks imbedded in the mud of ponds or sluggish streams. The leafstalks and flower stalks sometimes attain a length of several feet, varying with the depth of the water.

The sweet-scented water lily (*C. odorata*) has fragrant flowers from 3 to 6 inches in diameter, mostly white but sometimes pinkish or even deep pink. It occurs throughout the eastern United States and Canada. The white water lily (*C. tuberosa*), with tuberous rootstocks, has large, pure white flowers, 4 to 9 inches in diameter, which are nearly scentless. This species is most abundant in the region of the Great Lakes. The yellow pond lily (*Nymphæa advena*), closely related to the water lily, has yellow flowers tinged with green or brown. It is found from Labrador to Utah and southward.

The starchy seeds and rootstocks of various kinds of water lilies are used for food by native peoples in many districts of Asia, Africa, Australia, and tropical America. In North America, the Indians formerly included the water lily among their food plants.

Watermelon (*Citrullus vulgaris*). An annual vine of the gourd family, native to tropical Africa. It has been cultivated since very ancient times for its large, refreshing fruit, which weighs from 20 to 50 pounds and upwards. In structure, the fruit is really a huge berry with a hard, green, usually variegated rind. This encloses a pink or red pulp with a copious, sweet, watery fluid and numerous seeds. The watermelon is extensively grown in warm regions, particularly in South Russia and in the southern United States. Of the pulp of the ripe fruit, water comprises about 93 per cent and sugar about 2 per cent.

Wheat (*Triticum*). The most valuable and widely useful of the cereal grasses. It is an erect annual, with a hollow, jointed stem, usually from about 2 to 4 feet high, and long flat leaves. It bears at the summit a series of flowering spikelets, each consisting of from 2 to 8 flowers, closely crowded together in a dense, cylindrical, usually bearded head. In this are produced the starchy, gluten-bearing, nutritious seeds, everywhere highly prized for human food.

Wheat is unknown in the wild state but is believed to have been originally a native of the Euphrates region in southwestern Asia. Its cultivation antedates all recorded human history. It was grown by the Lake Dwellers of Switzerland, by the ancient Egyptians, and, as early as 2700 B. C., by the Chinese. Through ages of careful husbandry, wheat has been developed into the most highly esteemed bread plant in western civilization and the most extensively used cereal grain in the world.

While wheat is grown in large quantities in some warm climates, as in Egypt, India, and California, the world's chief supply is produced from 39° to 60° north latitude and from 24° to 40° south latitude. Though a hardy plant, wheat is not grown successfully so far north as barley, oats, or rye. Where the climate is sufficiently mild, wheat is usually sown during the autumn and matures early in the following summer. This is known as *winter wheat*. Where the winters are more severe, wheat is sown in the spring and is harvested after midsummer. Such a crop is called *spring wheat*. Wheat grown in somewhat dry climates is superior in quality to that produced in humid regions.

Of the many varieties of wheat, the true bread wheats are by far the most valuable. This group includes the hard and the soft winter wheats, the hard spring wheats, the white wheats, and the early wheats. The soft winter wheats are produced in the eastern United States, northern Europe, parts of Asia, Australia, and Argentina. The hard winter wheats are grown in the Mississippi valley and the Rocky Mountain region, in western Asia, and in southeastern Europe. The hard spring wheats are cultivated in Minnesota, North and South Dakota, and other northern plains of the United States, in the prairie provinces of Canada, in eastern Russia, and in southwestern Siberia. The white wheats are grown in western Asia, Australia, and along the Pacific coast of North and South America. The early wheats are produced in Australia, India, Japan, and the southern United States.

Besides the standard bread wheats, universally used for making flour, other important varieties are: the club or square head wheat; the poulard wheat; the durum wheat, the hardest known, used in making macaroni; Polish wheat; one-seeded wheat; emmer; and spelt.

In value, the world crop of wheat surpasses that of all other cereals. The total yield usually exceeds four billion bushels, of which Europe, with Russia and France leading, produces about one-half, and the United States about one-fourth. Other important wheat growing countries are Canada, India, and Argentina. See *Cereals*, *Grasses*.

Wild Flowers, American. The number of species of flowering plants growing wild in the United States and Canada is estimated to exceed 10,000. In the northeastern United States and the adjoining Canadian provinces there are about 4000 species. Small's *Flora of the Southeastern United States* describes more than 6300 species. Rydberg's *Flora of the Rocky Mountains and Adjacent Plains* enumerates about 5900. The flora of the Pacific slope embraces some thousands of species.

Many of the plants of one region are found in the adjacent regions and some are common to all parts of the continent. Consequently, the enumerations mentioned contain a large number of duplications. Each major region, however, has many characteristic plants which usually do not occur in the adjoining regions. Examples of wild flowers representative of the chief floral regions north of Mexico are given in the accompanying table.

REPRESENTATIVE AMERICAN WILD FLOWERS

NORTHEASTERN UNITED STATES AND SOUTHEASTERN CANADA

(Manitoba to northern Kansas and eastward)

Adder's-tongue . . . . . (*Erythronium americanum*).
Anemone, or Windflower . . (*Anemone*, various species).
Asters . . . . . (*Aster*, numerous species).
Black-eyed Susan . . . . . (*Rudbeckia hirta*).
Bloodroot . . . . . (*Sanguinaria canadensis*).
Bluebells . . . . . (*Mertensia virginica*).
Blue Flag . . . . . (*Iris versicolor*).
Bunchberry . . . . . (*Cornus canadensis*).
Cardinal Flower . . . . . (*Lobelia cardinalis*).
Columbine, Red . . . . . (*Aquilegia canadensis*).
Coneflower . . . . . (*Rudbeckia*, various species).
Crane's-bill . . . . . (*Geranium maculatum*).
Dogwood, Flowering . . . . . (*Cornus florida*).
Dutchman's-breeches . . . . . (*Dicentra cucullaria*).
Gentian, Fringed . . . . . (*Gentiana crinita*).
Goldenrod . . . . . (*Solidago*, various species).
Harebell . . . . . (*Campanula rotundifolia*).
Hepatica . . . . . (*Hepatica acutiloba, triloba*).
Jack-in-the-pulpit . . . . . (*Arisæma triphyllum*).
Jewelweed . . . . . (*Impatiens biflora, pallida*).
Lady's-slipper . . . . . (*Cypripedium*, various species).
Lily, Wild . . . . . (*Lilium*, various species).
Marsh Marigold . . . . . (*Caltha palustris*).
Moccasin Flower . . . . . (*Cypripedium acaule*).
Oswego Tea . . . . . (*Monarda didyma*).
Pitcher Plant . . . . . (*Sarracenia purpurea*).
Rose, Wild . . . . . (*Rosa*, various species).
Spring Beauty . . . . . (*Claytonia virginica*).
Squirrel Corn . . . . . (*Dicentra canadensis*).
Trailing Arbutus . . . . . (*Epigæa repens*).
Turtlehead . . . . . (*Chelone glabra, lyoni*).
Twinflower . . . . . (*Linnæa americana*).
Violets . . . . . (*Viola*, many species).
Virgin's-bower . . . . . (*Clematis virginiana*).
Wake-robin . . . . . (*Trillium*, various species).
Water Lily . . . . (*Nymphæa, Castalia*, various species).
Wood Betony . . . . . (*Pedicularis canadensis*).

SOUTHERN UNITED STATES

(Virginia to Oklahoma and southward, largely excluding the plants of the Northern states which extend southward)

Azaleas . . . . . (*Rhododendron*, various species).
Black Snakeroot . . . . . (*Cimicifuga racemosa*).
Bluebonnet . . . . . (*Lupinus texensis*).
Colicroot . . . . . (*Aletris farinosa*).
Cup Plant . . . . . (*Silphium perfoliatum*).

REPRESENTATIVE AMERICAN WILD FLOWERS—Con.

SOUTHERN UNITED STATES—Con.

Cypress Vine . . . . . (*Ipomœa quamoclit*).
Fetterbush . . . . . (*Andromeda floribunda*).
Forestiera . . . . . (*Forestiera acuminata*).
Great Laurel . . . . . (*Rhododendron maximum*).
Hydrangea . . . . . (*Hydrangea arborescens*).
Indian Pink . . . . . (*Spigelia marilandica*).
Jessamine, Yellow . . . . . (*Gelsemium sempervirens*).
Leather Flower . . . . . (*Clematis viorna*).
Loblolly Bay . . . . . (*Gordonia lasianthа*).
Magnolia . . . . . (*Magnolia*, various species).
Malvaviscus . . . . . (*Malvaviscus drummondii*).
Maypop . . . . . (*Passiflora incarnata*).
Meadow Beauty . . . . . (*Rhexia virginica*).
Mountain Laurel . . . . . (*Kalmia latifolia*).
Redroot . . . . . (*Ceanothus americanus*).
Rose, Cherokee . . . . . (*Rosa lævigata*).
Salvia, Wild . . . . . (*Salvia coccinea*).
Sneezeweed . . . . . (*Helenium tenuifolium*).
Spanish Bayonet . . . . . (*Yucca filamentosa, baccata*).
Spiderwort . . . . . (*Tradescantia virginica*).
Sweet Bay . . . . . (*Magnolia virginiana*).
Tree Orchis . . . . . (*Epidendrum*, various species).
Trumpet Vine . . . . . (*Bignonia radicans*).
Unicorn Plant . . . . . (*Martynia louisiana*).
Wistaria . . . . . (*Wistaria frutescens*).
Yellowwood . . . . . (*Cladrastis lutea*).

GREAT PLAINS

(Saskatchewan to western Texas)

Blanket Flower . . . . . (*Gaillardia aristata*).
Blazing Star . . . (*Liatris* or *Lacinaria*, various species).
Compass Plant . . . . . (*Silphium aristatum*).
Coneflower, Purple . . . . . (*Brauneria angustifolia*).
Golden Aster . . . . . (*Chrysopsis villosa*).
Golden Pea . . . . . (*Thermopsis rhombifolia*).
Indian Parsnip . . . . . (*Cymopterus glomeratus*).
Loco Weed . . . . . (*Aragallis lamberti*).
Mallow, Red . . . . . (*Malvastrum coccineum*).
Pasque Flower . . . . . (*Anemone patens nuttalliana*).
Pomme de Prairie . . . . . (*Psoralea esculenta*).
Prairie Clover . . . . . (*Petalostemon purpureus*).
Rose, Prairie . . . . . (*Rosa*, various species).
Sand Lily . . . . . (*Leucocrinum montanum*).
Shooting Star . . . . . (*Dodecatheon multiflorum*).
Spring Aster . . . . . (*Townsendia sericea*).
Sunflower, Wild . . . . . (*Helianthus*, various species).
Vetchling . . . . . (*Lathyrus ornatus*).
Western Dandelion . . . . . (*Agoseris glauca*).
Wild Licorice . . . . . (*Glycerrhiza lepidota*).

ROCKY MOUNTAIN REGION

(Alberta to New Mexico and Arizona)

Arnica . . . . . (*Arnica*, various species).
Beardtongue . . . . . (*Pentstemon*, numerous species).
Bitterroot . . . . . (*Lewisia rediviva*).
Columbine, Blue . . . . . (*Aquilegia coerulea*).
Deer's-tongue . . . . . (*Frasera speciosa*).
Evening Primrose . . . . . (*Oenothera*, various species).
Globe Flower . . . . . (*Trollius albiflorus*).
Golden Currant . . . . . (*Ribes aureum*).
Indian Paintbrush . . . . . (*Castilleja*, various species).
Moss Campion . . . . . (*Silene acaulis*).
Mountain Pink . . . . . (*Douglasia nivalis*).
Mountain Primrose . . . . . (*Primula parryi*)
Prickly Poppy . . . . . (*Argemone mexicana*).
Red Heather . . . . . (*Phyllodoce empetriformis*).
Sand Verbena . . . . . (*Abronia fragrans*).
Sego Lily . . . . . (*Calochortus nuttallii*).
Syringa . . . . . (*Philadelphus lewisii*).
Turkey Beard . . . . . (*Xerophyllum tenax*).
Umbrella Plant . . . . . (*Eriogonum*, various species).
White Heather . . . . . (*Cassiope mertensiana*).

PACIFIC NORTHWEST

(Including Oregon, Washington, British Columbia, and southeastern Alaska)

Aconite . . . . . (*Aconitum columbianum*).
Blue-eyed Mary . . . . . (*Collinsia tenella*).
Currant, Red Flowering . . . . . (*Ribes sanguineum*).
Fireweed . . . . . (*Epilobium angustifolium*).
Flowering Dogwood, Western . . . . . (*Cornus nuttallii*).
Gum Plant . . . . . (*Grindelia oregana*).
Hellebore, White . . . . . (*Veratrum californicum*).
Leopard Lily . . . . . (*Fritillaria lanceolata*).
Miterwort . . . . . (*Tellima grandiflora*).
Oregon Grape . . . . . (*Mahonia aquifolium*).
Pearly Everlasting . . . . . (*Anaphalis occidentalis*).
Rattlesnake Plantain . . . . . (*Peramium decipiens*).
Rhododendron, Western . . (*Rhododendron californicum*).
Salal . . . . . (*Gaultheria shallon*).
Salmonberry . . . . . (*Rubus spectabilis*).
Star Flower . . . . . (*Trientalis latifolia*).
Sweet Coltsfoot . . . . . (*Petasites speciosa*).
Valerian . . . . . (*Valeriana sitchensis*).
Wood Orchis . . . . . (*Piperia elegans*).
Yerba Buena . . . . . (*Micromeria chamissonis*).

CALIFORNIA

(Largely excluding the plants of the Pacific Northwest which extend southward)

Baby Blue-eyes . . . . . (*Nemophila insignis*).
Bird's-eyes . . . . . (*Gilia tricolor*).
California Poppy . . . . . (*Eschscholtzia californica*).
Chamisal . . . . . (*Adenostoma fasciculatum*).
Christmas Berry . . . . . (*Heteromeles arbutifolia*).
Cream Cups . . . . . (*Platystemon californicus*).
Farewell-to-spring . . . . . (*Godetia amoena*).
Golden Stars . . . . . (*Bloomera aurea*).
Ice Plant . . . . . (*Mesembryanthemum crystallinum*).
Larkspur, Scarlet . . . . . (*Delphinium nudicaule*).
Lupine . . . . . (*Lupinus*, many species).
Manzanita . (*Arctostaphylos* or *Uva-ursi*, various species).
Mariposa Tulip . . . . . (*Calochortus luteus*).
Miner's Lettuce . . . . . (*Montia perfoliata*).
Mission Bells . . . . . (*Hesperoyucca whipplei*).
Monkey Flower . . . . . (*Mimulus*, various species).
Owl's Clover . . . . . (*Orthocarpus versicolor*).
Pink Paintbrush . . . . . (*Orthocarpus purpurascens*).
Sierra Primrose . . . . . (*Primula suffrutescens*).
Snow Plant . . . . . (*Sarcodes sanguinea*).
Tidytips . . . . . (*Layia platyglossa*).
Whispering Bells . . . . . (*Emmenanthe penduliflora*).
White Sage . . . . . (*Audiberta polystachya*).
Wild Buckwheat . . . . . (*Eriogonum fasciculatum*).
Yerba Santa . . . . . (*Eriodictyon californicum*).
Zygadenus . . . . . (*Zygadenus fremonti*).

Willow (*Salix*). A genus of woody-stemmed plants of the willow family, closely related to the poplar, aspen, and cottonwood. There are nearly 200 species, found in most countries of the world except Australia. About half of all the known species of willows occur in North America, some 20 of which attain the size of trees.

In size, willows vary from tiny, herblike forms only 1 or 2 inches high, found in the arctic regions, to handsome trees 50 to 120 feet high, of temperate countries. As a rule, willows have narrow, lance-shaped, sharply pointed leaves, tough, bitter bark, and soft, white, brittle wood. The small blossoms, usually greenish, are borne in dense clusters called aments, or catkins, the male and female flowers being found on different trees. The small seeds, which are furnished with a long silky down, are often carried great distances by the wind.

Willows usually inhabit the banks of streams, and other low, moist grounds. However, they occur also in similar ground on the alpine summits of mountains, and quite generally in arctic and sub-arctic regions. Their range is from near the extreme northern limit of flowering plants southward to Chile and South Africa. They grow rapidly and have many large roots. These penetrate long distances through moist soil and bind it together with a network of fibers, thus preventing the banks of streams from being worn away.

While the willow is not of great commercial importance, few trees have more varied uses. Because of their rapid growth, various species are planted for hedges, shade and ornamental trees, windbreaks, and quick timber. The wood is used in cabinetwork, for making baseball bats and tool handles, and for wood pulp and charcoal. The bark is used in tanning and yields the bitter crystalline compound *salicin*, used in medicine. Baskets and wickerwork are woven from the young shoots, called osiers, produced by certain species of willows. Osier culture is important in low wet lands in England, France, Belgium, and the Netherlands. Osiers are grown to some extent in the United States, particularly in western New York, southeastern Michigan, and Maryland.

The most important of all the species is the white willow (*S. alba*), found throughout Asia and Europe and widely planted in America. It sometimes

reaches the height of 90 feet. The black willow (*S. nigra*), commonly 30 to 40 but sometimes 120 feet high, with a trunk 3 feet in diameter, is the largest and commonest native willow of North America. It occurs from New Brunswick to Manitoba and Florida, west to California. Except the aspen, the black willow has a more extensive range in North America than any other tree. The pussy or glaucous willow (*S. discolor*), usually a shrub but sometimes 25 feet high, is common on stream banks in the Eastern States and Canada. It bears white, silky, flowering catkins, called "pussy willows," which appear before the leaves very early in spring. The weeping willow (*S. babylonica*), a native of Asia, and the crack willow (*S. fragilis*), a European species, have been widely planted in America.

Winterberry (*Ilex verticillata*). A small shrubby species of holly; called also black alder or Christmas berry. It grows in swamps and on wet banks of streams in the northeastern United States and in adjacent parts of Canada. The oval, pointed leaves turn black in autumn and, after the first severe frosts, soon wither and fall. The greenish white flowers, borne in axillary clusters, blossom in early summer. These are followed by brilliant scarlet berries, about the size of peas. When mature in late autumn, the short-stalked berries are so crowded on the branches that they appear as if arranged in rings (verticillate). The handsome fruit remains on the shrub during winter, furnishing food to various species of birds. Fruit-bearing branches of the winterberry are often sold by city florists for winter decorations.

The smooth winterberry (*I. lævigata*), which occurs near the coast from Maine to Florida, is a beautiful shrub, similar to the black alder. The orange-colored berries, however, ripen earlier, are borne on longer stalks, and are much less crowded on the branches. See *Holly*, *Inkberry*.

Wintergreen (*Gaultheria procumbens*). A small, creeping, evergreen plant of the heath family, known also as checkerberry and partridge berry. It has shining leaves, white, recurved flowers, and bright red, spicy, berry-like fruit. The plant abounds in woods, especially under evergreen trees, in the northern United States and Canada. It yields the oil of wintergreen, much used for flavoring, for perfumery, and in medicine. Various species of *Pyrola* and *Chimaphila* are also called wintergreen.

Winter's Bark (*Drimys winteri*). An evergreen tree of the magnolia family, native to mountains and highlands from Mexico to Patagonia. The bark, which has a very pungent and astringent taste and a peculiar odor, is used as a tonic and as an antiscorbutic. In Brazil and in other South American countries, winter's bark is highly prized as a remedy for scurvy. There are many commercial substitutes for the drug, much so-called winter's bark being obtained from entirely different West Indian trees.

Wistaria (*wis-tā'ri-ā*). A genus of climbing shrubs of the pea family, named in honor of Caspar Wistar, but often spelled *Wisteria*. They have divided leaves and beautiful bluish flowers in drooping clusters. Some species are among the most handsome ornamental climbers. The American wistaria (*W. frutescens*) grows wild in marshy grounds from Virginia to Florida. It attains a length of 30 to 40 feet, and bears fragrant bluish purple flowers. This native climber is sometimes cultivated. The Chinese wistaria (*W. sinensis*), the finest and most popular cultivated species, has showy blue flowers. It is much used as a climber over arbors and the walls of houses.

Witch-hazel (*Hamamelis virginiana*). A large shrub or small tree, related to the sweet gum, with wavy-toothed leaves somewhat like those of the hazel. It grows from 15 to 25 feet high in low woods from Nova Scotia to Minnesota and southward to Florida and Texas. The witch-hazel blossoms late in autumn, the profuse yellow flowers appearing in showy clusters while the leaves are falling. The fruit, a two-seeded, woody capsule which ripens during the ensuing summer, has the peculiar property of shooting its seeds to a considerable distance.

A fluid extract, prepared from the leaves, called "witch-hazel" or "hamamelis," is used as a tonic and as a lotion. It does not, however, possess any known therapeutic value. Great virtues have long been popularly ascribed to a forked branch of this shrub when used as a divining rod for locating water and minerals, whence the name witch-hazel.

Woodbine. A popular name for the European honeysuckle (*Lonicera periclymenum*). The evergreen honeysuckle (*L. caprifolium*) is sometimes styled the American woodbine. Various other honeysuckles and several entirely different twining plants are likewise known as woodbine. For example, in New England, the Virginia creeper, and, in the Southeastern States, the yellow jessamine, are called woodbine, as is, in various districts, the hedge bindweed. See *Honeysuckle*, *Jessamine*, *Virginia Creeper*.

Woodruff (*Asperula odorata*). A small herb of the madder family, commonly called sweet woodruff, native to many parts of Europe. It has a weak but usually erect stem, 5 to 10 inches high, which bears 4 or 5 whorls of lance-shaped leaves, from 6 to 8 in a whorl, and small white flowers. The plant grows in shady woods, and, when dried, has a pleasing fragrance. It makes an agreeable herb tea and is usually one of the ingredients of the so-called "May drink," widely popular in Germany. The Germans in the United States substitute for woodruff the sweet-scented bedstraw (*Galium triflorum*), a closely related and somewhat similar plant, common in rich woodlands.

Dyer's woodruff (*A. tinctoria*), a native of Europe and of Siberia, is a perennial herb with reclining stems bearing whorls of 4 or 6 linear leaves and whitish flowers. In Dalmatia and in various other districts the root is used to some extent as a substitute for madder.

Wormwood (*Artemisia absinthium*). A perennial herb of the composite family, native to Europe and to northern Asia and introduced into the United States and Canada. It has an erect, somewhat woody stem, from 2 to 4 feet high, bearing silvery gray, much divided leaves and small heads of yellowish flowers arranged in racemes. The plant is somewhat aromatic, and all parts, especially the leaves, are intensely bitter.

Formerly wormwood was widely used as a tonic, as a vermifuge, and to protect garments from moths. It is now cultivated to some extent as the source of a bitter aromatic oil used in the preparation of absinthe, a strong alcoholic liquor made chiefly in France. Wormwood is mentioned in the Bible as a symbol of bitterness. The name wormwood is applied also to various other species of *Artemisia*. See *Sagebrush*.

Yam (*Dioscorea*). Twining, herbaceous plants of the yam family, natives of the tropics. They have heart-shaped leaves, small whitish flowers, winged seeds, and very large, tuberous roots. Various species are cultivated for food in warm regions, especially in China, India, and the East and West Indies. The starchy roots are used like the sweet potato, though somewhat coarser fleshed and less palatable. They usually contain an acrid principle which disappears upon cooking. The winged yam (*D. alata*) has immense roots which sometimes attain a weight of 100 pounds. The West Indian yam (*D. sativa*), with smaller roots than the preceding, is grown in southern United States.

Yarrow (*Achillea millefolium*). A small perennial of the composite family, native throughout the northern hemisphere. It was anciently named for

Achilles, to whom legend ascribed the discovery of its virtues. It has a somewhat woolly stem, finely dissected leaves with bitter aromatic taste and odor, and white, pink, or purple flowers borne in a flat-topped cluster. Both the leaves and the flowers are used in medicine, as a stimulant and tonic. The leaves, formerly in high repute for the treatment of wounds, are said to be still so employed in Scotland.

Yeast (*Saccharomycetes*). Yeast plants are single-celled fungi, of microscopic size. They are characterized by a peculiar method of reproduction known as budding, by which, under favorable conditions, they multiply with enormous rapidity. Numerous species live in plant juices or other liquids containing sugar in solution. They secrete a peculiar substance, called an enzyme, which causes the sugar to split into alcohol and carbon dioxide. This process is known as alcoholic fermentation. For many centuries yeasts have been cultivated for the production of beer and for making bread. In the form of compressed yeast, the plant is used as a means of supplying to the human diet certain necessary vitamines. See *Fungi*, *Vitamines*.

Yellowroot (*Xanthorrhiza apiifolia*). A low shrub of the crowfoot family; known also as shrub yellowroot, native to the southern United States. The long roots, the rootstock, and the bark are bright yellow. The root, which is intensely bitter and astringent, is used as a tonic. At the top of the short stem are borne numerous pinnate leaves. These are crowded together near the summit, giving the plant somewhat the appearance of a fern. In autumn, the foliage becomes brilliantly colored. The small wine-colored flowers are arranged in slender, elongated clusters. The name yellowroot is applied also to the goldenseal and to various other plants having yellow roots. See *Goldenseal*.

Yellowwood, American (*Cladrastis lutea*). A beautiful tree of the pea family, known also as Kentucky yellowwood, yellow ash, yellow locust, and gopher wood. This tree, native to rich soils, especially along mountain streams, from western North Carolina to Missouri, is widely cultivated for ornament in the eastern United States. It attains a maximum height of about 50 feet, with a trunk diameter of 3½ feet. The tree bears divided leaves of 5 to 11 leaflets, and showy white flowers in large clusters. The bark is used in medicine and yields a yellow dye. The yellow, strong, hard but brittle wood is sometimes used for making gunstocks. The name yellowwood is applied to various other species of trees.

Yew (*Taxus*). A genus of evergreen trees or shrubs of the yew family (*Taxaceæ*), somewhat related to the pine and hemlock. They have flat, linear leaves, appearing as if in two ranks, a fleshy, cup-shaped, red fruit, nearly enclosing the bony seed, and purplish, thin bark. There are about 7 species, natives of the North Temperate Zone. Of these, 3 occur in North America.

The European yew (*T. baccata*) is a medium-sized, long-lived forest tree, highly prized for its hard, strong, elastic wood, formerly used in making bows. The American yew, or Ground Hemlock (*T. canadensis*), is a low, straggling shrub, usually 1 or 2 feet high and seldom over 5 feet high. It grows in woods from Newfoundland to Manitoba and south to New Jersey and Iowa. The western yew (*T. brevifolia*), a tree sometimes 80 feet high, with a trunk occasionally 4 feet in diameter, occurs from British Columbia to California. The hard, flexible, bright red wood is used for tool handles and machine bearings. The Indians of the northwest coast made from it their best bows and also canoe paddles. The Japanese yew (*T. cuspidata*), an ornamental tree, is gaining favor in this country, especially in its dwarf forms.

The stinking yew, or California Nutmeg (*Torreya californica*), which closely resembles the true yews, is a handsome tree, usually 35 to 50 feet high. It has a straight trunk about 3 feet in diameter, with rigid, bristle-pointed leaves, and a fleshy, plumlike or olive-like fruit. The hard, fine-grained, lemon-yellow wood is very durable.

Yucca (*yŭk'ȧ*). A genus of large plants of the lily family. They have rigid, sharp-pointed leaves, and large nodding flowers sometimes borne in huge terminal clusters. There are about 16 species, natives of North and Central America.

Adam's Needle (*Y. filamentosa*) is a showy species, much cultivated for ornament. It grows wild in sandy soil from Maryland to Louisiana. This plant bears an edible fruit called datile. The Spanish Bayonet (*Y. baccata*) has stout-pointed leaves and dark purple, edible fruit. It occurs native from Texas to California and southward.

The Joshua Tree (*Y. brevifolia*), so named by the Mormons, sometimes grows from 30 to 40 feet high, with a woody trunk 3 feet in diameter. It is a weirdly branching species, characteristic of the Mohave desert, and extending eastward to Utah.

The so-called Mission Bells (*Y. whipplei*) is a handsome plant of the southern California chaparral. It is almost stemless, with numerous rigid, spiny, basal leaves. At flowering time it bears aloft an immense cluster, sometimes 15 feet high, of fragrant, creamy white, somewhat bell-shaped, drooping blossoms.

Zamia (*zā'mĭ-ȧ*). A genus of cycads found only in the tropics and subtropics of the western hemisphere. There are about 30 species, ranging from Florida to Chile. They usually have short, thickened stems, densely covered with persistent leaf bases, and surmounted by a crown of large pinnate leaves. In old plants the central portion of the stem often contains much starch, from which a kind of sago or arrowroot is made.

From the tuberous rootstocks of the Coontie (*Z. pumila*), which grows in low grounds in Florida, the Seminole Indians prepared a favorite starch food. This was later used by the whites and called Florida arrowroot. The misleading name "sago palm" has been given to this plant.

Zanthoxylum (*zăn-thŏk'sĭ-lŭm*). A genus of prickly trees or shrubs of the rue family, with divided leaves and small greenish flowers. There are about 150 species, natives chiefly of tropical regions. Of these, 4 occur in the United States.

The Prickly Ash (*Z. americanum*), usually 6 to 10 feet high but sometimes 25 feet high, bears its leaves and flowers in axillary clusters. It is found wild from Quebec to South Dakota and southward to Virginia and Kansas. The Southern Prickly Ash, Toothache Tree, or Pepperwood (*Z. Clava-Herculis*), usually 25 or 30 feet high but sometimes 50 feet high, bears its flowers in terminal clusters. This very prickly tree grows along streams from Virginia to Texas. The bark and fruit of both the foregoing species have powerful stimulant and tonic properties.

The Satinwood (*Z. flava*), called also yellowwood, is a small evergreen tree of southern Florida and the West Indies. The hard, yellow wood takes a satiny polish and is in demand for making furniture and tool handles. A smaller, shrubby, nearly spineless species (*Z. coriacea*) occurs in southern Florida and in Cuba.

Zinnia (*zĭn'ĭ-ȧ*). A genus of herbs and half-shrubs of the composite family. There are about 20 species, natives of mountainous regions from southern Colorado to Chile, but most numerous in Mexico and in Central America. Generally, zinnias have opposite, undivided leaves and bear showy heads of flowers. Several species have become popular in cultivation. Of these, the best-known is the garden zinnia (*Z. elegans*). This is an erect annual, usually about 18 inches high, bearing large, handsome flowers which exhibit a great range of colors. There are both single and double forms, the heads of which often exceed 3 inches in diameter. Zinnias are hardy, thrive on great variety of soils, and bloom profusely from midsummer until frost.

TEST QUESTIONS

Distinguish between the fields of science, philosophy, and art, in respect to subject matter and purpose 857
Enumerate some important results of progress in chemistry; in physics 857
Give several illustrations of the practical results arising from the use of the microscope in the study of plants and animals 858
To what is the success of science due? What is a working hypothesis? Name some conspicuous examples of such hypotheses . . . 858
Point out the characteristics of the scientific attitude 858
Discuss the general application of scientific methods in practical affairs 858

PHYSIOGRAPHY

State the three divisions of the earth with which physiography is concerned. Name several sciences closely related to physiography 859
Describe the character and origin of adobe soils. 859
Name and locate two important examples of æolian deposits 859
Enumerate several ways in which the air plays a part in human life 859
What is alluvium? Where are important alluvial areas to be found? 859
State some explanations of the formation of anchor ice 859–860
Describe the air movement in the anticyclone. What weather changes may accompany the anticyclone? 860
State the conditions of climate implied in the term aridity. Point out some striking types of vegetation and animal habits developed under arid conditions 860
Name the principal constituents of the earth's atmosphere 860
To what cause is the aurora borealis now ascribed? What name is given to the similar phenomenon in the southern hemisphere? . 861
Describe the following: barrier beach; barrier reef; beach 861
What conditions are said to account for the form of the distribution of buttes? 861
By what process are caves produced? Name some famous caves 862
Explain the application of the name chinook; of cirque 862
Define climate. State its chief elements. Point out the important factors that determine variations of climate 862
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Of what are clouds composed? Describe the principal kinds of clouds 862–863
To what conditions of rainfall is the term cloudburst applied? 863
Name the six continents. What is a continental platform? Give the average height of land on the continents 863
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Discuss the character and the causes of deserts. 864
Explain the formation of dew. What is the meaning of the expression dew point? . 864–865
Describe the following: dike; drumlin; dune. Discuss the origin and some effects of atmospheric dust 865
To what causes are earthquakes ascribed? In what countries are earthquakes most frequent? Where are they least frequent?. 865–866
Define erosion. Point out the effects of several agents of erosion 866
Define escarpment. What is an esker? Give examples of the effect of faulting 866
Explain the formation of fiords 866
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Indicate the conditions under which frost is formed. Compare these conditions with those attending the production of dew. What is "black frost"? 867
State an accepted explanation of the action of geysers 867–868
Enumerate the types or classes of glaciers. Give examples of the important earth-shaping work of the Ice Age glaciers in the United States and Canada 868
Describe the Gulf Stream 868
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Distinguish between thermal, tepid, and hot springs. To what characteristics are the curative properties of some hot springs ascribed? Discuss the term humidity 869
In what parts of the world do the greatest number of hurricanes occur? 869
Define hydrosphere. State the greatest depth of the Atlantic Ocean; of the Pacific. Compare the mass or weight of the sea with that of the air; with that of the solid part of the earth 869
Why can ice float on water? Illustrate the process of regelation 870
What is an iceberg? What proportion of an iceberg usually appears above water? Indicate the usual form of antarctic icebergs 870
Point out the processes by which continental islands are formed. To what agencies are oceanic islands due? 870
Define isobars 870
Indicate the origin and the course of the Japan Current 871
To what earth formations are the names kame and kettle hole applied? 871
Discuss some of the important effects of the Labrador Current 871
To what origin are the many lakes in high latitudes attributed? What lake, so far as known, is the deepest in the world? From what sources is lake water derived? Point out some important climatic effects of the Great Lakes. Indicate some of their other economic values 871
Describe the nature and origin of lava. To what practical uses are some lavas applied? Locate two great plateaus formed by lava flows 872
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Explain the origin and application of the term monadnock 874
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By what three processes are mountains formed? Name the highest peak in North America; in Canada; in the United States 874
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To what causes are the great ocean currents due? Indicate some of the important effects of these currents 875

Define pampas; peat bogs; potholes 876
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Distinguish between weather and climate. . . 886
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Describe the region between the site of the Appalachian mountains and that of the Rocky mountains as it appeared in the Ordovician period 890
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Distinguish between weight and mass. Define the dyne 927
Define the term work as used in mechanics. What is energy? What is meant by power? . 927
Describe some simple machines. Define mechanical advantage and explain how the theoretical mechanical advantage can be determined 928
Distinguish between solids, liquids, and gases . 929
Define density and specific gravity 929
What is meant by each of the following terms: Elasticity, stress, strain, elastic limit? . . . 929
Define pressure. Does hydrostatic pressure have direction as force does? 929
What is the hydrostatic paradox? Discuss . . 930
State Archimedes' Principle. Give some examples 930
Distinguish between cohesive and adhesive forces. Give some evidence for these forces . 930
Discuss surface tension and capillary action in terms of molecular forces 930
State Boyle's law. Illustrate by an example . 931
Describe von Guericke's and Torricelli's experiments for demonstrating the weight of the atmosphere 931

Heat

What happens to the energy dissipated when work is done against frictional forces? . . . 931
What is temperature? What is the connection between temperature and heat flow? . . . 931
Describe the construction of a mercury-in-glass thermometer. What are the "fixed points" of a thermometer? 932
Describe two common temperature scales, and explain how to convert from one scale to the other 932
Why is a cold milk bottle likely to break when hot water is poured into it? 933
Contrast the behavior of water with that of other substances as regards its thermal expansion. How does the expansion of gases compare with that of liquids? 933
What is meant by absolute zero? What is the temperature of absolute zero on the Centigrade scale? 933
Define the calorie and the British Thermal Unit. Which is larger, and by how much? 933
How is the heat of combustion of a fuel determined? 933
What are the two specific heats of gases? Which is larger and why? 934
Describe a gas, as pictured by the kinetic theory of gases. What, according to this theory, is heat energy? What is temperature? 934
How are the freezing and boiling points of water affected by changes in pressure? Are all materials affected by pressure in the same way? What is regelation? 934
Describe briefly three methods of transfer of heat. Which of these methods require the presence of matter for transfer to take place? 935
What is the "greenhouse" effect? 935
Discuss the conversion of work into heat, and the conversion of heat into work. Can either of these conversions take place with 100% efficiency? 935

Wave Motion and Sound

Name the two general types of wave motion. Give an example of each 936
What is meant by the term wave length? . . . 936
What is meant by the frequency in wave motion? 936
How is wave speed related to wave length and frequency? 936
What is meant by constructive interference of waves? By destructive interference? 936
What is the law of reflection for wave motion? 936
What is meant by refraction? Why does it occur? 936
What is meant by diffraction? Upon what factors does it depend? 936
Through what kinds of media may sound waves be sent? 937
How can it be shown that a medium is required for the propagation of sound? 937
Describe a situation which shows that sound waves all travel with the same speed, regardless of frequency 937
List some properties of sound which illustrate that sound is a wave motion 937
What causes an echo? 937
What is the physical difference between those sounds called noise and those called musical sounds? 937
The pitch of a musical sound depends upon what physical property? 937
What are overtones? What subjective property of sound do they affect? 937

Light

Who first conceived of light as a wave motion? 937
Why did Newton favor the particle theory of light? 937
How were Newton's objections to the wave theory overcome? 937
What kind of wave motion is light? Who receives credit for the development of the theory? 937
What was the ether? Is the ether considered necessary? 937
Are there any phenomena which the wave theory alone cannot satisfactorily explain? . 938
Describe three methods which have been used to measure the speed of light 938
What is meant by a light ray? 938
Explain the formation of shadows in terms of light rays 938
Give some examples of the refraction of light . 938
Distinguish between real images and virtual images 939
How does a plane mirror or looking glass form an image? 939
What is the principle of the astronomical telescope? 939
Does the moon appear brighter through a telescope than it does to the unaided eye? . . . 939
Why does a prism break white light into colors? What is this called? 939
Why does colored cloth appear to be of different color in daylight and in artificial light? . . 940
Give an example of interference of light . . . 940
How do polaroid glasses remove glare? . . . 940

Electricity

Distinguish between electrostatics and electrodynamics 940
What is a coulomb? What is an electric current? In what units is it measured? 940
What is the difference in structure of conductors and insulators? 941
What distinguishes an alternating from a direct current? 941
What is meant by electromotive force? by potential difference? 941
What is Ohm's Law? 941
Define volt, ohm, kilowatt, and kilowatt hour 941
How can one calculate the cost of operating an electric iron? 942
List the major effects of electric currents. Upon which of these does the operation of a fuse depend? 942
What is electrolysis? an electrolyte? What is a Faraday? 942
How efficient is a storage battery? 942
What is a magnetic field? What is the connec-

tion between magnetism and electricity? . . 943
Describe the behavior of bar magnates. How can the action of a magnet be explained in terms of the behavior of atoms? 944
What type of iron should be used to make permanent magnets? 944
Describe the magnetic field of the earth. Define angle of dip and declination. Name another celestial body which has a similar magnetic field 944
What is an induced electromotive force? Of what use is it? 944

Modern Physics

List the evidence which leads to the concept of the electron 945
Describe the Rutherford-Bohr model of the atom 945
What are isotopes? 945
List and describe various elementary particles 946
How are X-rays generated? What is the order of magnitude of their wave lengths? 946
How have X-rays been of use in medicine and surgery? 946
List the various types of electromagnetic waves and give their approximate wave lengths . 946
How was radioactivity discovered? Describe the three types of radiation emitted in radioactivity 947
What experiment led Einstein to develop his Relativity Theory? 948

CHEMISTRY

Define the term chemistry. Name the chief branches of the science. Mention four practical applications of analytical chemistry . . 949
Explain the difference between organic and inorganic chemistry; between compounds and elements 949
Explain nuclear chemistry and tell its effect on modern chemistry 950
What is chemical attraction? 950
Name three types of chemical reaction and give an example of each 950
What is meant by double decomposition? . . 951
How many elements are known and how are they arranged? 951
Give the names and atomic weights of three metals; of three nonmetallic elements. State the melting point of gold; of lead 952
Contrast the atomic theory as advanced by Dalton with that of recent scientists . . . 953
By what method are liquid vegetable oils changed to solids? 954
How do colloids differ from crystalloids? . . . 954
Show by example the effect of distillation on a liquid; a solid 954
Give the chemical formula of common salt; of water; of sulphuric acid; of gold chloride; of sugar. What is the molecular weight of sugar? 955
What is a salt? Name three salts 956
Why is aluminum wire frequently substituted for copper in electrical work? 957
Who discovered americium and what are its chemical properties? 957
In what states is barium chiefly mined and what is the value of the annual production? . . . 958
What effect does beryllium have on copper? . 958
Give two important uses of chlorine 959
Why is chromium so named? State three industrial applications of chromium or its compounds 959
To what properties does copper owe its great utility? Name three copper ores 959
Who discovered curium and what interesting fact can you give concerning it? 959
Tell why fluorine is of value commercially . . 959
State the most interesting fact concerning helium. How is it used commercially? . . . 960
In what human gland is iodine normally found? 961
Name eight alloys or compounds of lead. Why is lead valuable to the plumbing industry? . 961
For what purpose is magnesium used by photographers? What new process has made magnesium useful in airplane manufacture? 962
Mention the principal ore and the chief uses of mercury 962
Describe neptunium and tell how its discovery assisted scientists in making further important discoveries 962
Name four compounds which contain nitrogen. How may ammonia be made from air? . . 963
What is the commercial source of phosphorus? 963
State three purposes for which platinum is used 963
What part did plutonium play in bringing about the ending of World War II? 964
By whom was polonium discovered? 964
Describe the action of potassium on water. Name ten important compounds of potassium 964
Summarize the most notable characteristics of radium. Why is radium valuable in the treatment of cancer? Of what is luminous paint composed? 964
What color is imparted to a flame by sodium and its compounds? 966
Which strontium compound is used to impart a red color to the flames of fireworks? . . . 966
What percentage of the world's supply of sulphur is produced in the United States? . 966
Describe the chief commercial use of tin. Name two uses of metallic tungsten 967
How is commercial acetylene made? 968
Why is the white of an egg sometimes used to clear coffee? 968
Define "proof spirit." Name three poisonous alkaloids. What alkaloid is used as a local anesthetic? 968
What is aniline? aspirin? calomel? Give a method for preparing a bleaching solution; for preparing Bordeaux mixture 969
State three uses for carbolic acid 970
Explain the advantage of the retort method over older methods of making charcoal . . 970
Name an explosive, a disinfectant, and a drug, each prepared from coal tar. Name three commercial applications of distillation 970
What is a 4-8-2 fertilizer? 971
Distinguish between hydrocarbons and carbohydrates 972
To what is the term marsh gas applied? . . . 972
Who first used laughing gas in surgery? . . . 972
What are the principal sources of protein? Explain their value to the human body . . . 973
How is salt obtained and prepared for use? . . 974
Give the chemical name of each of the following: grain alcohol; alum; borax; carbolic acid; quicklime; muriatic acid; baking soda; TNT; water glass 975
What is the chief characteristc of a high-speed steel? of invar? 977
Define the term steel. How much carbon is present in a specimen of high-carbon steel? . 978
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Why is antimony used in the composition of type metal? 978
Compare the properties of cast iron and wrought iron 978

ANATOMY

What is anatomy? 979
What are the basic characteristics of living matter? 979
What are the tissues and how do they differ from organs? 979
Briefly describe the periosteum and indicate its importance to bone 979
How does cartilage differ from bone? Name the three kinds of cartilage found in the body. . 979
Distinguish between axial and appendicular skeleton 979

Briefly describe some of the types of joints found in the body 980
Enumerate the types of muscle tissue in the body and indicate the function of each. . . 980
Name and locate five muscles of the body which form prominent landmarks on the surface of the body. What is the action of each? . 980–81
List the structures, in order, through which food passes from the beginning of the alimentary canal to its termination 981
Briefly describe the tongue, indicating its function and its nerve supply 981
In tabular form, compare the salivary glands with the pancreas with respect to location and function 981–82
How does the bile, which is secreted by the liver, get into the alimentary tract? 982
What and where are the sinuses of the head, and what is their connection with the nasal cavities? 982
Name, in order, the principal structures of the respiratory system 982
What is the Eustachian tube and what is its function? Why is it of clinical importance? . 982
Describe the pleura 983
List the organs which comprise the urinary system only, and describe each with respect to location and function 983
Give the location of each of the ductless glands in the body 984
Briefly describe the heart. What is its blood supply? 984
What are the two major divisions of the nervous system and what structures belong to each? 985
List the sense organs and briefly describe each, telling how they are adapted to serve their special function 986

PHYSIOLOGY

What is physiology? 987
What are capillaries and how are they adapted to their function? 987
How does lymph get into the tissue spaces, and what are the provisions for its removal? . . 987
Describe the circulation of blood through the heart 988
Discuss briefly the mechanism of the heart beat 988
What is the origin of the normal heart sounds? . 989
What is pulmonary ventilation and how does it differ from respiration? 989
Discuss the mechanical factors in digestion . . 990
What controls the secretion of digestive juices?. 990
How does the kidney form urine, and why is this a regulatory as well as an excretory mechanism?. 991
How does the body maintain constant temperature? 992
Discuss the fuction of each of the endocrine organs in the body 992

PSYCHOLOGY AND PSYCHIATRY

In what year was scientific psychology born? 995
Name two men who are considered the "fathers" of modern psychology 995
Name three fields of psychology 995
What factors determine what a person will perceive? 995
What is amnesia? 996
How is the IQ of a child determined? . . . 997
Discuss the relative importance of heredity and environment 998
How are psychological tests used in vocational guidance? 998
What is the function of employee selection? . 998
What are the functions of the school psychologist? 998
Discuss the type of approach investigators have taken in the field of mental disease. . 999
How may some of the older concepts explain some of the present day misconceptions concerning mental illness? 999
Discuss the symptoms one would expect to find in a patient with organic disease of the brain. 1000
Why are the symptoms of schizophrenia so difficult to understand? 1001
Describe what is meant by a mental conflict. 1001
What is a mental mechanism and describe three? 1001
Mention in brief two of the techniques used in the treatment of mental disease. 1002

BIOLOGY

State a broad definition of biology. Point out the subject matter of this science as commonly understood 1003
Discuss the meaning, development, and present character of the doctrine of evolution. 1003–1004
Summarize the chief points of Mendel's law . 1004

ZOOLOGY

Define zoology; enumerate the chief divisions of this science. Point out the advantages arising from the use of scientific names for animals 1005
Account for the name of the adjutant. What article of commerce is obtained from all the species of the adjutant? 1006
Distinguish between alligators and crocodiles, in point of appearance and habits 1006
Indicate the native habitat and the commercial importance of the alpaca 1006–1007
Describe the amœba 1007
Explain the meaning of the term amphibian. Enumerate several animals of this class . . 1007
Discuss the nesting and feeding habits of ants 1007–1008
Explain the accurate use of the term ape. . . 1008
Describe the remarkable manner of life of aphids 1008
Characterize the class of animals called arthropods 1009
Describe the axolotl's remarkable power of transformation 1009
Describe the baboon 1009
What are barnacles? Recount an ancient story about barnacles and barnacle geese . . . 1010
Outline some characteristic habits of bats . . 1010
Distinguish the chief American species of bear, as to appearance and habits 1010–1011
Describe the beaver and some of his remarkable powers 1011
Characterize and classify the creatures called birds 1011–1012
Account for the rapid extermination of the American bison 1012
Describe and give the habitat of three species of blackbird 1012
Indicate the nesting and wintering localities of the bluebird 1012
Estimate the quality and the commercial value of the bluefish 1012
Describe the habits of the boa constrictor. 1012–1013
Give another name for the bobolink. To what other birds is the bobolink closely related?. 1013
Summarize the economic uses of the Indian buffalo 1013
Outline the cycle of transformations characteristic of the butterfly. Characterize the caddisfly. Describe the habits of its larva, the caddisworm 1014
Distinguish the two species of camels. Point out their economic value. Illustrate the capability of the dromedaries 1014–1015
To what family of birds do the canary and the cardinal belong? 1015
Characterize in general the animals called carnivores 1015
Summarize the history of the carp; its present commercial importance 1015
What is a caterpillar? 1016

Point out the distinguishing characteristics of animals of the cat family 1016
Indicate the general and the common meaning of the term cattle 1017
Name three examples of the cetacea 1017
Describe the habits and peculiar powers of the chameleon 1017
Point out the economic value of the chamois. 1017
Characterize the chimpanzee as to form and habits 1018
Describe the largest known kind of clam. . . 1018
Characterize the destructive powers of the various species of cobra 1018–1019
Estimate the economic importance of the codfishes 1019
Describe the condor as to size and habits . . 1019
Explain the formation of coral. Indicate the value of red coral 1019–1020
Describe the use of tamed cormorants by fishermen 1020
Discuss the European corn borer and means for combating it 1020
Indicate the great variety of species and sizes of crabs 1020
Tell several interesting facts about the habits of cranes. Describe the body structure of the crawfish 1021
Upon what food do crows subsist? 1021
By what striking characteristics are cuckoos distinguished? 1021–1022
What useful product is obtained from the cuttlefish? 1022
Summarize the habits of the white-tailed deer. 1022
Name several animals that belong to the dog family. From what species is the domestic dog believed to have sprung? 1022–1023
Discuss the history of animal domestication. How many animals are now considered domesticated? 1023
Under what conditions is the donkey most useful? 1023
Compare river ducks and sea ducks, as to habits and number of species 1023–1024
Where do eagles usually nest? Which of the eagles is the national emblem of the United States? 1024
Why are earthworms found on sidewalks in the morning after a heavy rain? How do earthworms aid in the improvement of soil? . . 1024
Describe the habits of eels 1024–1025
For what product is the eider valued? 1025
Distinguish the two known species of elephant. For what product is the African elephant hunted? 1025
Tell several interesting facts about the various species of fireflies 1026
Characterize the typical fish 1026
Name several members of the flycatcher family that migrate to the United States and Canada 1027
Describe the appearance and the habits of the flying squirrel 1027
Indicate the commercial value of foxes . . . 1027
Describe the development of the tadpole into the frog 1027–1028
Give the migration habits of the fur seals . . 1028
Describe the habits of gallflies and their effects on plants 1028
To what countries is the gazelle native? Describe its coloring. Tell some interesting facts about the giraffe's eyes and nostrils. Discuss the varied usefulness of the goat . 1029
Compare the Old World goldfinch and the American goldfinch as to appearance and habits 1030
Describe the gorilla 1030
Recount the distinctive habits of the grebes . 1030
What are the names commonly applied to the ruffed grouse? Describe the appearance and the habits of this bird 1031
Account for the name guinea pig. Point out some interesting characteristics and a modern use of this animal 1031
Indicate the commercial importance of halibut 1031–1032
Distinguish the hare from the rabbit 1032
Describe the appearance and some habits of the hedgehog 1032
Indicate the habitats of the most common varieties of herons 1032
Where is the hippopotamus to be found native? How is this animal especially adapted to remain long under water? 1033
Point out some changes in the characteristics of the hog or pig due to domestication. Give two reasons for the high value of the hog in food production 1033
Discuss the kinds, the habits, and the economic value of the honeybee 1033–1034
Point out the evil effects of the hookworm and the chief means of prevention 1034
Summarize the history of the breeding and use of the horse 1034–1035
Indicate the startling rapidity with which the house fly multiplies. What diseases will this fly disseminate? 1035
Of what materials do humming birds build their nests? Indicate the habitats of three American species of humming bird 1035
Summarize the methods of controlling the two chief classes of plant destroying insects. . . 1036
Point out the distinctive characteristics of the class of animals called insects 1036
What old notion about the jackal has been discredited? 1036
Describe two chief varieties of jays 1037
Account for the name "killer whale" 1037
What useful service does the kingbird perform? 1037
Point out useful services of the king snake; of the ladybird 1038
Where are skylarks to be found naturalized in America? 1038
In what countries is the leopard found? . . . 1038
What kind of country does the lion prefer? . 1039
Describe the llama and indicate its economic value 1039
For what purpose is the Canada lynx hunted?. 1039
Account for the name of the lyre bird . . . 1040
Describe the chief varieties of mackerel . . . 1040
Point out the distinguishing characteristics of the mammals 1040
State some uses of the manatee; of the marten. Describe the annual migration of the golden plover; of the arctic tern 1041
Describe two species of moccasin 1042
Point out the value of moles on the farm . . 1042
Characterize the mollusks. Name several kinds that are used as food 1042
For what purpose is the mongoose valuable? 1042–1043
Point out a difference between the Old World monkey and the American monkey . . . 1043
Outline the habits of mosquitoes. How are mosquitoes best combated? 1043
Summarize the valuable characteristics of the mule 1044
What commercial product is yielded by the musk deer? Describe the musk ox. For what is the muskrat valuable? 1044
Indicate the commercial value of mussels . . 1045
Describe the nightingale and his habits of song. 1045
Summarize the habits of the octopus. State a probable reason for the remarkable coloring of the okapi 1045
Recount several curious habits of the opossum; of the orang-utan 1046
Suggest reasons why the Baltimore oriole is called "golden robin" or "hangnest" . . . 1046
Indicate the size and the running speed of the ostrich 1046
Discuss the economic value of the ox. How many species are included in the ox family?. 1047

Summarize the processes of oyster culture . . 1047
Discuss the former great numbers and the extermination of the passenger pigeon. Outline the history of the rearing and use of peacocks 1048
Describe the pearl and point out the chief sources from which pearls are obtained . . 1048
Describe the nesting habits of the penguin; of petrels; of pheasants; of the phœbe . . . 1049
How do pigeons feed their young? Name several familiar American species of pigeons . 1049–1050
Describe the platypus. 1050
To what animal is the name polecat properly applied? 1050
Upon what does the porcupine feed? 1050
Discuss the characteristics of the primates; of the protozoans. Name important examples of each class 1051
Describe the peculiar nesting habits of the python 1051–1052
Describe the chief species of rabbits, in respect to appearance and habits 1052
Point out some interesting habits of raccoons. 1052
Name some interesting characteristics and habits of ravens 1053
Discuss the usefulness of the reindeer . . 1053–1054
Explain the application of the term reptiles 1054
Account for the name of the American robin. 1054
Describe the characteristics of rodents; of the ruminants 1055
For what is the sable valued? 1055
Compare the Atlantic and the Pacific salmon 1055–1056
Discuss the combating of the destructive San Jose scale. Characterize the scale insects in general 1056
Explain the application of the following names: sea devil; sea horse; sea lion; sea snake. . 1057
Describe the nesting habit of sea turtles. Compare the chief species and their uses . . . 1057
Discuss the history of sheep breeding and the economic value of sheep 1058
Describe the structure and the use of snails . 1059
Characterize the general group of animals called snakes 1059–1060
Is the bite of spiders dangerous to human beings? 1060
Explain how sponges secure nutriment . . . 1060
Describe the habits of the stork which have made these birds welcome around human dwellings in Europe 1061
Of what economic value are swallows? . . . 1062
What are swifts? Describe the swordfish; indicate its value 1062
Describe two varieties of the terrapin. Distinguish between the brown thrasher and the thrushes 1063
Describe the habits of toads and point out their value in a garden. 1063–1064
Explain the phrase "totem animals" 1064
Point out the dangerous character of the trichina 1064
Compare the chief varieties of trout . . 1064–1065
To what family does the turkey belong? What are vampires? 1065
Enumerate the chief species of warblers . . 1066
Describe the nests of the two great classes of wasps; of the weaver bird 1067
Point out the important products derived from the whale. 1067–1068
Discuss the habits of wolves. For what are wolf skins used? 1068
Tell a popular legend attaching to the woodchuck 1069
Describe the special adaptations of the bill, tongue, feet, and feathers of woodpeckers. . 1069
Point out the economic value of the yak. 1069–1070
Describe the habits of the two varieties of yellowlegs 1070
Discuss the characteristics of the zebu that make of it such great value in its native countries 1070

BOTANY

Define botany. Explain the subject matter treated under the various main divisions of botany 1071
Outline the special values of alfalfa and the history of its cultivation. What are algæ? What are alpine plants? Name some examples 1072–1073
Explain the botanical term annual 1073
Of what country is the apple a native? the apricot? 1073
Name three aquatic plants. Under what other names is the trailing arbutus known? . . . 1073
What portion of the following plants is used for food: artichoke? asparagus? avocado? 1073–1074
Describe the general character of the organisms called bacteria 1074–1075
For what purposes is bamboo commonly used? Indicate the food value of bananas 1075
Discuss the history, present production, and value of Lima, navy, and soy beans . 1075–1076
Account for the recent important development of the beet raising industry 1076
Name several kinds of so-called big trees. In what localities are they found? 1076
Why was the scientific name *Lewisia* given to bitterroot? 1077
Discuss the cultivation of blackberries and blueberries 1077
Summarize the uses to which the wood of the blue gum and that of the box tree are put. Enumerate the products derived from the bottle tree; from the breadfruit 1078
Of what region is buckwheat a native? Indicate the history and the extent of cabbage cultivation 1079
Show how the cactus adapts itself to arid conditions. Discuss the food values of some types of cactus 1079–1080
Describe the following flowering plants: California poppy; camellia; carnation. Point out the uses of the carrot and of carthamin. 1080
Whence was the cassaba melon introduced into America? Give evidence for ancient cultivation of the castor oil plant. Discuss the cultivation of cauliflower. 1081
Describe the century plant. What products are derived from this and similar species? . . . 1082
What are cereals? Give the derivation of this name 1082
Summarize the economic value of various kinds of chestnut trees. For what purposes is chicory grown? Tell how cinchona (quinine) was introduced into Europe. . . 1083
To what family of plants do the clovers belong? What economic value do they possess? . . 1084
What country produces most of the world's supply of coffee? 1084
Describe the compass plant 1084
Describe the method of securing cork . . . 1085
Discuss the origin and the value of corn . . 1085
Discuss the history of plant cultivation . . . 1086
Point out the uses of cypress; of the date palm. 1086
Discuss the characteristics of desert plants. From what source is ebony secured? Describe edelweiss; eglantine 1087
Compare as to appearance and economic value the chief species of elm 1087–1088
Describe endive and indicate its use 1088
What are epiphytes? Name a familiar example. 1088
Describe the eucalyptus and point out some of its commercial values 1088
Describe the method of reproduction in ferns. 1088
Indicate the antiquity of fig production and the growth of the industry in America 1089
Discuss the uses and the production of flax . 1089
Indicate the range of growth of the forget-me-not; of foxtail grass 1089
Discuss the various types of fungi and their uses 1089–1090
Describe the gentians; varieties of geranium. 1090

Describe the following and point out their uses: ginger; the ginkgo; ginseng 1090
For what purposes is goldenseal used? . . . 1090
Where did the cultivated American gooseberry originate? 1090–1091
Outline the history of grape growing. From what wild grape have the most important American grapes been produced? Compare the American with the European grape . . 1091
Of what region is the grapefruit a native? When was its cultivation established in the United States? 1091
What commercial product is derived from the ground pine? 1091
Describe the fruit of the guava. 1091–1092
Of what economic value is the guayule? . . 1092
Describe the appearance and indicate the range of the various hawthorns 1092
Compare the varieties of hemlock as to appearance and commercial value 1092
For what purposes is hemp cultivated? . . . 1092
Discuss the products derived from various species of holly. 1093
What are honey plants? Enumerate the most important of these in the United States and Canada. Indicate their economic importance 1093
Summarize the history of hop growing .1093–1094
Describe the appearance and the use of horehound 1094
What is the chief interest attaching to the horsetail? Describe the uses to which Iceland moss is put 1094
Describe three important species of iris . . . 1094
Account for the name jack-in-the-pulpit . . 1095
What are Job's tears? 1095
Describe three species of the Judas tree. Account for the name 1095
Describe and enumerate the uses of several species of juniper 1095–1096
Discuss the production and the value of jute. 1096
For what purpose are the following valuable: Kafir corn? kale? kapok? kelp? 1096
Where is the kumquat produced? For what is it used? Characterize several species of lady's-slippers 1096
Describe the outstanding characteristics of the leguminous plants 1097
Tell several interesting facts about the ancient and the modern cultivation of lentils and lettuce 1097
Discuss the nature, the chief habitats, and some uses of lichens 1097
Indicate the commercial importance of licorice 1097–1098
To what purposes is lignum-vitæ applied? . . 1098
Enumerate and describe several important species of lilacs; of lilies 1098
Of what regions is the lily of the valley native? 1098
Enumerate the common uses of the wood and the bark of the linden. What products do the linden flowers yield?. 1098
From what source are litchi nuts secured? 1098–1099
Describe the origin and the characteristics of the loganberry 1099
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MATHEMATICS

INTRODUCTORY

FROM the very earliest times, man has needed some means of counting things in groups. In learning to count beyond 2 or 3, primitive peoples often devised systems based on a grouping of fives, tens, or twenties, as suggested by finger counting and by gestures connected with the hands and the feet. Thus, in Greenland, on the Orinoco, and among the aborigines of Australia, six is "one on the other hand," ten is "two hands," and twenty is "a man." Traces of counting in this fashion still remain in the languages of peoples who use a purely decimal notation; for example, the English word *score* in such expressions as "three score years and ten," the French numeral *quatre-vingts* (four 20's), and the Roman notation. The ancient Babylonians developed a system of grouping by sixties, which still prevails in our system of measuring time and angles.

Had the number of fingers or toes in man been more or less than ten, our numbering system would probably have been different. It is likely that people having six fingers on each hand and six toes on each foot would have adopted a system of notation based on twelve instead of on ten. Such a system would have many advantages over our method of computation, since twelve has four exact divisors, 2, 3, 4, and 6, while ten has only two exact divisors, 2 and 5.

Whatever system is used, the counting of real things in groups still remains basic in mathematics.

Throughout time, from the early ages, when man's struggles with computations resulted in developing various systems of arithmetic, to the present day, when knowledge of mathematical theories has extended the scientific horizons to include electronics, radar, atomic energy, and many other applications, progress and developments in fields of science have been preceded by the introduction of the necessary mathematical tools. Thus a knowledge of geometry was necessary in order to design and build the Egyptian pyramids and other structures, and these represented practical applications of geometry. Many early developments in mathematics were associated with progress in the study of astronomy. The invention of calculus by Newton and Leibnitz, not only opened up vast new fields of mathematics, but also made it possible to develop important applications in fields of science, particularly physics and chemistry. Without a knowledge of mechanics as gained in a study of physics we could not enjoy any of the modern means of transportation, including locomotives, automobiles, steamships, and various types of airplanes. Einstein's Theory of Relativity represented a tremendous contribution to mathematical theories and subsequent developments have resulted in the atomic and hydrogen bombs, and other applications of atomic power.

BRIEF HISTORICAL NOTES

From various historical treatises on mathematics we learn that our concepts of numbers date back to the remote times of the Old Stone Age, and that by the time of the New Stone Age the Neolithic man had developed a feeling for geometrical patterns. In all countries, whether in the Orient or the Occident, man's progress toward a stable civilization was attended by, or perhaps stimulated by, an increase in his knowledge of numbers and his ability to make computations. The Chinese, Japanese, Koreans, Hindus, Arabs, Babylonians, Egyptians, all developed some form of a number system and methods of computation as it was found necessary to have such a system for use with trade, for land measurements, for reckoning time and making other early studies in astronomy, and for numerous other general uses. Some systems were developed independently in various countries, while some were transplanted from one country to another and further developed and modified to suit the needs there. Concepts of numbers and computations as developed in early times in Babylon and Egypt were further developed by the Greeks, influenced by the Hindus and Arabs, and finally the developments during the Renaissance in Europe had much to do with the foundation of modern mathematics.

Babylon and Egypt. Early Babylonian clay tablets (3000–2000 B.C.) indicate a well developed system of numbers and a knowledge of land measures. The Babylonians divided the circumference of a circle into 360 degrees and probably knew that the radius could be applied to the circumference of a circle six times as a chord, and that each part thus cut off would contain 60 degrees. For the mensuration of the circle, they used, as did the early Hebrews and Chinese, the value $\pi = 3$.

The structures built by the Egyptians imply a considerable knowledge of applied mathematics. Geometry, as a practical art, is said to have originated in Egypt. Herodotus tells us that surveying was developed by the Egyptians to relocate tracts of land after the annual inundations of the Nile.

Greece. The Greeks were a people much devoted to scientific and philosophical study, but in no branch of learning were their achievements more brilliant than in the field of mathematics. The Greeks received mathematics as a body of practical rules and left it a well developed science.

Thales (640–546 B.C.), a merchant of Miletus, was interested in the geometrical theories and practices of the Egyptians. He deduced the heights of the pyramids from the lengths of their shadows and measured the distance of a ship from the shore by the method of similiar triangles.

Pythagoras (582–500 B.C.) is credited with the discovery of "irrational numbers," such as $\sqrt{2}$, which cannot be calculated exactly. He is credited also with the formulation of the so-called Pythagorean theorem, according to which the square on the longest side of a right-angled triangle is equal to the sum of the squares on the other two sides.

Plato (429–347 B.C.), though not primarily a mathematician, urged the study of mathematics on his pupils, some of whom were largely instrumental in the development of solid geometry.

Euclid (about 300 B.C.) was more responsible than anyone else for the early development of methods of teaching geometry. Euclidian Geometry was named for him. His division of Geometry into "books," his formal statements of theorems, his constructions, proofs, and conclusions, were followed by standard textbooks for over 2000 years and, with some alterations, to make the work conform to modern methods of teaching, are still substantially followed.

Archimedes (287–212 B.C.), a geometrician and mechanician of Syracuse, was one of the greatest mathematicians of antiquity. His methods of solving problems in mechanics bear a strong resemblance to the methods of the calculus of modern times. By the use of inscribed and of circumscribed regular polygons, he determined the value of π correct to the third decimal place. His contributions to mechanics include the formulation of the laws of the lever, of pulleys, and of screws. The *Principle of Archimedes* is one of the most important propositions in the science of hydrostatics.

Hindus and Arabs. The Hindus early developed a pronounced talent for numerical computation. They incorporated into their own system the knowledge of Babylon and of Greece and then worked out many independent results. They seem to have developed the use of the symbol 0 to indicate the *place value* of notation. Thus, in 51 = 50 + 1, the 5 means five tens, while in VI = V + 1, the V means simply five ones. This improvement in symbols was one of the greatest advances in the progress of mathematics.

Brahmagupta (about 598 A.D.) and Bhaskara (born 1114 A.D.) were two notable mathematicians of the Hindu school.

The Arabs carried to Europe a knowledge of Eastern mathematics. From the 9th to the 13th century, the courts of the Mohammedan princes were the seats of remarkable scientific activity, and to this circumstance we owe the preservation of much of the mathematical knowledge of the ancients.

The Renaissance in Europe. In the 16th century, Tartaglia, Ferro, and Ferrari, in Italy, and Viète, in France, developed algebra to such a point that Descartes, applying the algebraic methods to geometry, invented a new and simple method for the study of many curves which had previously been studied with great difficulty.

Pure geometry was developed by Kepler, Descartes, and Pascal, and the theory of numbers by Fermat. Logarithms were invented by Napier, and the simplification of his method by Briggs led to an ease of computation without which it is probable that the civilization of today would not have attained to its present stage. The most far-reaching advances of the period, however, were the invention of the differential and integral calculus by Newton and Leibnitz and the invention of analytical geometry by Descartes. These inventions had much to do with the foundation of modern mathematics by Euler, Lagrange, and Laplace.

SOME FAMOUS PROBLEMS

A method of teaching frequently used by mathematicians of ancient times was by assigning students special problems for solution. This method was used effectively with the teaching of geometry; and three problems, the trisection of an angle, the duplication of a cube, and squaring a circle, influenced the study of geometry for centuries. Requirements for the solutions were that only the compass and the unmarked straight edge were to be used. Through attempts to solve these problems in this way, many new propositions and processes were discovered. Modern mathematicians have proved that the problems cannot be solved by these means.

Trisection of any Angle. In modern mathematics it has been definitely shown that the problem of trisecting an angle by use of a ruler and compass presents equations that are irreducible and can be solved by aid of a finite number of square roots only for special values of the angle. A method that claims to trisect *any* angle is only approximate or else employs means disallowed by the limitations of the problem.

Duplication of the Cube. According to tradition, this problem originated from an oracle of Apollo, whose shrine was at Delos. The problem, therefore, was known as the Delian problem. The oracle declared to the Athenians that a pestilence prevailing among them would cease if they would double the cube-shaped pedestal of the altar of Apollo, that is, replace it by another of twice the original volume. This requirement reduces to the solution of the equation $x^3 = 2a^3$. The solution of this equation gives an incommensurable quantity which cannot be represented with the limitations originally laid down. However, through the use of the higher plane curves and of methods somewhat similar to those of modern analytical geometry, the problem was solved even by the ancient Greeks.

Squaring the Circle. This problem requires the determination of a square exactly equal in area to that of a given circle, and would require the exact evaluation of π, the ratio of the circumference to the diameter of a circle. It has been shown that the exact determination of this ratio is impossible.

Evaluation of the Ratio π. The earliest attempts to determine the value of π were either guesses, or computations made by determining the perimeter of a regular polygon having so large a number of sides that the polygon approached a circle in character. By this method, the value of π was known to fifteen decimal places by the close of the 16th century. This result required the calculation of the perimeter of a polygon of over one billion sides. Modern methods, by the use of infinite converging series, have carried the value to 707 decimal places, as determined by William Shanks in 1873.

Modern study has shown that π cannot be expressed as a decimal, as a surd, or as an algebraic number.

MODERN MATHEMATICS

Since the time of Newton, the older branches of mathematics have steadily grown in power, and many new branches have arisen. Of these, some of the most important are differential geometry, non-Euclidean geometry, vector analysis, quaternions, determinants, and functions of a complex variable.

Argand (1755–1803) published an interpretation of the complex number. His work began the development of this hitherto mysterious quantity in the field of applied mathematics.

In the hands of Abel, Gauss, Cauchy, Weierstrass, and Riemann, the general theory of the complex variable and the various "infinite" processes of mathematical analysis were developed. Invaluable aid was thereby given to most of the great mathematical theories.

The introduction of Einstein's Theory of Relativity was followed by great progress in many fields of mathematics, including a renewal of interest in Riemannian geometry, and opened up vast new vistas both in the field of mathematics and of science. Developments which have produced atomic energy, the atomic bomb, and the hydrogen bomb will be continued and give to the world other powerful agencies for peace as well as war.

Modern science is constantly relying on the aid of the mathematician. To the joint efforts of the pure mathematician and the practical scientist is due, in great degree, our prosperity and the advance of knowledge. Thus the history of modern mathematics is the account of an ever widening development of two interdependent aspects of the science: the inner realm of order among mathematical ideas themselves, and the outer realm, which seeks dominion over material objects in time and space.

MATHEMATICAL EDUCATION

Educational methods constantly undergo changes to meet conditions imposed by the times in which they exist. The earliest American elementary schools taught arithmetic only and did not go much beyond the study of fractions and of proportion. A few decades later, when high schools first began to appear, arithmetic had become more difficult and included many subjects that were subsequently replaced by some of the simpler parts of more advanced mathematics. Thus we now find algebra, geometry, and trigonometry being taught in our secondary schools whereas large parts of these subjects were formerly considered to be of college grade.

The teaching of mathematics should always form an important part of our educational program. There is some cause for considering whether the modern trend in teaching mathematics does not destroy much of the pleasure and benefit which were formerly gained when logical reasoning was the basis for teaching mathematics, and when knowledge of the branch of mathematics being taught was considered to be as important as the methods used in teaching it.

ARITHMETIC

THE word arithmetic is derived from the Greek *arithmos*, meaning number. It is usually defined as the *science* of numbers and the *art* of computation.

Many pupils who are able to grasp other subjects readily find great difficulty in mastering arithmetic. This may be due to lack of interest, and hence to making indifferent effort, more than to an inability to grasp the subject. Anyone who will study with patience and diligence should experience little difficulty in mastering the work of arithmetic.

In this section on arithmetic an attempt will be made to explain, in clear and simple language, the operations of arithmetic, namely, addition, subtraction, multiplication, and division, and to give numerous applications of these operations. It is not intended that the work given here should take the place of a school textbook, or of a teacher. However, since the average reader will not have the guidance of an instructor, more detailed explanations and examples will be given than is ordinarily done in a textbook. Thus the section should be valuable as a guide for those who desire to study alone, and as a work of ready reference for those who have forgotten much of the subject. It should be found helpful to students who have had trouble with arithmetic and to those teachers who value simple and effective ways of presenting a subject that is usually considered difficult to teach.

If a reader feels that there is any conflict here with modern methods of teaching, he should keep in mind the fact that our major interest is in having the reader master the subject and gain the ability to perform operations of arithmetic automatically and with speed and accuracy. To do this, he must understand certain principles and gain such facility in their use that applying them correctly becomes a habit of mind.

It is doubtful if there is a substitute for a thorough mastery of the multiplication tables, and similar elementary but absolutely necessary groups of facts. However, the modern method of teaching facts of multiplication seems to produce satisfactory results, particularly when multiplication tables are introduced after the facts have been learned. In whatever manner he gains the ability to multiply numbers with speed and accuracy, it is important that a student shall gain that ability.

Equal emphasis should be given to attaining knowledge of the other branches of mathematics to be presented,—mensuration, algebra, geometry, and trigonometry,—and to gaining the ability to apply that knowledge automatically.

DEFINITIONS

Many definitions will be given where they are first required, that is, in connection with the topics which they concern. Other definitions, which belong to the whole subject of arithmetic, are given below.

A **unit** is one, or a single thing: 1, one day, one dollar.

A **number** is a unit, or a collection of units: 1, 4, 18, 23, 35.

A **figure** is a character or symbol used to express a number: 2, 3, 9.

Notation is a method of writing or expressing numbers by characters. The notation in common use today is the Arabic, or decimal, system. According to this system, numbers are expressed as so many individual units, tens, hundreds, and higher powers of ten. The figure designating how many of each power of ten are included, has a fixed relative position. The powers of ten, such as hundreds, thousands, and ten-thousands, are called units of different **orders.**

The different orders of units increase from right to left, and decrease from left to right, in a tenfold ratio. The number 64,832 contains units of five different orders—ones (units), tens, hundreds, thousands, and ten-thousands. The figure 2 placed at the extreme right indicates that the number includes 2 ones. The figure 3, standing in the second position from the right, designates 3 tens. The figure 8, in the third place from the right, means 8 hundreds. Similarly, in this number, 4 means 4 thousands, and 6 means ten-thousands.

A **digit** is any of the ten figures or symbols, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, by which all numbers may be expressed. Some authorities do not include 0 (zero, or cipher, with preference given to zero) with the digits. By itself, 0 expresses no value, but it is used with other digits in order to preserve their relative position, thereby showing the order of units which they represent.

When the value of a number is expressed approximately, it is often important to know the number of significant figures that are used. The **significant figures** are those that remain to a number or decimal if the zeros to the right or left are disregarded. Thus 35,000 and 0.0035 each has two significant figures, 35. The value of π is commonly expressed as 3.1416, which is to five significant figures.

An **aliquot part** of a number is that part which will divide the number without a remainder: 6 is an aliquot part of 18.

An **abstract number** is a number used without reference to any particular thing or quantity: 5, 20, 37.

A **concrete number** is a number used with reference to some particular thing or quantity: 4 bushels, 17 dollars.

A **factor** is any of the numbers which, when multiplied together, form a product: 3 and 5 are factors of 15; 3, 5, and 7 are factors of 105.

A **perfect number,** such as 6, is the sum of all its divisors except itself ($1 + 2 + 3 = 6$).

A **prime number** is a number having no factor other than itself and 1. Such, for example, are 5, 7, 13, 17, 29.

A **prime factor** is a factor that is a prime number: 7 is a prime factor of 21.

A **composite number** is a number that has factors other than itself and 1. Examples of composite numbers are 8, 9, 42.

An **even number** is a number that is divisible by 2 without a remainder: 4, 6, 30.

An **odd number** is a number that is not divisible by 2 without a remainder: 3, 9, 27.

An **integer** is a whole number: 7, 16, 23.

A **problem** is a question to be solved.

A **solution** is a statement or a series of statements showing how a problem is solved.

ADDITION

Addition is the process of uniting several numbers into one equivalent number.

The **addends** are the numbers to be added.

The **sum** is the result obtained by addition.

Like numbers are numbers that represent the same kind of units: 17 and 25; 18 bushels and 3 bushels; 12 boys and 5 boys.

Unlike numbers are numbers that represent different kinds of units: 8 days and 4 dollars; 35 miles and 4 hours.

Only *like numbers* can be added.

The sign + indicates addition and is read *and* or *plus.*

The sign = indicates equality and is read *equals* or *is equal to.*

ADDITION BY CARRYING

Problem. Find the sum of 8438, 4822, and 8816.

Solution.—

ten-thousands	thousands	hundreds	tens	units	
	8,	4	3	8	Write the number so that units of the same order stand in the same column
	4,	8	2	2	
	8,	8	1	6	
2	2,	0	7	6	

Add the figures in the column of units. The result is 16 or 1 ten and 6 units. Write 6 under the column of units. Add the 1 ten to the column of tens. This column then totals 7 tens, and hence a 7 is placed under the column of tens. Next adding the figures in the hundreds' column we obtain 20 hundreds or 2 thousands and no hundreds. Place a 0 under the hundreds' column. The 2 thousands added to the sum of the figures in the thousands' column make 22 thousands, or 2 ten-thousands and 2 thousands. Write the 2 thousands under the column of thousands and place the 2 ten-thousands in the next column to the left. The sum of the addends is then seen to be 22,076.

It may be observed that the sum of the units', hundreds', and thousands' columns consists of two figures each, one of which represents the next higher order of units. The figure representing the next higher order of units, when added to its proper column, is said to be carried; hence the name of the process.

TO PROVE ADDITION

A prudent, accurate computer will usually check or prove, his work. This requires extra labor, but if accurate results are important extra labor can be justified. Fortunately adding machines are quite accurate and when available produce accurate results with slight effort on the part of the computer.

Some aids in checking addition are given below.

(1) *Reverse the direction of adding.* Add *up*, then add *down*, each column.

(2) *Cast out nines.* A method of checking addition that is often used is by casting out nines. While there are certain types of errors that will not be detected by this method, it is in general quite reliable for use as a check.

Find the sum of the digits, or figures, in each addend. Divide each sum by 9. The remainder, if any, is called the excess of 9's for that addend. Add these excesses and find the excess of 9's in this sum. Find the excess of 9's in the answer to the problem. These two results will agree if all the work is free of errors.

8438	Excess of 9's in 23	=	5.
4822	Excess of 9's in 16	=	7.
8816	Excess of 9's in 23	=	5.
22076	Excess of 9's in 17	=	**8.**
17	Excess of 9's in 17	=	**8.**

The sum of the digits in the first addend is 23 and the excess of 9's is 5; the sum of the digits in the second addend is 16 and the excess of 9's in 16 is 7; the sum of the digits in the third addend is 23, and the excess of 9's is 5. The sum of the excesses is 17 and the excess of 9's in 17 is 8. The sum of the digits in the answer to the problem is 17 and the two results using excesses agree, and from this check we would assume the result of the original addition is correct.

Instead of finding the excess of 9's in the sum of the digits in each addend, the excess of 9's may be found by dividing each number directly by nine. Thus, by division, the excess of 9's in the addends of the above illustration is readily seen to be 5 for 8438, 7 for 4822, and 5 for 8816, while for the remainder 22,076 it is 8. All of these are in agreement with the results already found.

SUBTRACTION

Subtraction is the process of finding how much greater one number is than another.

The **minuend** is the number from which another number is subtracted.

The **subtrahend** is the number to be subtracted.

The **difference** or **remainder** is the result obtained by subtraction.

The sign − indicates subtraction and is read *less* or *minus*.

Two methods of subtraction are in common use: (1) the "taking away" method; (2) the Continental, or Austrian, method.

THE "TAKING AWAY" METHOD

Problem. Subtract 929 from 1486.

Solution.—

1486 minuend	Write the subtrahend under the minuend, placing units of the same order in the same column.
929 subtrahend	
557 remainder	

Begin the subtraction at the column of units. Since we cannot take 9 units from 6 units, we take 1 ten from the tens' column and reduce it to units. 1 ten = 10 units. Adding 10 units to the 6 units, we have 16 units. 9 units from 16 units = 7 units. Place the 7 units under the column of units. Since we have taken 1 ten from 8 tens, we have only 7 tens left. 2 tens from 7 tens = 5 tens. Write the 5 tens under the column of tens. 9 hundreds from 14 hundreds = 5 hundreds. Write the 5 hundreds under the hundreds' column. The remainder, or difference is 557.

THE CONTINENTAL (AUSTRIAN) METHOD

Problem. Subtract 929 from 1486.

Solution.—

1486 minuend
929 subtrahend
557 remainder

(9 plus how many are 16?) 9 plus **7** are 16; **1** to carry.

The 1 is carried to the tens' column of the subtrahend and is added to the 2, which thus becomes 3.

(3 plus how many are 8?) 3 plus **5** are 8; 0 to carry.

(9 plus how many are 14?) 9 plus **5** are 14.

The figures in bold-faced type are those which appear in the result.

This method is also called the "making change" method and the method of "complementary addition."

TO PROVE SUBTRACTION

(1) *By addition.* Add the remainder to the subtrahend. The result, if there has been no error, will equal the minuend.

$$929 + 557 = 1486.$$

(2) *By subtraction.* From the minuend, subtract the remainder. The result, if there has been no error, will equal the subtrahend.

$$1486 - 557 = 929.$$

(3) *By casting out nines.*

(a) Add the excesses of 9's in the remainder and the subtrahend. The excess of 9's in the result should equal the excess of 9's in the minuend.

remainder	557	Excess of 9's =	8.
subtrahend	929	Excess of 9's =	2.
minuend	1486	Excess of 9's = **1.** 10	Excess of 9's = **1.**

It will be observed that this process is similar to the proof of an addition by casting out nines.

(b) Subtract the excess of 9's in the subtrahend from the excess of 9's in the minuend. If the result is equal to the excess of 9's in the remainder, or difference, the work is probably correct.

If the excess of 9's in the subtrahend is greater than that in the minuend, add one 9 to the minuend figure and then subtract.

minuend	1486	Excess of 9's	= 1.
subtrahend	929	Excess of 9's	= 2.
remainder	557	Excess of 9's = **8.**	**8.**

MULTIPLICATION

Multiplication is the process of taking one number as many times as there are units in another; it is a short process of finding the sum of equal numbers.

The **multiplicand** is the number to be multiplied.

The **multiplier** is the number by which to multiply; it shows how many times the multiplicand is taken.

The **factors** are the multiplicand and the multiplier, or the numbers multiplied.

The **product** is the result obtained by multiplication.

Partial products are the several results obtained by multiplying the multiplicand by each digit of a multiplier which contains two or more figures.

The sign × indicates multiplication. It is read *times* when it precedes the multiplicand, and *multiplied by* when it follows the multiplicand.

Problem. Multiply 986 by 75.

Solution.—

986 multiplicand
75 multiplier
4930 partial product
6902 partial product
73,950 product

Write the multiplier under the multiplicand, placing units of like order in the same column.

The multiplicand, 986, represents 9 hundreds, 8 tens, and 6 units. 6 units × 5 = 30 units. 30 units = 3 tens and 0 units. Write the 0 under the units' column and carry the 3 tens to be added to the tens' column. 8 tens × 5 = 40 tens. 40 tens + 3 tens = 43 tens. 43 tens = 4 hundreds and 3 tens. Write the 3 under the tens' column and carry the 4 to be added to the hundreds' column. 9 hundreds × 5 = 45 hundreds. 45 hundreds + 4 hundreds = 49 hundreds. 49 hundreds = 4 thousands and 9 hundreds. Write 49 so that the 9 stands in the hundreds' column and the 4 stands in the thousands' column, which represents the next higher order of units. The first partial product is thus 4930. The second partial product, 6902, obtained in a similar manner, is written so that the 2 stands in the tens' column because the 7 of the multiplier represents 7 tens. The sum of the two partial products so written is 73,950, the product of 986 and 75.

The result will not be affected by interchanging the multiplicand and the multiplier, that is, by using 75 as the multiplicand and 986 as the multiplier.

TO PROVE MULTIPLICATION

(1) *By reversing the order of multiplication and multiplying again.*

986	75
75	986

(2) *By dividing the product by either the multiplicand or the multiplier.* In either case, the quotient should be the other factor.

75	986
986 ⟌ 73,950	75 ⟌ 73,950

(3) *By casting out nines.*

Find the excess of 9's in the multiplicand and in the multiplier. Multiply the numbers so obtained. If the excess of 9's in the product agrees with the excess of 9's in the answer to the problem, the work is probably correct.

multiplicand 986 Excess of 9's = 5.
multiplier 75 Excess of 9's = 3.
product 73,950 Excess of 9's = **6.** 15 Excess of 9's = **6.**

SHORT METHODS

(1) To Multiply an Integer by 10, 100, 1000, etc.

Annex to the multiplicand as many zeros as there are zeros in the multiplier.

Problem. Multiply 28 by 1000.

Solution.—Three zeros annexed to 28 gives 28,000, which is the product required.

(2) To Multiply Integers Ending in Zeros.

Multiply the significant figures and annex to the product as many zeros as there are zeros in the multiplicand and the multiplier together.

Problem. Multiply 540 by 300.

Solution.—54 × 3 = 162. Three zeros annexed to 162 gives 162,000.

(3) To Multiply Integers by 9, 99, or Any Other Number Consisting of 9's.

Annex to the multiplicand as many zeros as there are 9's in the multiplier and from the result subtract the multiplicand.

Problem. Multiply 476 by 99.

Solution.—Two zeros annexed to 476 gives 47,600. 47,600 − 476 = 47,124.

(4) To Multiply Integers by 25, 50, 75, etc.

To multiply by 25, multiply the multiplicand by 100 and divide the product by 4.

Problem. Multiply 384 by 25.

Solution.—384 × 100 = 38,400.
38,400 ÷ 4 = 9,600.

To multiply by 50, multiply the multiplicand by 100 and divide the product by 2.

Problem. Multiply 384 by 50.

Solution.—384 × 100 = 38,400.
38,400 ÷ 2 = 19,200.

To multiply by 75, multiply the multiplicand by 100; divide the product by 4 and multiply the result by 3.

Problem. Multiply 384 by 75.

Solution.—384 × 100 = 38,400.
38,400 ÷ 4 = 9,600.
9,600 × 3 = 28,800.

DIVISION

Division is the process of finding how many times one number is contained in another.

The **dividend** is the number to be divided.

The **divisor** is the number by which the dividend is divided.

The **quotient** is the result obtained by division and indicates how many times the divisor is contained in the dividend.

The **remainder** is the part of the dividend that is left when the divisor is not exactly contained in the dividend; it is always less than the divisor. When there is no remainder, the division is said to be **exact.**

The sign of division is ÷. It is read *divided by.* Division is indicated as follows:

36 ÷ 9 ; 9⟌36 ; 9⟌36 ; 9⟌36__ ; ³⁶⁄₉ ; 36 : 9.

Problem. Divide 54,862 by 85.

Solution.—

645 37/85 quotient
divisor 85 ⟌ 54,862 dividend
51 0
3 86
3 40
462
425
37 remainder

Write the divisor at the left of the dividend and separated from it by a vertical line.

Since 54 will not contain the divisor, 85, it is necessary to take 548 as a partial dividend to be divided by 85. The number of times 85 is contained in 548 is determined by estimating the number of times 8, the left-hand figure of the divisor, is contained in the left-hand figures of the dividend. Since 5 is too small to contain 8, we estimate the number of times 8 is contained in 54. Eight is contained in 54 six times. We thus estimate that 85 is contained in 548 six times. The first quotient figure, therefore, is 6. Write the 6 over 8 in the dividend, the last of the three figures chosen for the partial dividend. Multiply the divisor, 85, by 6, writing the product, 510, beneath the first three figures of the dividend

as shown. Subtract 510 from 548 in the dividend. To the difference, 38, append the 6, "brought down" from the dividend, where it stood immediately to the right of the figures 548.

This process is repeated, 386 now being regarded as the dividend. 85 is contained in 386 four times. Write the 4 in the quotient to the right of the quotient figure previously obtained. Multiply 85 by 4 and write the product, 340, beneath 386. Subtract 340 from 386. To the difference, 46, append the 2 "brought down" from the dividend, and we have 462, which is now regarded as the dividend. 85 is contained in 462 five times. Write the 5 in the quotient to the right of the other quotient figures. Multiply, 85 by 5, writing the product, 425, beneath 462. Subtracting 425 from 462, we have 37.

When there are no more digits to be "brought down," the process of division is complete. The difference, if any, obtained in the final step is the remainder, which should be written in the quotient with the divisor under it and separated from it by a horizontal or an oblique line. The quotient of 54,862 divided by 85 is $645\frac{37}{85}$.

When the process of division is carried out in full as shown in the above problem, the operation is called **long division.**

When the multiplication and the subtraction in the process of division are performed mentally, only the quotient figures being written at each step, the operation is called **short division.** Short division is rarely used when the divisor has more than one figure, but is particularly useful if it contains only one figure. However, under modern methods of teaching many students fail to learn to divide by one figure by short division.

Problem. Divide 8763 by 9.

Solution.—

divisor	9	8763	dividend
		$973\frac{6}{9}$	quotient

TO PROVE DIVISION

(1) *By multiplication.*

If the division is exact, multiply the quotient by the divisor. Where there is a remainder, multiply the integral part of the quotient by the divisor and to the product add the remainder. The result in either case should equal the dividend.

$$645 \times 85 = 54{,}825.$$
$$54{,}825 + 37 = 54{,}862.$$

(2) *By casting out nines.*

Multiply the excess of 9's in the quotient by the excess of 9's in the divisor; from this product, cast out the 9's. The result should be equal to the excess of 9's in the dividend after the remainder, if any, has been subtracted.

quotient 645 Excess of 9's = 6.
divisor 85 Excess of 9's = 4.
24 Excess of 9's = **6.**
54,862 − 37 = 54,825 Excess of 9's = **6.**

SHORT METHODS

(1) When the Divisor is 10, 100, 1000, etc.

Cut off from the right hand of the dividend as many figures as there are zeros in the divisor. Place the divisor under the figures cut off and the whole will be the quotient.

Problem. Divide 3875 by 100.

Solution.—$3875 \div 100 = 38\frac{75}{100}$.

(2) When the Divisor is 20, 25, 50, etc., an Aliquot Part of a Unit of Higher Order.

Divide the dividend by a unit of the order next higher than the divisor. Take the result as many times as the divisor is contained in this next higher unit.

Problem. Divide 42,800 by 25.

Solution.—
$$42{,}800 \div 100 = 428.$$
$$428 \times 4 = 1712.$$

The divisor, 25, is ¼ of 100, the next higher unit. When a number is divided by 100, which is 4 times 25, the quotient will be ¼ of what it would be if the number were divided by 25. Since the divisor is 4 times as great, the quotient will be ¼ as large. Therefore, to divide by 25, divide the dividend by 100 and multiply the result by 4.

TESTS OF DIVISIBILITY

2 is an exact divisor of an *even* number, that is, a number the right-hand digit of which is 0, 2, 4, 6, or 8.

3 is an exact divisor of a number, the sum of whose digits is divisible by 3.

4 is an exact divisor of a number if its two right-hand figures are zeros, or if the number expressed by its two right-hand figures is divisible by 4.

5 is an exact divisor of any number whose right-hand digit is 0 or 5.

6 is an exact divisor of an even number, the sum of whose digits is divisible by 3.

8 is an exact divisor of a number whose three right-hand figures are zeros, or if the number expressed by its three right-hand figures is divisible by 8.

9 is an exact divisor of any number having digits whose sum is divisible by 9.

10 is an exact divisor of any whole number whose units' digit is 0.

12 is an exact divisor of a number divisible by both 3 and 4.

GREATEST COMMON DIVISOR

A **common divisor** of two or more numbers is a number that is an exact divisor of each of them.

The **greatest common divisor** (G. C. D.) of two or more numbers is the greatest number that is an exact divisor of each of them.

Numbers prime to each other are such as have no common divisor: 7 and 12; 8, 9, and 11.

(1) To Find the Greatest Common Divisor of Numbers That Can be Readily Factored.

(a) Separate each number into its prime factors; multiply the factors that are common to all, taking each factor the greatest number of times it occurs in every number. The product will be the G. C. D.

Problem. Find the G. C. D. of 27, 36, and 45.

Solution.—
$$27 = 3 \times 3 \times 3.$$
$$36 = 2 \times 2 \times 3 \times 3.$$
$$45 = 3 \times 3 \times 5.$$
$$3 \times 3 = 9. \quad \text{G. C. D.}$$

(b) Divide the numbers by any factor common to all; divide the quotients in the same manner and continue the division until there is a set of quotients prime to each other. Multiply the divisors and the product will be the G. C. D.

3	27	36	45
3	9	12	15
	3	4	5

$3 \times 3 = 9$. G. C. D.

(2) To Find the Greatest Common Divisor of Numbers That Cannot be Readily Factored.

Divide the larger number by the smaller. If there is a remainder, divide the preceding divisor by this remainder. Continue in this manner until there is no remainder. The last divisor is the G. C. D.

Problem. Find the G. C. D. of 161 and 207.

Solution.—

161	207	1				
	161					
	46	161	3			
		138				
		23	46	2		
			46			

23 = G. C. D.

Problem. Find the G. C. D. of 425 and 3825.
Solution.—

$$425 \overline{)3825}\ \overline{)9}$$
$$3825$$

425 = G. C. D.

If more than two numbers are given, find the greatest common divisor of two of them, then of this divisor and of one of the remaining original numbers, and so on. The last common divisor will be the G. C. D.

Problem. Find the G.C.D. of 292, 1022, and 1095.
Solution.—

$$292 \overline{)1022}\ \overline{)3} \qquad 146 \overline{)1095}\ \overline{)7}$$
$$876 \qquad 1022$$
$$146 \overline{)292}\ \overline{)2} \qquad 73 \overline{)146}\ \overline{)2}$$
$$292 \qquad 146$$

73 = G. C. D.

Numbers that contain no common factor cannot have a greatest common divisor: 30 and 77; 8, 12, and 15. Such numbers are prime to each other.

LEAST COMMON MULTIPLE

A **multiple** of a given number is a number that is exactly divisible by the given number.

A **common multiple** of two or more numbers is a number that is exactly divisible by each of those numbers.

The **least common multiple** (L. C. M.) of two or more numbers is the least number that is exactly divisible by each of those numbers.

To Find the Least Common Multiple of Two or More Numbers.

(1) Separate each number into its prime factors. Take each prime factor the greatest number of times it occurs in any one of the numbers. The product of the factors thus selected is the L. C. M.

Problem. Find the L. C. M. of 27, 36, and 45.
Solution.—

$27 = 3 \times 3 \times 3.$
$36 = 3 \times 3 \times 2 \times 2.$
$45 = 3 \times 3 \times 5.$

$3 \times 3 \times 3 \times 2 \times 2 \times 5 = 540$. L.C.M.

(2) Divide the numbers by any factor common to any two or more of the numbers. Bring down the quotients and any indivisible numbers. Repeat the process until the quotients are prime to each other. The product of the divisors and the last quotients is the L. C. M.

Problem. Find the L. C. M. of 7, 18, and 24.
Solution.—

3	7	18	24
2	7	6	8
	7	3	4

$3 \times 2 \times 7 \times 3 \times 4 = 504$. L. C. M.

CANCELLATION

The labor with computations involving division of numbers is lessened if common factors between dividend and divisors are removed. The process of removing such factors is known as **cancellation.** Some teachers now frown upon the use of the word cancellation in this process, but the term is still recognized in standard textbooks on arithmetic.

Problem. Divide $12 \times 5 \times 18 \times 70$ by $3 \times 14 \times 9 \times 20$.
Solution.—

$$\frac{\overset{2}{\cancel{12}} \times 5 \times \overset{6}{\cancel{18}} \times \overset{7}{\cancel{70}}}{\underset{1}{\cancel{3}} \times \underset{1}{\cancel{14}} \times \underset{3}{\cancel{9}} \times \underset{2}{\cancel{20}}} = 10.$$

By inspection, it will be seen that 10 is a factor common to 70 in the dividend and to 20 in the divisor. Draw a line through 70 and above it write 7, the quotient of 70 when divided by the common factor 10. 20 in the divisor will, similarly, be replaced by 2, as shown. 7 as a common factor, which, being rejected, leaves 2 in place of 14 and 1 in place of 7. The 1 is seldom written. When all factors common to both dividend and divisor have been rejected in this manner, divide the product of the remaining factors of the dividend by the product of the remaining factors of the divisor. Two factors, 2 and 5, remain in the dividend and none in the divisor. $2 \times 5 = 10$.

COMMON FRACTIONS

A **fraction** is one or more of the equal parts of a unit.

If a unit, which is a single thing, is divided into 2 equal parts, one of the parts is called *one half* of the unit and is represented by the fraction ½; if a unit is divided into 3 equal parts, one of the parts is called *one third*, or ⅓ of the unit; if a unit is divided into 4 equal parts, each part is called *one fourth*, or ¼ of the unit, and so on.

A unit that is divided into *halves* contains only 2 equal parts. Since one part is ½, 2 parts, or the whole, = ⅔. A unit divided into *fourths* must contain 4 equal parts: 1 part is ¼; 2 parts are ¾; 3 parts are ¾; 4 parts, or the whole, are ¼. It is clear, then, that fractions like ¼, ⅝, ⅞, ⅞ express the *whole.* Each fraction represents the *whole unit* or all of the parts into which each unit is divided. An expression such as ⅔, ¾, ⅘, or anything less than ⅜, ¼, ⅝, etc., represents but a *fractional part* of the unit.

A **common fraction** is a fraction expressed by two numbers, one under the other with a line between them: ⅓, ⅝, ⅞.

The **denominator** of a fraction is the number below the line. This number is called the denominator because it always *denominates*, or *names*, the parts, whether *thirds*, *fourths*, *fifths*, *etc.*, into which the unit is divided.

If an orange is cut into 2 equal parts, either of these parts is larger than each piece of the same orange would be if the orange were cut into 3 equal parts. It is evident, therefore, that ½ is less in value than ½, that ¼ is less than ⅛, and so on. In other words, the larger the denominator, the greater the number of parts into which the unit is divided, and the smaller the size of each part. As the denominator of the fraction grows larger, the parts of the unit grow smaller.

A **common denominator** is a denominator that is common to two or more fractions: 12 is a common denominator of 1/12, 5/12, 7/12.

The **least common denominator** (L. C. D.) is the least denominator that can be made common to two or more fractions without changing their value. The L. C. D. of several fractions is the L. C. M. of the given denominators. The L. C. D. of ½, ¾, and ⅞ is 8, which is also the L. C. M. of 2, 4, and 8.

The **numerator** of a fraction is the number above the line.

The fraction ⅝, for example, shows that the unit is divided into 8 equal parts and that 5 of these parts are under consideration; ⅞ means that 7 of these parts are being considered, and so on. It follows, therefore, that the number above the line *numbers* or *numerates* the parts; it always shows *how many* are taken.

The **terms** of a fraction are the numerator and the denominator.

A fraction is an expressed division. The numerator is the *dividend* and the denominator is the *divisor.*

The **value** of a fraction is the result obtained by dividing its numerator by its denominator.

A **proper fraction** is a fraction whose value is less than 1. Its numerator is less than its denominator: ⅔, ⅞, 5/12.

An **improper fraction** is a fraction whose value is 1 or more than 1. Its numerator equals or exceeds its denominator: $\frac{5}{5}$, $\frac{4}{3}$, $\frac{19}{7}$.

A **mixed number** is a number expressed by an integer, or whole number, and a fraction: $7\frac{3}{4}$, $16\frac{2}{3}$.

The **reciprocal** of a fraction is the fraction inverted: the reciprocal of $\frac{3}{7}$ is $\frac{7}{3}$.

Similar fractions are fractions that have a common denominator: $\frac{5}{8}$ and $\frac{7}{8}$.

Dissimilar fractions are fractions that have different denominators: $\frac{1}{4}$, $\frac{3}{8}$, $\frac{5}{12}$.

A fraction is in its **lowest terms** when its numerator and its denominator are prime to each other, that is when the terms of the fraction have no common divisor: $\frac{4}{5}$, $\frac{7}{9}$, $\frac{15}{17}$.

Of two fractions having the same denominator, the one having the larger numerator has the greater value: $\frac{7}{12}$ is more than $\frac{5}{12}$.

Of two fractions having the same numerator, the one having the larger denominator has the smaller value: $\frac{5}{9}$ is less than $\frac{5}{8}$.

Multiplying the numerator or dividing the denominator by a number multiplies the fraction by that number. Thus, in the fraction $\frac{3}{7}$, if the numerator, 3, is multiplied by 2, the fraction itself is multiplied by 2, becoming $\frac{6}{7}$. Similarly, in $\frac{3}{8}$, if the denominator, 8, is divided by 2, the fraction is multiplied by 2, becoming $\frac{3}{4}$.

Dividing the numerator or multiplying the denominator by a number divides the fraction by that number. Thus, in the fraction $\frac{4}{9}$, if the numerator, 4, is divided by 2, the fraction $\frac{4}{9}$ is divided by 2, becoming $\frac{2}{9}$. Likewise, in $\frac{3}{5}$, if the denominator, 5, is multiplied by 2, the fraction is divided by 2, becoming $\frac{3}{10}$.

TRANSFORMATION OF FRACTIONS

It is often necessary to transform a fraction into one with a different form without changing its value.

(1) Equivalent Fractions With Higher Terms.

A fraction may be expressed in higher terms by multipling each term of the fraction by the number needed to give the fraction the new denominator.

Problem. Express $\frac{3}{4}$ in twelfths.

Solution.—To obtain twelfths, it is necessary to divide the unit into 12 equal parts. An orange that has been divided into *fourths* contains 4 equal parts. The same orange may be divided into *twelfths* by cutting each one of the *fourths* into 3 equal parts. Since in $\frac{1}{4}$ of the orange there are $\frac{3}{12}$, in $\frac{3}{4}$ of the orange there are 3 times as many, or $\frac{9}{12}$. Therefore, $\frac{3}{4} = \frac{9}{12}$.

The new denominator, 12, is 3 times the given denominator, 4. By multiplying each term of the fraction $\frac{3}{4}$ by 3, the fraction becomes $\frac{9}{12}$. Therefore, $\frac{3}{4} = \frac{9}{12}$.

Multiplying both numerator and denominator by the same number changes the *form* of a fraction but does not change its *value*.

(2) Equivalent Fractions With Lower Terms.

The fraction may be expressed in lower terms if the numerator and denominator contain one or more common factors. This is done by the process of removing common factors between dividend and divisor as previously explained.

Problem. Express $\frac{6}{8}$ in fourths.

Solution.—To obtain fourths, an orange must be divided into 4 equal parts. $\frac{1}{8}$ of an orange is obtained by dividing an orange into 8 equal parts, which is the same as dividing each quarter into 2 equal parts. $\frac{2}{8} = \frac{1}{4}$. Then $\frac{6}{8}$ is equivalent to $\frac{3}{4}$.

The new denominator, 4, is $\frac{1}{2}$ of the given denominator, 8. By dividing each term of the fraction $\frac{6}{8}$ by 2, the fraction becomes $\frac{3}{4}$. Therefore, $\frac{6}{8} = \frac{3}{4}$.

Dividing both numerator and denominator by the same number changes the *form* of a fraction but does not change its *value*.

(3) To Express an Improper Fraction as a Whole or Mixed Number.

An improper fraction may be expressed as a whole number if the denominator is a factor of the numerator; otherwise it may be expressed as a mixed number.

Problem. Express $\frac{64}{8}$ as a whole or mixed number.

Solution.—Since in 1 unit there are 8 eighths ($\frac{8}{8}$), there are as many units in $\frac{64}{8}$ as the number of times 8 is contained in 64, which is 8. Therefore, $\frac{64}{8} = 8$. The division is exact.

It will be seen that the above solution is equivalent to dividing the numerator by the denominator: $\frac{64}{8} = 8$.

Problem. Express $\frac{12}{7}$ as a whole or mixed number.

Solution.—1 unit = 7 sevenths ($\frac{7}{7}$). The number of units in $\frac{12}{7}$ is equal to the number of times 7 is contained in 12, which is $1\frac{5}{7}$. Therefore, $\frac{12}{7} = 1\frac{5}{7}$. The division is not exact.

As in the preceding problem, the result may be obtained by dividing the numerator by the denominator: $\frac{12}{7} = 1\frac{5}{7}$.

(4) To Express a Mixed Number as an Improper Fraction.

A mixed number may be expressed as an improper fraction by adding the numerator of the fraction to the product of the denominator by the whole number, and placing this sum over the denominator.

Problem. Express $16\frac{2}{3}$ as an improper fraction. This is equivalent to showing how many thirds there are in $16\frac{2}{3}$.

Solution.—Since in 1 unit there are $\frac{3}{3}$, in 16 units there are 16 times $\frac{3}{3}$, or $\frac{48}{3}$. Adding $\frac{48}{3}$ and $\frac{2}{3}$, we have $\frac{50}{3}$. Therefore, $16\frac{2}{3} = \frac{50}{3}$.

The above solution is equivalent to the following: $16 \times 3 = 48$; $48 + 2 = 50$; $16\frac{2}{3} = \frac{50}{3}$.

(5) To Express an Integer as a Fraction.

An integer may be expressed in fractional form by writing 1 under it for a denominator: $27 = \frac{27}{1}$. Since a fraction is an expressed division, $\frac{27}{1}$ shows that 27 is divided by 1. There are 27 ones in 27. Therefore, $\frac{27}{1} = 27$. Moreover, this fraction may be expressed with higher terms, as under (1). Thus $27 = \frac{27}{1} = \frac{81}{3}$.

(6) To Express Two or More Fractions With a Common Denominator.

Any common multiple of the denominators may be used as a common denominator of the fractions, and by employing (1) we may express each fraction as a fraction in higher terms whose denominator is the chosen common denominator.

Problem. Express $\frac{1}{2}$ and $\frac{2}{3}$ with a common denominator.

Solution.—A common denominator of $\frac{1}{2}$ and $\frac{2}{3}$ may be chosen as 6, 12, 18, 96, etc. Let us use 18 as the common denominator and express $\frac{1}{2}$ and $\frac{2}{3}$ as eighteenths. Using the method given in (1) we have $\frac{1}{2} = \frac{9}{18}$, and $\frac{2}{3} = \frac{12}{18}$. Therefore, the fractions $\frac{1}{2}$ and $\frac{2}{3}$, when expressed with a common denominator 18, become $\frac{9}{18}$s and $\frac{12}{18}$s respectively.

(7) To Express Fractions With Their Least Common Denominators.

Each fraction will be in simplest form for operations involving other fractions if the chosen common denominator is the L. C. D. of the fractions involved. Hence, we select the L. C. D. of two or more fractions as the L. C. M. of their denominators, and proceed as under (6) to express each fraction as a fraction with denominator equal to this L. C. D.

Problem. Express $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{6}$ as fractions whose common denominator is the L. C. D. of the fractions.

Solution.—The L. C. M. of 3, 4, and 6 is 12, and this is also the L. C. D. of the fractions. Using the method under (1) or (6), we readily express the fractions $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{6}$ with the L. C. D. 12 as $\frac{8}{12}$, $\frac{9}{12}$, and $\frac{10}{12}$, respectively.

ADDITION OF FRACTIONS

(1) To Add Fractions Having a Common Denominator (Similar Fractions).

Add the numerators and place the sum over the denominator.

Problem. Add 1/14, 8/14, and 7/14.

Solution.—

$$1/14 + 8/14 + 7/14 = \frac{1+8+7}{14} = 1\frac{1}{14}.$$

(2) To Add Fractions Having Different Denominators.

Similar fractions may be added as in (1) immediately above, while dissimilar fractions must first be expressed as equivalent fractions with a common denominator before they can be added. Hence, to add dissimilar fractions, we proceed as in (7) above to express each fraction as an equivalent fraction whose denominator is the L. C. D. of the fractions, and place the sum of the resulting numerators over the L. C. D.

Problem. Add 2/3 and 3/4.

Solution.—The L. C. D. of 2/3 and 3/4 is 12. These fractions, when expressed as equivalent fractions with 12 for denominators, are 8/12 and 9/12, respectively. Hence, we may obtain their sum as

$$2/3 + 3/4 = 8/12 + 9/12 = \frac{8+9}{12} = 17/12 = 1\,5/12.$$

(3) To Add Mixed Numbers.

Add the integers and fractions separately; then add their sums.

Problem. Add 18⅝ and 14⅜.

Solution.—As under (2), just above, express the fractions ⅝ and ⅜ as equivalent fractions with their L.C.D. 18, and obtain 15/18 and 4/18, respectively. Thus we have ⅝ + ⅜ = 15/18 + 4/18 = 19/18 = 1 1/18. Hence, since 18 + 14 = 32, we may write 18⅝ + 14⅜ = 32 + 1 1/18 = 33 1/18.

SUBTRACTION OF FRACTIONS

The principles used in addition of fractions apply also to subtraction of fractions. One fraction can be subtracted from another only when the two fractions have a common denominator; as 7/8 − 5/8 = 2/8.

(1) To Subtract Dissimilar Fractions.

Express the fractions with their L. C. D. Subtract the numerator of the subtrahend from the numerator of the minuend and place the difference over the L. C. D.

Problem. From ⅝ take 3/8.

Solution.—The fractions ⅝ and 3/8 when expressed as equivalent fractions with their L. C. D. become 20/24 and 9/24, respectively. Hence we have ⅝ − 3/8 = 20/24 − 9/24 = 11/24.

(2) To Subtract Mixed Numbers.

If the fractions are not similar, express them as equivalent fractions with their L. C. D. Then subtract the whole numbers and the fractional parts separately.

In case the fraction in the subtrahend is larger than the fraction in the minuend, then 1 must be taken from the whole number of the minuend and added to its fraction before the fractions are subtracted.

Problem. From 27⅜ subtract 13¾.

Solution.—27⅜ = 27⅜ = 26 1/8

13¾ = 13⅞ = 13⅞

13 5/8.

When the fractions are expressed with their L. C. D., the fraction in the subtrahend ⅞ is found to be larger than the fraction ⅜ in the minuend, and as ⅞ cannot be taken from ⅜, it becomes necessary to take 1 from 27 and add it to the fraction and obtain 27⅜ = 26 1/8. Now the subtraction can be performed. Since 26 − 13 = 13, and 1 1/8 − ⅞ = ⅝, the difference 27⅜ − 13¾ = 26 1/8 − 13⅞ = 13 5/8.

MULTIPLICATION OF FRACTIONS

The multiplication of two fractions is indicated as, "multiply one fraction by another," "find the product of two fractions," or by showing the fractions separated by the sign of multiplication ×. When multiplying two or more fractions, the work will be simplified if each fraction is expressed in lowest terms and if each factor is cancelled that is common to any numerator and any denominator of the fractions when shown ready for multiplication.

(1) To Multiply a Fraction by an Integer.

Multiply the numerator of the fraction by the integer and place the product over the denominator. If the result is an improper fraction, it should be reduced to a whole or mixed number.

Problem. Multiply 7/12 by 5.

Solution.—7/12 × 5 means that 7/12 is taken 5 times. 7/12 taken once = 7/12; 7/12 taken 5 times = 5 times as much, or 35/12. Therefore, 7/12 × 5 = 35/12 = 2 11/12.

The above solution is equivalent to multiplying the numerator of the fraction by the integer and placing the result over the denominator: 7/12 × 5 = 35/12 = 2 11/12.

(2) To Multiply an Integer by a Fraction.

Multiply the integer by the numerator of the fraction and divide the product by the denominator.

Problem. Multiply 108 by ⅝.

Solution.—108 × ⅝ is the same as ⅝ of 108. ⅛ of 108 = 12; ⅝ of 108 = 5 times 12, or 60. Therefore, 108 × ⅝ = 60. Or, 108 × ⅝ = 540/9 = 60.

By cancellation, $\overset{12}{\cancel{108}} \times 5/\cancel{9} = 60.$

(3) To Multiply a Fraction by a Fraction.

Write the product of the numerators over the product of the denominators.

Problem. Multiply 4/5 by 2/3.

Solution.—4/5 × 2/3 = 2/3 of 4/5. Divide a unit into 5 equal parts. Divide each of the 5 equal parts into 3 equal parts. The unit will then be divided into 15 equal parts. It will be seen that 1/3 of 1/5 equals 1/15 of the whole. If 1/3 of 1/5 = 1/15, then 1/3 of 4/5 will equal 4 times as much, or 4/15; 2/3 of 4/5 will equal 2 times as much, or 8/15. Therefore, 2/3 of 4/5 = 8/15, or 4/5 × 2/3 = 8/15.

The above solution is equivalent to multiplying the numerators and placing the result over the product of the denominators: 4/5 × 2/3 = 8/15.

(4) To Obtain the Product of a Mixed Number and an Integer.

Express the mixed number and the integer as improper fractions and proceed as in the multiplication of a fraction by a fraction. Or, multiply the whole part and the fractional part of the mixed number separately by the integer and add these partial products.

Problem. Find the product of 31½ and 27.

Solution.—31½ reduced to an improper fraction = 63/2; 63/2 taken 27 times = 63/2 × 27 = 1701/2 = 850½. Or, 63/2 × 27/1 = 1701/2 = 850½. Or,

(a)

31½
27
13½ (½ × 27 = 13½.)
217
62
850½

(b)

27
31½
13½ (27 × ½ = 13½. ½ of 27 = 13½.)
27
81
850½

In (a), multiply the fraction ½ by the integer 27; multiply 31 by 27. In (b), multiply the integer 27

by the fraction $\frac{1}{2}$; multiply 27 by 31. In each problem, add the partial products in order to obtain the complete product.

(5) To Multiply Mixed Numbers.

To find the product of two mixed numbers, first express the mixed numbers as improper fractions and then proceed as in the multiplication of a fraction by a fraction. We may also multiply one mixed number by another by the four-step process of multiplying mixed numbers. In this process the product is obtained by adding the following four products: one fraction by the other, one whole number by the other, and each fraction by the whole number of the other mixed number. The problem below will be solved by each of these methods.

Problem. Find the product of $17\frac{5}{8}$ and $16\frac{2}{3}$.

First solution.—The mixed numbers $17\frac{5}{8}$ and $16\frac{2}{3}$ expressed as improper fractions are $\frac{141}{8}$ and $\frac{50}{3}$, respectively. Hence, we have

$$17\frac{5}{8} \times 16\frac{2}{3} = \frac{141}{8} \times \frac{\overset{10}{\cancel{50}}}{3} = \frac{470}{3} = 293\frac{1}{3}.$$

Second solution.—

$$\begin{array}{r} 17\frac{5}{8} \\ 16\frac{2}{3} \\ \hline \frac{5}{12} \quad (\frac{5}{8} \times \frac{2}{3} = \frac{5}{12}.) \\ 272 \quad (17 \times 16 = 272.) \\ 11\frac{1}{3} \quad (\frac{2}{3} \times 17 = \frac{34}{3} = 11\frac{1}{3}.) \\ 9\frac{5}{8} \quad (\frac{5}{8} \times 16 = \frac{48}{8} = 9\frac{5}{8}.) \\ \hline 293\frac{1}{3} \end{array}$$

DIVISION OF FRACTIONS

In general, the process of division of fractions is the reverse of the process of multiplication of fractions.

(1) To Divide a Fraction by an Integer.

Divide the numerator or multiply the denominator by the integer. This is the same as multiplying the dividend by the reciprocal of the divisor.

Problem. Divide $\frac{9}{10}$ by 3.

Solution.—Divide a unit into 10 equal parts. $\frac{9}{10}$ shows that 9 of these parts are being considered. To divide 9 of these parts, or $\frac{9}{10}$, by 3 is to take $\frac{1}{3}$ of these parts, or $\frac{1}{3}$ of $\frac{9}{10}$. $\frac{1}{3}$ of $\frac{9}{10} = \frac{3}{10}$. Therefore, $\frac{9}{10} \div 3 = \frac{3}{10}$.

$\frac{9}{10}$ is the dividend; 3 is the divisor. $\frac{9}{10}$ divided by $3 = \frac{9}{10} \div 3$. $\frac{9}{10} \div 3$ is the same as $\frac{1}{3}$ of $\frac{9}{10}$. $\frac{1}{3}$ of $\frac{9}{10} = \frac{3}{10}$, or $\frac{9}{10} \div 3 = \frac{3}{10}$.

The above solution is equivalent to multiplying the dividend, $\frac{9}{10}$, by the reciprocal of the divisor, 3:

$$\frac{9}{10} \div \frac{3}{1} = \frac{\overset{3}{\cancel{9}}}{10} \times \frac{1}{\cancel{3}} = \frac{3}{10}.$$

(2) To Divide an Integer by a Fraction.

Multiply the integer by the reciprocal of the fraction. In other words, multiply the dividend by the reciprocal of the divisor.

Problem. Divide 35 by $\frac{5}{9}$.

Solution.—In 1 unit there are $\frac{9}{9}$. In 35 units there are 35 times $\frac{9}{9}$, or $\frac{315}{9}$. Then $35 = \frac{315}{9}$. $\frac{315}{9} \div \frac{5}{9}$ means that we are asked to find how many $\frac{5}{9}$ there are in $\frac{315}{9}$. There are as many $\frac{5}{9}$ in $\frac{315}{9}$ as the number of times 5 is contained in 315, which is 63. Therefore, $35 \div \frac{5}{9} = 63$.

The above solution is equivalent to inverting the divisor and multiplying:

$$35 \div \frac{5}{9} = \frac{\overset{7}{\cancel{35}}}{1} \times \frac{9}{\cancel{5}} = 63.$$

(3) To Divide a Fraction by a Fraction.

Multiply the dividend by the reciprocal of the divisor and proceed as in the multiplication of a fraction by a fraction.

Problem. Divide $\frac{4}{5}$ by $\frac{2}{3}$.

Solution.—Changed to a common denominator, $\frac{4}{5} = \frac{12}{15}$ and $\frac{2}{3} = \frac{10}{15}$. $\frac{12}{15} \div \frac{10}{15}$ means that we are asked to find how many times $\frac{10}{15}$ is contained in $\frac{12}{15}$. $\frac{10}{15}$ is contained in $\frac{12}{15}$ as many times as 10 is contained in 12, that is, $1\frac{1}{5}$ times. Therefore, $\frac{4}{5} \div \frac{2}{3} = \frac{12}{15} \div \frac{10}{15} = 1\frac{1}{5}$.

The above solution is equivalent to inverting the divisor and multiplying:

$$\frac{4}{5} \div \frac{2}{3} = \frac{\overset{2}{\cancel{4}}}{5} \times \frac{3}{\cancel{2}} = \frac{6}{5} = 1\frac{1}{5}.$$

(4) To Divide a Mixed Number by a Mixed Number.

Express the mixed numbers as improper fractions and proceed as in the division of a fraction by a fraction.

Problem. Divide $9\frac{3}{8}$ by $4\frac{1}{2}$.

Solution.—$9\frac{3}{8} = \frac{75}{8}$; $4\frac{1}{2} = \frac{9}{2}$. Change $\frac{9}{2}$ to eighths to give the fractions a common denominator. $\frac{9}{2} = \frac{36}{8}$. $\frac{75}{8} \div \frac{36}{8}$ means that we are to find how many times $\frac{36}{8}$ is contained in $\frac{75}{8}$. $\frac{36}{8}$ is contained in $\frac{75}{8}$ as many times as 36 is contained in 75, which is $2\frac{1}{12}$ times. Therefore, $9\frac{3}{8} \div 4\frac{1}{2} = 2\frac{1}{12}$.

The above solution is equivalent to the following: $9\frac{3}{8} = \frac{75}{8}$; $4\frac{1}{2} = \frac{9}{2}$.

$$\frac{75}{8} \div \frac{9}{2} = \frac{\overset{25}{\cancel{75}}}{\underset{4}{\cancel{8}}} \times \frac{\cancel{2}}{\underset{3}{\cancel{9}}} = \frac{25}{12} = 2\frac{1}{12}.$$

DECIMAL FRACTIONS

A **decimal fraction,** commonly called a **decimal,** is a proper fraction whose denominator is 10, or a power of 10. A decimal fraction is usually written by placing a point, called a **decimal point,** to the left of the numerator and with no denominator, as $\frac{4}{10} = .4$. A decimal fraction is said to have as many places as there are digits (including zeros between the decimal point and the first significant digit) to the right of the decimal point, when the fraction is written with the decimal point notation. If the decimal fraction is written as a proper fraction, the number of places in the decimal fraction correspond with the number of zeros in the denominator. Thus the decimal fractions $\frac{9}{10} = 0.4$, $\frac{324}{1000} = 0.324$, and $\frac{32}{10,000} = 0.0032$, have one, three, and four places respectively.

Many computers place a zero to the left of the decimal point. This notation was used above where 0.4 was used for .4, 0.324 for .324, and 0.0032 for .0032. Use of this form is a matter of personal preference.

A **mixed decimal** is a number expressed by an integer and a decimal as 589.082. This number is read five hundred eighty-nine and eighty-two thousandths. We may note that $589.082 = 589\frac{82}{1000}$.

The decimal .0825 is read eight hundred twenty-five ten-thousandths; .825 is read eight hundred twenty-five thousandths; .00825 is read eight hundred twenty-five hundred-thousandths.

It should be observed that moving the decimal point one place to the *right* multiplies the decimal fraction by 10 and that moving the decimal point one place to the *left* divides the fraction by 10.

The value of the denominator of a decimal fraction is determined by the position of the last figure in the decimal. The following notation indicates the values of the denominators for each of the first eight decimal places:

Ten-thousands	Thousands	Hundreds	Tens	Units	Decimal point	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths	Ten-millionths	Hundred-millionths
0	0	0	0	0	.	0	0	0	0	0	0	0	0
integers						decimals							

The period, which is always placed *before* the decimal, *separates* the decimal fraction from the integer.

TRANSFORMATION OF DECIMALS

The decimal .6 is read 6 tenths. Changed to hundredths .6 becomes .60, or 60 hundredths; changed to thousandths .6 is .600, or 600 thousandths. Since $\frac{6}{10} = \frac{60}{100} = \frac{600}{1000}$ or $\frac{600}{1000} = \frac{60}{100} = \frac{6}{10}$, it is clear that .6 = .60 = .600. Therefore, zeros annexed to the end of a decimal fraction, or zeros dropped from the end of a decimal fraction, do not change its value.

(1) To Express a Decimal as a Common Fraction.

Omit the decimal point, supply the appropriate denominator, and express the fraction in lowest terms.

Problem. Express .052 as a common fraction.

Solution.—$.052 = \frac{52}{1000} = \frac{13}{250}$.

(2) To Express a Common Fraction as a Decimal.

A common fraction is equivalent to a whole number, a mixed decimal, or a decimal fraction, according as the numerator is equal to or greater than the denominator and is exactly divisible by it, the numerator is greater than the denominator but does not contain it as a factor, or the numerator is smaller than the denominator. The first case is revealed upon division and the fraction is equal to the quotient of the numerator by the denominator. In the second case zeros are annexed at the right of the numerator and the numerator is then divided by the denominator and the quotient is expressed as a mixed decimal. In the third case, where the given fraction is a proper fraction, annex zeros to the right of the numerator, divide the numerator by the denominator, and then from the right of the quotient point off as many decimal places as there are zeros annexed and used.

Problem. Express $\frac{3}{16}$ as a decimal.

Solution.—$\frac{3}{16} = 3.0000 \div 16 = .1875$.

Problem. Express $16\frac{1}{7}$ as a mixed decimal.

Solution.—$16\frac{1}{7} = 16.0000 \div 7 = 2.2857$.

The decimal equivalent of a common fraction can be expressed to any desired degree of accuracy by annexing a sufficient number of zeros to the numerator.

Note.—A table of decimal equivalents of some common fractions will be found in the list of mathematical tables.

ADDITION OF DECIMALS

In arranging decimals or mixed decimals for addition, care must be taken to place under one another the digits which have the same denomination; that is, units must be placed under units, tenths under tenths, and so on. This brings the decimal points directly under one another. Though it is unnecessary to do so, the number of digits to the right of the decimal point may be equalized in the addends by annexing zeros to those that are deficient in digits. This has been done below.

Add as with whole numbers, placing the decimal point in the sum directly under the decimal points in the addends.

Decimals	Mixed Decimals
0.2380	17.34
0.0500	0.84
0.0022	3456.00
0.2902	3474.18

SUBTRACTION OF DECIMALS

Write the subtrahend under the minuend so that units of the same order stand in the same column. This brings one decimal point directly under the other. Proceed as in the subtraction of whole numbers, placing the decimal point in the remainder directly under those above it.

Decimals		Mixed Decimals
.5310	minuend	128.3090
.0429	subtrahend	46.5692
.4881	remainder	81.7398

MULTIPLICATION OF DECIMALS

Multiply decimals as whole numbers are multiplied and then from the right of the product point off as many figures for decimals as there are decimal places in both multiplicand and multiplier, prefixing zeros if necessary.

(1) $7.32 \times 0.032 = 0.23424$.

or

$7.32 \times .032 = .23424$.

(2) $0.0026 \times 0.0003 = 0.00000078$.

or

$.0026 \times .0003 = .00000078$.

In the first illustration, the multiplicand has 2 decimal places and the multiplier 3, so that the product must have 2 + 3 = 5 places.

In the second illustration, the multiplicand has 4 decimal places and the multiplier has 4 so that the product must have 4 + 4 = 8 places. Since the product must have 8 decimal places, it is necessary to prefix 6 zeros to the digits in the product.

To multiply a decimal by 10, 100, 1000, etc., move the decimal point as many places to the right as there are zeros in the multiplier

$.63 \times 10 = 6.3$
$.63 \times 100 = 63$
$.63 \times 1000 = 630$

DIVISION OF DECIMALS

(1) To Divide a Decimal by an Integer.

The division is performed as with integers. The decimal point in the quotient is placed directly above the decimal point in the dividend.

Problem. Divide 399.552 by 192.

Solution.—

2.081 quotient
divisor 192 | 399.552 dividend

Where the division is exact, the position of the decimal point may also be determined by pointing off from the right of the quotient as many decimal places as there are decimal places in the dividend.

The correctness of the location of the decimal point may be tested mentally by noting that 192 is contained 2 + times in 399 and hence that the integral part of the quotient will be 2.

(2) To Divide by a Decimal.

To divide a whole number or a decimal by a decimal, proceed as in dividing by an integer, but write the first figure of the quotient as many places to the left of its normal position as there are decimal places in the divisor. The decimal point in the quotient is placed directly above the decimal point in the dividend.

Problem. Divide 7.8125 by 31.25.

Solution.—

.25 quotient
divisor 31.25 | 7.8125 dividend

In dividing with integers, 2, the first figure of the quotient, would be written over the 2 in the dividend. Since there are two places of decimals in the divisor, the 2 of the quotient must be written two places farther to the left, that is, over 8 in the dividend.

Where the division is exact, the position of the decimal point may also be determined by pointing off, from the right of the quotient, decimal places equal in number to the excess of the decimal places in the dividend over those in the divisor. Thus, in the above problem, there are 4 decimal places in the dividend and 2 in the divisor. 4 − 2 = 2. Therefore, the quotient must have 2 decimal places.

(a) If the number of decimal places in the divisor exceeds the number of decimal places in the dividend, the deficiency must be supplied by annexing zeros to the dividend. This should be done before beginning the division.

Problem. Divide 278.2 by .325.

Solution.—

856. quotient
divisor .325 | 278.200 dividend

(b) If the number of figures in the quotient is less than the excess of the decimal places in the dividend over those of the divisor, the deficiency must be supplied by prefixing zeros to the figures in the quotient.

Problem. Divide .730 by 365.

Solution.—

.002 quotient
divisor 365 | .730 dividend

(c) If there is a remainder after dividing a decimal either by an integer or by a decimal, annex zeros to the dividend and continue the division as many more places as is desired. The zeros annexed are decimals of the dividend. They do not change its value.

Problem. Divide 1682.3 by 24.

Solution.—

70.0958 + quotient
divisor 24 | 1682.3000 dividend

Problem. Divide 5638.7 by .204.

Solution.—

27640.686 + quotient
divisor .204 | 5638.700000 dividend

SIMPLE METHODS

When the divisor contains decimal figures, the work may be simplified by either of the following methods.

First method. Move the decimal point, in both divisor and dividend, as many places to the right as there are decimal places in the divisor, annexing zeros to the dividend if necessary. The divisor thus becomes an integer.

Second method. Move the decimal point, in both divisor and dividend, either to the *right* or to the *left*, a sufficient number of places in order to express the divisor with one digit to the left of the decimal point. If necessary, annex or prefix zeros to the dividend.

Divide as with integers with the first method and as with division by a decimal with the second.

Problem. Divide 7.8125 by 31.25.

First solution.—

.25 quotient
divisor 3125 | 781.25 dividend

Second solution.—

.25 quotient
divisor 3.125 | .78125 dividend

The process with each of the above methods is equivalent to multiplying both divisor and dividend by the same number, and this does not change the quotient.

PERCENTAGE

Per cent and **percentage** are terms derived from the Latin *per centum* and mean *by the hundred*: 7 per cent is 7 out of every hundred, or 7 hundredths; 11 per cent is 11 out of every hundred, or 11 hundredths. The sign % is used for the words per cent: 7 per cent may be written 7%.

Since any percentage is a certain number of hundredths, it may be expressed by a common fraction or by a decimal fraction: 7 per cent is equivalent to $\frac{7}{100}$, .07, or 7%. No new principle is involved, for units per cent are really numerators of fractions whose denominators are 100.

The equivalent of any fraction in units per cent is found by reducing the fraction to a decimal and using the figures in the first two decimal places as the number of integral units per cent. The following are the equivalents of some common fractions in units per cent:

$\frac{1}{2} = .50 = 50\%$. $\frac{1}{5} = .20 = 20\%$.
$\frac{1}{3} = .33\frac{1}{3} = 33\frac{1}{3}\%$. $\frac{1}{6} = .16\frac{2}{3} = 16\frac{2}{3}\%$.
$\frac{1}{4} = .25 = 25\%$. $\frac{1}{8} = .12\frac{1}{2} = 12\frac{1}{2}\%$.

There are five elements which enter into the operations of percentage; namely, *rate, percentage, base, amount, difference.*

The **rate** or **rate per cent** is the number which denotes how many hundredths or units per cent are taken. This number is sometimes written in the form of a decimal.

The **percentage** is the result obtained by taking a certain per cent of a number.

The **base** is the number on which the percentage is reckoned.

The **amount** is the sum of the base and the percentage.

The **difference** is the base minus the percentage.

All problems in percentage are similar to three type problems; namely, to find any one of the three numbers,—base, rate, and percentage,—when the other two are given.

(1) To Find the Percentage When the Base and the Rate Are Given.

Problem. A man had $480 in a bank and drew out 15% of it. How much money did he draw out?

Solution.—

15% = .15.
15% of $480 =
$480 × .15 = $72, sum drawn out.

$480 is the base; .15 is the rate; $72 is the percentage.

Percentage = base × rate.

Since the percentage is the product of two factors, the base and the rate, it is clear that, if the product and one factor are given, the other factor is obtained by dividing:

15 = 3 × 5.
15 ÷ 3 = 5.
15 ÷ 5 = 3.

(2) To Find the Base When the Percentage and the Rate Are Given.

Problem. A man rented a house for $60 a month. The yearly rent of the house was 12½% of its value. What was the value of the house?

Solution.—

$60 × 12 = $720, rent for 1 year.
12½% = .125.
$720 ÷ .125 = $5760, value of house.

$720 is the percentage; .125 is the rate; $5760 is the base.

Base = percentage ÷ rate.

This problem may also be analyzed as follows: At $60 a month, the yearly rent of the house is $720. Since the yearly rent, $720, is 12½% of the value of the house, then $720 is 12½% of a certain number. If 12½% of this number = $720, 1% of it = $720 ÷ 12½ = $57.60. 100%, or the whole amount, = 100 times as much, or $5760.

(3) To Find the Rate When the Base and the Percentage Are Given.

Problem. A farmer had 550 sheep and sold 121 of them. What per cent and also what fractional part of his flock did he sell?

Solution.—

121 ÷ 550 = .22 = 22%, rate.
22% = $\frac{22}{100}$ = $\frac{11}{50}$, the fractional part.

121 is the percentage; 550 is the base; 22% is the rate.

Rate = percentage ÷ base.

This problem may also be analyzed as follows: The number 550 is the whole, or 100%, of the flock. 1% of this number is 550 ÷ 100, or 5.5. Since 5.5 is 1% of the whole number of sheep, 121 will include as many units per cent of the whole flock as the number of times 5.5 is contained in 121. 121 ÷ 5.5 = 22, which is the required percentage.

(4) To Find the Base When the Amount and the Rate Are Given.

Problem. This year's salary of $3600 is 12½% more than last year's. Find last year's salary.

Solution.—

Last year's salary = 100% of itself.
Increase in salary = 12½% of last year's salary.
Therefore this year's salary, which is $3600, = 100% + 12½% = 112½% of last year's.
112½% = 1.125.
Last year's salary × 1.125 = $3600.
Hence last year's salary = $3600 ÷ 1.125 = $3200.

Base = amount ÷ (100% + rate).

The *amount* is always a *product*, of which the base is one factor and 1 (that is, 100%) + the rate, expressed as a decimal or as a common fraction, is the other factor.

(5) To Find the Base When the Difference and the Rate Are Given.

Problem. A man sold his automobile for $1880 and thereby lost 20% of what he paid for it. What was the cost of the automobile?

Solution.—

Cost = 100% of itself.
Loss on automobile = 20% of cost.
Therefore the selling price, which is $1880, = 100% − 20% = 80% of the cost.
80% = .80.
The cost × .80 = $1880.
Therefore the cost = 1880 ÷ .8 = $2350.

Base = difference ÷ (100% − rate).

The *difference* is always a *product*, of which the base is one factor and 1 (that is, 100%) − the rate, expressed as a decimal or as a common fraction, is the other factor.

INTEREST

Interest is the sum paid for the use of money.

Principal is the sum for the use of which interest is paid.

Amount is the sum of the principal and the interest.

Rate of interest is the number indicating the sum of money paid for the use, throughout one year, of each unit of the principal. It is usually expressed as a percentage of the principal: six per cent rate of interest is six cents of interest for every hundred cents of principal. The maximum rate is generally established by law and varies in different states and in different countries.

Usury is a higher rate of interest than that allowed by law.

Simple interest is interest calculated on the principal only.

Compound interest is interest calculated at regular intervals on the sum of the principal and the accumulated interest.

Exact interest is interest computed on the basis of 365 days to a year.

Ordinary interest, or **bankers' interest,** is interest computed on the basis of 360 days to a year.

Problems in interest are similar to problems in ordinary percentage:

The *principal* is the base.
The *rate of interest* is the rate per cent.
The *interest* is the percentage.
The *amount* is the same in both interest and percentage.

For the purpose of computing interest for short periods, the so-called commercial year, 360 days, is commonly used. When large sums of money are involved, *exact interest* may be used.

SIMPLE INTEREST

Although in problems involving simple interest the time may be less than, equal to, or greater than a year, the vast majority of applications are for periods less than a year.

THE GENERAL EQUATION OF INTEREST

All problems in interest may be solved by use of the one general equation:

Interest = principal × rate × time.

Any one of the four quantities, *interest*, *principal*, *rate*, or *time*, may be found when the other three are known. The time is expressed in years; the rate as a decimal fraction. In computing time 360 days are used for ordinary interest, and 365 for exact. The problems below, with which ordinary interest is used, illustrate the principal variations in the use of the formula that has been given above.

Problem. What principal will produce $44.80 ordinary simple interest in 2 yr. 8 mo. at 6%?

Solution.—

2 yr. 8 mo. = 2⅔ yr.
6% × 2⅔ = 16% = .16.
$44.80 ÷ .16 = $280, principal.

Principal = interest ÷ (rate × time).

Problem. What sum of money will amount to $165.64 in 90 days at 4%? What will be the interest?

Solution.—

90 days = ¼ yr.
$.04 × ¼ = $.01.
$1 + $.01 = $1.01, amount of $1 for 90 days at 4%.
$165.64 ÷ 1.01 = $164, principal.
$165.64 − $164 = $1.64, interest.

Principal = amount ÷ amount of $1 for given time and rate.

Problem. At what rate of interest will $1600 produce $7 in ordinary simple interest in 45 days?

Solution.—

45 days = $\frac{45}{360}$ yr. = .125 yr.
$7 ÷ .125 = $56, interest for 1 year.
$56 ÷ $1600 = .035, or 3½%, rate of interest.

Rate = (Interest ÷ time) ÷ principal,
= Interest ÷ (principal × time).

Problem. In what time will $3000 produce $18 ordinary simple interest at 3%?

Solution.—

$3000 × .03 = $90, interest for 1 yr.
$18 ÷ $90 = .2 yr., time.
The required time is .2 yr. = .2 × 360 da. = 72 days.

Time = interest ÷ (principal × rate).

SPECIAL METHODS USING 6%

With the following methods, ordinary simple interest is used, that is, interest based on a year of 360 days, or 12 months of 30 days each.

SIX PER CENT METHOD

At 6% the interest on $1.

for 1 year is $.06,
for 1 month is $.005,
for 1 day is $.000⅙.

Problem. Find the interest and the amount on $600 for 3 years 4 months 10 days at 6% ordinary simple interest. Find also the ordinary simple interest and the amount at 4%.

Solution.—

At 6% the interest on \$1.
for 3 years is \$.18,
for 4 months is \$.02,
for 10 days is \$.001⅔,
for total time \$.201⅔.
\$.201⅔ × 600 = \$121, interest.
\$600 + \$121 = \$721, amount.

Interest = principal × rate × time.

Amount = principal + interest.

The interest on \$1 for 3 yr. 4 mo. 10 da. at 6% = \$.201⅔.

at 1% = ⅙ of \$.201⅔ = \$.033$^{11}/_{18}$,
at 4% = \$.033$^{11}/_{18}$ × 4 = \$.134$^{4}/_{9}$.
\$.134$^{4}/_{9}$ × 600 = \$80.66⅔, or \$80.67, interest.
\$600 + \$80.67 = \$680.67, amount.

Note.—Interest at any rate per cent may be determined by dividing the interest at 6% by 6 (to get 1%) and multiplying the result by the required rate per cent.

BANKERS' SIXTY-DAY METHOD

The ordinary simple interest on any principal for 60 days, or 2 months, at 6% is 1% of the principal.

Problem. What is the interest on \$350 for 5 mo. 13 da. at 6%?

Solution.—

\$3.50 = interest for 60 da., or 2 mo.
\$.35 = interest for 6 da.
5 mo. = 2½ times 2 mo.
12 da. = ⅕ of 60 da.
1 da. = ⅙ of 6 da.
\$3.50 × 2½ = \$8.75, interest for 5 mo.
⅕ of \$3.50 = \$ .70, interest for 12 da.
⅙ of \$ .35 = \$ .058⅓, interest for 1 da.
\$9.508⅓, or \$9.51.

To find the interest on any number of dollars for 6 days at 6%, move the decimal point in the number representing the principal *three* places to the left; for 60 days, *two* places to the left; for 600 days, *one* place to the left.

A SHORT METHOD

To compute ordinary simple interest at 6%, one may multiply the number of dollars by the number of days, divide by 6, and move the decimal point *three* places to the left.

Problem. What is the interest on \$350 for 5 mo. 13 da. at 6%?

Solution.—

5 mo. 13 da. = 163 da.
\$350 × 163 ÷ 6 = \$9508.33⅓.

Moving the decimal point three places to the left, we obtain \$9.50833⅓, or \$9.51.

EXACT INTEREST

Problem. Find the exact interest on \$452.60 for 90 days at 5%.

Solution.—

\$452.60 × .05 = \$22.63, interest for 1 yr.
\$22.63 ÷ 365 = \$.062, interest for 1 da.
\$.062 × 90 = \$5.58, exact interest.

COMPOUND INTEREST

In transactions involving compound interest, the principal is increased at the end of each *interest period* by the interest which accrued during that period, whereas, as we have seen, the principal remains the same in those transactions involving simple interest. When interest is added to the principal periodically to become the new principal for the next period, it is said to be **converted** into principal, or to be **compounded.** At the end of an interest period, the total amount, after the interest has been added, is called the **compound amount.** This compound amount becomes the principal for the next interest period. The difference between the compound amount and the original principal is called the **compound interest.**

The examples below illustrate the difference between simple and compound interest.

SIMPLE INTEREST

\$600 = principal.
6% = rate.
2 yr. = time.
\$600 × .06 × 2 = \$72, interest.
\$600 + \$72 = \$672, amount.

COMPOUND INTEREST

\$600 = first principal.
\$36 = interest for first year.
\$636 = second principal.
\$38.16 = interest for second year.
\$674.16 = third principal.

The third principal gives the compound amount at the end of 2 years as \$674.16.

Compound amount and compound interest may be computed by the formula below, where the letter designations are, S for amount, P for principal, n for number of interest periods, i for the rate of interest per period, and I for compound interest.

$$S = P\,(1 + i)^n; \quad I = S - P.$$

Problems involving the first formula may be readily solved by use of tables on compound interest. Textbooks which deal with mathematics of investment feature very complete tables with the interest rate i covering those rates that arise frequently in ordinary transactions, and with n varying from 1 to 200 or 300 for very small rates of interest, and from 1 to 100 for other interest rates. The table below is of necessity quite limited, but will serve to let the reader see how to use a compound interest table. Modern interest rates are seldom above 6% and lower rates of interest than those shown in the table below are needed. These are included in more complete tables.

In the table the time is shown in the first column under years. Instead of thinking of time in terms of years, it may be thought of in terms of interest periods, particularly in those cases in which interest is compounded more frequently than once a year. Thus a sum of money invested at 8% compounded semi-annually for 6 years, would have interest at 4% on outstanding principal added each 6 months, and the amount may be found from the table as though the investment were at 4% per period for 12 periods, or 4% per year for 12 years.

COMPOUND INTEREST TABLE

Years	4%	5%	6%	7%	8%
1	1.040000	1.050000	1.060000	1.070000	1.080000
2	1.081600	1.102500	1.123600	1.144900	1.166400
3	1.124864	1.157625	1.191016	1.225043	1.259712
4	1.169859	1.215506	1.262477	1.310796	1.360489
5	1.216653	1.276282	1.338226	1.402552	1.469328
6	1.265319	1.340096	1.418519	1.500730	1.586874
7	1.315932	1.407100	1.503630	1.605782	1.713824
8	1.368569	1.477455	1.593848	1.718186	1.850930
9	1.423312	1.551328	1.689479	1.838459	1.999005
10	1.480244	1.628895	1.790848	1.967151	2.158925
11	1.539454	1.710339	1.898299	2.104852	2.331639
12	1.601032	1.795856	2.012197	2.252192	2.518170
13	1.665074	1.885649	2.132928	2.409845	2.719624
14	1.731676	1.979932	2.260904	2.578534	2.937194
15	1.800944	2.078928	2.396558	2.759032	3.172169
16	1.872981	2.182875	2.540352	2.952164	3.425943
17	1.947901	2.292018	2.692773	3.158815	3.700018
18	2.025817	2.406619	2.854339	3.379932	3.996020
19	2.106849	2.526950	3.025600	3.616528	4.315701
20	2.191123	2.653298	3.207136	3.869685	4.660957

Problem. Find the compound amount of \$600 for 2 years at 6%. Also find the compound interest.

Solution.—The table shows that \$1 at compound interest in 2 years at 6% will amount to \$1.123600.

\$1.123600 × 600 = \$674.16, amount.
\$674.16 − \$600 = \$74.16, compound interest.

SINKING FUNDS

If an equal amount of money is placed in a fund at regular intervals, and each payment draws compound interest, then the total value of the fund at the end of any period is the sum of the value of each of the payments when compound interest to the end of the period has been added. The regular payments, of equal amounts, and at a fixed rate of compound interest, represent an **annuity.** In an **ordinary annuity** each regular fixed payment is made at the end of the year, while in an **annuity due** each payment is made at the beginning of the year. The total value of the fund at the end of any period, called the **amount** of the annuity, includes the payment paid then with an ordinary annuity, but no payment is made then (and hence none is included in the amount) with an annuity due.

A fund which is created to meet future obligation is known as a **sinking fund.** Textbooks on mathematics of investment include, among other tables, a table which gives the amount of an annuity of \$1 for numerous periods of time and rates of interest. The sinking fund table below gives the amount of an annuity due of \$1 for the various years and interest rates shown; each payment of \$1 is made at the beginning of the year. By applying this table the reader should see how a table may be used for computing the value of a sinking fund. For general use, he should have a more complete table, one with time extending beyond 20 years, and with a wider range for rates of interest in order to cover the smaller interest rates that are frequently needed in applications.

SINKING FUND TABLE

Years	4%	5%	6%	7%	8%
1	1.04	1.05	1.06	1.07	1.08
2	2.1216	2.1525	2.1836	2.2149	2.2464
3	3.2465	3.3101	3.3746	3.4399	3.5061
4	4.4163	4.5256	4.6371	4.7507	4.8666
5	5.6330	5.8019	5.9753	6.1533	6.3359
6	6.8983	7.1420	7.3938	7.6540	7.9228
7	8.2142	8.5491	8.8975	9.2598	9.6366
8	9.5828	10.0266	10.4913	10.9780	11.4876
9	11.0061	11.5779	12.1808	12.8164	13.4866
10	12.4864	13.2068	13.9716	14.7836	15.6455
11	14.0258	14.9171	15.8699	16.8885	17.9771
12	15.6268	16.7130	17.8821	19.1406	20.4953
13	17.2919	18.5986	20.0151	21.5005	23.2149
14	19.0236	20.5786	22.2760	24.1290	26.1521
15	20.8245	22.6575	24.6725	26.8881	29.3243
16	22.6975	24.8404	27.2129	29.8402	32.7502
17	24.6454	27.1324	29.9057	32.9990	36.4502
18	26.6712	29.5390	32.7600	36.3790	40.4463
19	28.7781	32.0660	35.7856	39.9955	44.7620
20	30.9692	34.7193	38.9927	43.8652	49.4229

Problem. If \$200 is deposited in a fund at the beginning of each year for 15 years, and the money earns 5% compound interest, what will be the value of the fund at the end of 15 years?

Solution.—The table shows that \$1 deposited at the beginning of each year for 15 years at 5% will amount to \$22.6575 at the end of the 15th year.

\$22.6575 × 200 = \$4531.50, value of account.

DISCOUNT

Discount is a deduction made from a gross sum on any account whatever.

Rate of discount is the amount of discount for each unit of the gross sum. It is usually expressed as units per cent.

Discount series is a series of successive discounts made on a bill.

Net price or **net cost** is the price or cost as originally set forth less the discount.

Commercial discount is a deduction from the price or value of anything.

Cash discount is a reduction made for the immediate payment of a bill.

Time discount is a reduction made for the payment of a bill within a definite time.

Trade discount is a deduction from a trade list or list price. It may be based on the condition of the market, the size of the order, or various other factors.

Promissory note is a written promise to pay a stated sum of money on demand or at a specified time.

Face of a note is the sum for which the note is drawn.

The **amount,** or **maturity value,** is the value of the note at maturity, being the sum of its face value and of the interest accrued.

Term of discount is the time from the date of discount of a note to the date of its maturity.

Bank discount is the sum charged by a bank for cashing a note or a time draft, or for making a loan.

Proceeds is the sum of money which a borrower actually receives. It is the difference between the maturity value of the note (face value if the note bears no interest) and the bank discount.

True discount is the interest which, added to a principal, called present worth, or present value, will equal the maturity value of the note (face value if the note bears no interest).

Present worth, or **present value,** of a debt payable at some future time is that sum which, being put at interest, will amount to the debt at the time the debt becomes due.

COMMERCIAL DISCOUNT

Problem. Find the net price of a piano listed at \$500, sold at 20% and 5% off.

Solution.—

\$500 × .20 = \$100, first discount.
\$500 − \$100 = \$400, first net price.
\$400 × .05 = \$20, second discount.
\$400 − \$20 = \$380, net price.

Problem. What single discount is equivalent to a discount series of 25%, 15%, and 5%?

Solution.—

\$100 × .25 = \$25, first discount.
\$100 − \$25 = \$75, first net amount.
\$75 × .15 = \$11.25, second discount.
\$75 − \$11.25 = \$63.75, second net amount.
\$63.75 × .05 = \$3.1875, third discount.
\$63.75 − \$3.1875 = \$60.5625, third net amount.
\$100 − \$60.5625 = \$39.4375 = \$39.44.
\$39.44 ÷ \$100 = .3944 = 39.44%, which is the rate of an equivalent single discount.

BANK DISCOUNT

(1) To Find Bank Discount and Proceeds When Face of Note, Time, and Rate Are Given.

Problem. A note for \$500 payable in 60 days is discounted by a bank. Find the bank discount and the proceeds, money being worth 5%.

Solution.—

\$500 × .05 = \$25, interest for 1 year.
60 days = 1/6 of a year.
1/6 of \$25 = \$4.16⅔, or \$4.17, bank discount.
\$500 − \$4.17 = \$495.83, proceeds.

Bank discount = face of note × rate × time.

Problem. A note for \$600, bearing 6% interest, dated Sept. 20, 1954, and payable in 6 mo. was discounted at 7%, Feb. 12, 1955. Find the bank discount and the proceeds.

Solution.—

Date of maturity is March 20, 1955.
Term of discount = 36 da. (number of days from Feb. 12 to Mar. 20, 1955).
Interest on \$1 for 6 mo. (½ yr.) at 6% = \$.03.
Interest on \$1 for 1 da. at 6% = .000⅙.
\$.03 × 600 = \$18, interest for 6 mo.
\$600 + \$18 = \$618, amount.
\$.000⅙ × 36 = \$.006, interest on \$1 for 36 da. at 6%.
Interest on same at 1% = ⅙ of \$.006 = \$.001.
Interest at 7% = \$.001 × 7 = \$.007.
\$.007 × 618 = \$4.326, or \$4.33, bank discount.
\$618 − \$4.33 = \$613.67, proceeds.

Note.—When an interest-bearing note is discounted, the discount must be computed on the amount due at maturity.

(2) To Find Face of Note When Proceeds, Time, and Rate Are Given.

Problem. For what sum must a 90-day note be drawn to yield \$3160 if the rate of discount is 5%?

Solution.—

90 da. = ¼ of 1 yr.
5% of \$1 = \$.05.
¼ of \$.05 = \$.0125, interest on \$1 for 90 da. at 5%.
\$1.00 − \$.0125 = \$.9875, proceeds of \$1.
\$3160 ÷ .9875 = \$3200, face of note.

Face of note = proceeds ÷ proceeds of \$1.

TRUE DISCOUNT

To Find the Present Value and the True Discount.

Problem. A man owes \$260 payable in 8 months, money being worth 6%. What is the present value of the debt? What is the true discount?

Solution.—

\$1 at 6% for 8 months will amount to \$1.04.
\$260 ÷ 1.04 = \$250, present value.
\$260 − \$250 = \$10, true discount.

Present Value = amount due ÷ value of \$1 for given time and rate.

PROFIT AND LOSS

Profit and **loss** are terms used to express the sum gained or lost in buying and selling.

Net cost is the actual purchase price before buying expenses, such as transportation, are added.

Gross cost is the net cost plus all buying expenses.

List price is the established price at which an article is to be sold as given in a printed list or catalogue.

Net selling price is the sum received for an article after all discounts are deducted.

Gross profit represents the difference between net selling price and gross cost.

Net profit is gross profit minus selling and overhead expenses. If a profit is a negative number, it is a loss.

(1) To Find Gain or Loss in Dollars When Cost and Percentage of Gain or Loss on Cost Are Given.

Problem. A man bought a lot for \$2560 and sold it at a gain of 20% on the cost. How much did he gain? What was the selling price?

Solution.—

\$2560 × .20 = \$512, gain.
\$2560 + \$512 = \$3072, selling price.

Gain or loss = cost × rate.
Selling price = cost + gain or cost − loss.

(2) To Find the Percentage of Profit or Loss on Selling Price When Cost and Selling Price Are Given.

Problem. A farm was bought for \$5600 and was sold for \$6300. What was the gain per cent as figured on the selling price?

Solution.—

\$6300 − \$5600 = \$700, gain.
\$700 ÷ \$6300 = .11⅑ = 11⅑%, rate of gain.

Rate = gain or loss ÷ selling price.

(3) To Find Cost of an Article When Gain in Dollars and Gain Per Cent of Cost Are Given.

Problem. A man sold a watch at a profit of \$24, which represented a gain of 16⅔% on the cost. What was the cost of the watch?

Solution.—\$24 ÷ .16⅔ = \$144, cost.

Cost = gain or loss ÷ rate.

(4) To Find Cost of an Article When Selling Price and Per Cent of Loss on Selling Price Are Given.

Problem. A dealer sold a radio for \$100, thereby losing 20% on the selling price. Find the cost of the radio.

Solution.—

100% + 20% = 120% = 1.20.

(For each \$1 in the selling price, there is \$1.20 in the cost.)

\$100 × 1.20 = \$120, cost.

Cost = selling price × (100% + rate of loss).

COMMISSION OR BROKERAGE

Commission or **brokerage** is the compensation or percentage allowed an agent for transacting business.

Consignment is the merchandise forwarded to the agent.

Consignor is the person who sends the merchandise.

Consignee is the person to whom the merchandise is sent.

Gross proceeds is the amount for which the merchandise is sold.

Net proceeds is the sum remaining after the commission and all other charges have been deducted.

Problem. A real estate agent sold a house for \$12,500. After deducting his commission of 5%, how much did he remit to his principal?

Solution.—

\$12,500 × .05 = \$625, commission.
\$12,500 − \$625 = \$11,875, sent to principal.

Commission = sales price × rate of commission.

Problem. A grain dealer bought 24,000 bushels of wheat at \$2.00 a bushel. His commission was 1%. How much money must be sent to cover cost of grain and commission?

Solution.—

\$2.00 × 24,000 = \$48,000, cost of wheat.
\$48,000 × .01 = \$480, commission.
\$48,000 + \$480 = \$48,480, sum sent.

Commission = purchase price × rate of commission.

Problem. The average rate of commission charged by a real estate agent is 5%. What is the value of the real estate he must sell each year to produce an income of \$6500?

Solution.—

5% = .05.
\$6500 ÷ .05 = \$130,000, value of real estate.

Sales price = commission ÷ rate of commission.

Problem. An agent charged 12½% for buying a consignment of bicycles. His commission was \$250. What was the total cost to be transmitted by the consignee?

Solution.—

\$250 ÷ .125 = \$2000, purchase price.
\$2000 + \$250 = \$2250, cost.

Purchase price = commission ÷ rate of commission.

Problem. A man bought 400 acres of land at $25 an acre. The agent's commission was $250. What rate of commission did he charge?

Solution.—
$25 × 400 = $10,000, cost of land.
$250 ÷ $10,000 = .025 = 2½%, rate of commission.

Rate of commission = commission ÷ purchase price.

Problem. If $2500 is sent to an agent to invest in grain at a commission of 1¾%, what will be the amount actually invested in the grain? What is the agent's commission?

Solution.—
100% + 1¾% = 101¾% = 1.0175.
(For every dollar invested, $1.0175 is sent to the agent.)
$2500 ÷ 1.0175 = $2457, investment.
$2500 − $2457 = $43, commission.

Purchase price = amount ÷ (100% + rate of commission).

INSURANCE

Insurance is a guaranteed security against a specified type of loss or damage. There are two general kinds of insurance; namely, property and personal.

Property insurance includes, chiefly, fire, natural gas explosion, marine, live stock, furniture, plate glass, automobile, tornado, crop, cyclone, flood, boiler, liability, and burglary insurance.

Personal insurance includes, chiefly, life insurance, health insurance, accident insurance, hospital care insurance, and liability for personal injury insurance.

Policy is a written contract between the party insured and the company which assumes the risk.

Face of the policy is the amount of insurance.

Premium is the sum paid for insurance for a designated unit of time.

Rate is the amount paid per unit of insurance for a specified period of time. Rate is also expressed as the cost of $1 or of $100 of insurance for the period of time covered by the premium.

(1) To Find Premium When Face of Policy and Rate Are Given.

Problem. Household goods valued at $2500 are insured at the rate of $.50 per $100 for a term of 3 years. What is the premium?

Solution.—
$.50 ÷ $100 = .005 = ½%, rate.
$2500 × .005 = $12.50, premium.

Premium = face of policy × rate.

(2) To Find Rate When Face of Policy and Premium Are Given.

Problem. A store is insured for $18,000 and the annual premium is $600. Find the rate.

Solution.—
$600 ÷ $18,000 = .03⅓ = 3⅓%, rate.

Rate = premium ÷ face of policy.

(3) To Find Face of Policy When Premium and Rate Are Given.

Problem. A man paid $18 for burglary insurance at $.75 per hundred dollars. Find the face of the policy, or amount of insurance.

Solution.—
$18 × 100 ÷ .75 = $2400, face of policy.

Face of policy = premium × 100 ÷ rate (rate per 100 units).

(4) To Find Face of Policy When Value of Property and Rate Are Given.

Problem. For what sum must a store and contents valued at $29,400 be insured in order to cover entire loss by fire in addition to the premium paid at the rate of $2 per hundred?

Solution.—
$100 − $2 = $98.
(For each $98 in the value of the property, there must be $100 of insurance.)
(29,400 ÷ 98) × 100 = $30,000, face of policy.

TAXES

Tax is a sum of money levied on persons or on property by a government for public purposes.

Taxes are of two kinds—direct and indirect.

Direct tax is a tax levied on persons who are expected to bear the ultimate weight of it. Such are a poll tax, an income tax, a sales tax, a real estate tax.

Indirect tax is a tax, the ultimate weight of which is not expected to be borne by the persons who pay it. Import and corporation taxes are indirect taxes.

Poll tax is a tax of uniform amount levied on each individual, usually on each male citizen. Poll is an obsolete word for head. The tax was so named because it amounted to a definite sum per head.

Income tax is a tax on a person's income.

Property tax is a tax on property.

Property is of two kinds—real estate and personal property.

Real estate is immovable property, such as houses and lands.

Personal property is movable property, such as household goods, jewelry, cattle, machinery, cash, notes, bonds, and mortgages.

Assessors are officers appointed to determine the taxable value of property, to prepare assessment rolls, and to apportion taxes.

Assessed valuation is the value put upon property by the assessors.

Rate of taxation is the amount of taxes payable on each unit of the assessed valuation of the property. The rate is usually expressed in mills per dollar. One mill is one tenth of a cent. Expressed as a percentage, a rate of one mill is 1/10 of 1%.

(1) To Find Tax When Assessed Valuation and Rates Are Given.

Problem. The assessed valuation of a certain county is $4,246,600 and the rate of taxation for public schools is 4½ mills on the dollar. What is the school tax?

Solution.—
4½ mills = .45% = .0045, rate.
$4,246,600 × .0045 = $19,109.70, school tax.

Tax = assessed valuation × rate.

(2) To Find Federal Income Tax When Gross Income, Deductions, Exemptions, and Rate are Given.

Problem. John Smith is married and has three dependent children. He earns $6,000 gross income per year. He has deductions of $100 for contributions, $350 for interest, $275 for taxes. He gets a $600 exemption each for himself, his wife, and three children. Since he will file a joint return, his tax is twice the applicable rate applied to one-half of his taxable income. The rate on taxable amounts under $2,000 is 20%. Taxable income is the difference between gross income and the sum of deductions and exemptions.

Solution.—

Gross Income		$6,000.00
Deductions: Contributions	$100.00	
Interest	350.00	
Taxes	275.00	
		725.00
Net Income		$5,275.00
Exemptions: 5 × $600.00		3,000.00
Taxable Income		**$2,275.00**
Tax equals ½ (2,275.00) × 20% × 2		
Tax equals 1,137.50 × 20% × 2		
Tax equals $227.50 × 2 equals		**$ 455.00**

Tax = (Net Income − exemptions) × rate.

STOCKS AND BONDS

Stock, or **Capital Stock,** represents the amount contributed by stockholders to carry on the business of a corporation, company, or firm.

Share is one of the equal parts into which capital stock is divided.

Par value of stock is its face value. The par value of one share is usually $100. Some stocks, however, have no par value.

Market value of stock is the sum for which it will sell. This price may be above or below the par value, where a par value is specified on the face.

Stock is **at par** when it sells for its face value; stock is **above par,** or at a **premium,** when it sells for more than its face value; stock is **below par,** or at a **discount,** when it sells for less than its face value.

Dividend is the sum paid to stockholders from the profits of the business. It is usually computed on the par value of a share.

Preferred stock is stock upon which a certain specified dividend is payable from the company's profits before any of the profits are available for dividends on the remainder of the shares. The remaining shares constitute the **common stock.**

Bond is a term currently used to denote a document representing one of a number of parts of a debt payable to the holders of the bonds. Bonds are usually issued in denominations of $1000, $500, or $100. A bond differs from a share of stock in the following ways: (1) a bond is a contract, generally secured by a mortgage, to pay a definite sum, known as the par value, at a definite time, while stock is not an unconditional promise to pay any sum; (2) a bond bears interest, while stock normally pays dividends; and (3) a bond always has a par value, while many stocks have no par value.

Brokerage is the fee or compensation paid to a broker for his services in buying or selling stocks or bonds.

When a broker buys stock for a customer, the brokerage must be *added* to the quoted price in order to determine the actual cost of the shares; when a broker sells for a customer, the brokerage must be *subtracted* from the quoted price in order to determine the proceeds of the sale.

Brokerage charges were formerly calculated at a certain rate per cent on the par value of stocks or bonds, but under current practices the computation of commissions is not such a simple process. The charges for commissions are based on several factors, such as, in the case of bonds, the purchase price in relation to the par value of the bond, the number of years to run, and the number of bonds bought or sold, and, in the case of stocks, the price per share and whether the stocks are bought in 100-share units, or odd lots. Since there is such a large number of classifications we will make no attempt to present all of them, but will select certain applications of both stocks and bonds and will give some problems to illustrate the practices which are presented.

The commission charges given in the bond table below are for a $1000 bond, and the selling prices are at the specified per cent of the par value of the bond. Thus the value of bonds in the range "At 1 but under 10" would be from $10 to $99.99. For example, the purchase price of a bond bought at 9.6 would be .096 × $1000 = $96.

BONDS

Price	Commission per bond. 1 or 2 bond orders	3 bond orders	4 bond orders	5 or more bond orders
Selling under 1	$1.50	$1.20	$0.90	$0.75
At 1 but under 10	2.50	2.00	1.50	1.25
At 10 and above	5.00	4.00	3.00	2.50

STOCKS

To determine the minimum non-member (of New York stock exchange) commission on stocks selling at $1.00 per share or above, the formula, or table, below may be used. The constitution of the New York Stock Exchange provides for a minimum commission but the formula for determining this minimum will not be given here.

Amount of Money Involved	Commission
Under $100	As mutually agreed
$100 to $1,999	1% plus $5.00
$2,000 to $4,999	½% plus $15.00
$5,000 and above	1/10% plus $35.00
Odd Lot, $2 less.	

(1) To Find the Amount of Dividend.

Problem. A stock company whose shares have a par value of $100 declares a dividend of 5%. What dividend does *A* receive who owns 57 shares?

Solution.—

$100 × 57 = $5700, stock.
$5700 × .05 = $285, dividend.

or

$100 × .05 = $5, dividend per share.
$5 × 57 = $285, total dividend.

(2) To Find the Rate of Dividend or Installment to be Paid.

Problem. The capital of a company is $500,000. The receipts for one year are $67, 000, and the expenses are $103,000. If stockholders are assessed, what will be the rate of assessment?

Solution.—

$103,000 − $67,000 = $36,000, loss.
$36,000 ÷ $500,000 = $.072 = 7⅕%, rate.

(3) To Find the Cost of Bonds at a Given Quotation.

Problem. Find the cost of 20 bonds quoted at 98, the denomination of the bonds being $1000.

Solution.—

$1000 × .98 = $980, market value of bond.
Brokerage on one $1000 bond = $2.50.
$980 + $2.50 = $982.50, cost of 1 bond.
$982.50 × 20 = $19,650, cost of 20 bonds.

(4) To Find the Commission Charges on Stocks and the Purchase Price.

Problem. Find the commission on 100 shares of stock selling at 42½. What is the price?

Solution.—

$4250, money involved.
1% on first $2000 = $20.00
½% on $2250 = $11.25
plus $ 5.00, for round lot.
$36.25, commission.

or, from the formula,

½% of $4250 = $21.25
plus $15.00
$36.25, commission.
$4250 + $36.25 = $4286.25, price of 100 shares.

The price given does not include taxes, which have to be added.

Problem. Find the commission on 20 shares of stock selling at 34⅛. What is the price?

Solution.—

$682.50, money involved.
1% of $682.50 = $6.83
plus = $5.00
11.83
less 2.00, for odd lots.
$9.83, commission.
$682.50 + $9.83 = $692.33, price of 20 shares of stock.

Federal tax is to be added to the price given.

MENSURATION

MENSURATION is a branch of applied mathematics dealing with the calculation of lines, surfaces, and volumes from measured data. In the following section are given the areas of plane figures, together with formulas relating to their dimensions and properties; the surfaces and volumes of solids are also treated in the same manner. Practically all of the problems of measurement met with in everyday experience may be solved by an adaptation of the formulas here given. The formulas, as far as possible, follow the notation given in the figures. Where this is not possible, an explanation is given at the beginning of each set of formulas.

The reader is reminded that, in using these formulas, the product of the measures of two dimensions of a plane figure gives the measure of the area in square units, and that the product of the measures of the three dimensions of a solid gives the measure of the volume of the solid in cubic units.

The satisfactory use of this section demands a knowledge of the operations of arithmetic, such as may be obtained from the preceding section. In many cases, also, the various rules will be understood more easily if the reader has become familiar with the principles given in the sections entitled *Algebra* and *Geometry*, which appear farther on in this department.

The following general method of using the data here given is recommended:

1. Represent by a sketch the problem to be solved, showing the dimensions in the sketch in the same proportions that they bear in the problem.

2. Select from the figures in this section the one similar to the sketch thus obtained.

3. Replace the letters used in the figure with the measurements stated in the problem.

4. Select the formula in which the dimension to be found is shown at the left of the equality sign.

5. Substitute for each letter given in the formula the corresponding dimension of the problem, and perform the indicated operations. Remember that multiplication signs are seldom given in formulas. The formula $A = ab$ is translated $A = a \times b$. Unless otherwise specifically stated, all dimensions must be measured by the same unit; for example, feet and inches must be changed to either feet or inches.

MENSURATION OF PLANE SURFACES

TRIANGLES

A **triangle** is a plane figure formed by three straight lines which intersect by twos in three points. Each of these three points is the *vertex* of the angle formed by the two *sides* of the triangle which intersect in it.

Triangles are usually classified in two ways:

1. Classification based on the sides;

An **equilateral triangle** is a triangle in which the three sides are equal.

An **isosceles triangle** is a triangle having two equal sides.

A **scalene triangle** is a triangle having no two sides equal.

2. Classification based on the angles;

A **right-angled triangle** is a triangle having a right angle.

An **acute-angled triangle** is a triangle in which all of the angles are acute.

An **obtuse-angled triangle** is a triangle which has one obtuse angle.

The **base** is the side upon which the triangle appears to rest. Any side may be used as base.

The **vertex** of a triangle is the vertex of the angle opposite the base. Since a triangle may be placed with any side as the base, in reality the vertex of any angle may be regarded as a vertex of the triangle.

The **altitude** of a triangle is the perpendicular distance from the vertex to the base. It may be necessary to extend the base to meet the perpendicular.

The **median** is the line drawn from the vertex of a triangle to the middle of the opposite side.

The area of any triangle is equal to half the product of the base and the altitude. In the following formulas, a, b, and c have been used to designate the sides of the triangle, h its altitude, and A its area. In the right-angled triangle the altitude is equal to a.

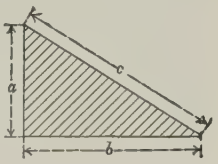
RIGHT-ANGLED TRIANGLE

$$A = \frac{ab}{2}.$$

$$c = \sqrt{a^2 + b^2}.$$

$$b = \sqrt{c^2 - a^2}.$$

$$a = \sqrt{c^2 - b^2}.$$



Problem. The sides a and b of a right-angled triangle are 24 and 10 inches, respectively. What is the area, and what is the length of the hypotenuse c?

Solution.

$$A = \frac{ab}{2} = \frac{24 \times 10}{2} = 120 \text{ square inches.}$$

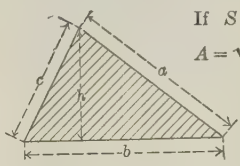
$$c = \sqrt{a^2 + b^2} = \sqrt{24^2 + 10^2} = \sqrt{676} = 26 \text{ in.}$$

ACUTE-ANGLED TRIANGLE

$$A = \frac{bh}{2} = \frac{b}{2}\sqrt{a^2 - \left(\frac{a^2 + b^2 - c^2}{2b}\right)^2}.$$

If $S = \frac{1}{2}(a + b + c)$, then

$$A = \sqrt{S(S-a)(S-b)(S-c)}.$$



Problem. If $a = 22$ inches, $b = 24$ inches, and $c = 18$ inches, what is the area of the triangle?

Solution.

$$A = \frac{24}{2}\sqrt{484 - \left(\frac{484 + 576 - 324}{2 \times 24}\right)}$$

$$= 12\sqrt{484 - \frac{2116}{9}} = 189.3 \text{ sq. in.}$$

Or,

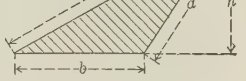
$$S = \tfrac{1}{2}(22 + 24 + 18) = 32.$$

$$A = \sqrt{32 \times 10 \times 8 \times 14}$$

$$= \sqrt{35840} = 189.3 \text{ sq. in.}$$

OBTUSE-ANGLED TRIANGLE

Problems involving this figure are solved by the same formulas and in the same manner as those which involve the acute-angled triangle.



In order to indicate the length of the altitude in a sketch, it is customary to extend the base, b, to meet the perpendicular, h, dropped from the vertex of the triangle.

QUADRILATERALS

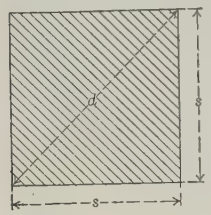
A **quadrilateral** is a plane figure of four sides and four angles.

A **diagonal** of a quadrilateral is a straight line that joins two opposite vertices.

SQUARE

A **square** is a quadrilateral all of whose sides are equal and all of whose angles are right angles.

A = area, s = side, d = diagonal. The diagonal divides the square into two right-angled triangles. Therefore, according to the Pythagorean theorem,



$d^2 = s^2 + s^2 = 2s^2$. $\therefore d = s\sqrt{2}$.

$A = s^2$.

$A = \frac{1}{2}d^2$.

$s = 0.7071\,d = \sqrt{A}$.

$d = 1.414s$

$= 1.414\sqrt{A}$.

Problem. The side, s, of a square is 14 inches. What is the area, and what is the length of the diagonal, d?

Solution. Area $= A = s^2 = 14^2 = 196$ sq. in. Diagonal $= d = 1.414s = 1.414 \times 14 = 19.80$ inches.

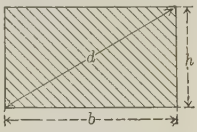
Problem. The area of a square is 196 square inches. What is the length of the side?

Solution. $s = \sqrt{A} = \sqrt{196} = 14$ inches.

RECTANGLE

A **rectangle** is a quadrilateral all of whose angles are right angles.

A = area; b = base, or length; h = altitude, or width; d = diagonal. The diagonal divides the rectangle into two right-angled triangles. Therefore, according to the Pythagorean theorem, $d^2 = b^2 + h^2$.



$A = bh$.

$A = b\sqrt{d^2 - b^2}$

$= h\sqrt{d^2 - h^2}$.

$d = \sqrt{b^2 + h^2}$.

$b = \sqrt{d^2 - h^2} = A \div h$.

$h = \sqrt{d^2 - b^2} = A \div b$.

Problem. A rectangle measures 11.5 inches by 15 inches. What is its area?

Solution. Area $= bh = 15 \times 11.5 = 172.5$ sq. in.

Problem. The height, h, of a rectangle is 11.5 inches and its area is 172.5 square inches. What is the length of the base, b, and of the diagonal, d?

Solution. $b = A \div h = 172.5 \div 11.5 = 15$ in.

$d = \sqrt{b^2 + h^2} = \sqrt{132.25 + 225}$

$= \sqrt{357.25} = 18.90$ inches.

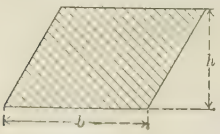
PARALLELOGRAM

A **parallelogram** is a quadrilateral with opposite sides parallel and equal. Rectangles, squares, rhombi, and rhomboids are all parallelograms.

A **rhombus** is an equal-sided parallelogram whose angles are not right angles.

A **rhomboid** is a parallelogram whose adjacent sides are not equal and whose angles are not right angles.

A = area, b = base, h = altitude. The dimension h must always be measured at a right angle to the dimension b.



$A = bh$.

$b = A \div h$.

$h = A \div b$.

Problem. The base, b, of a parallelogram is 24 inches. The height, h, is 9 inches. What is the area?

Solution. Area $= bh = 24 \times 9 = 216$ sq. in.

Problem. The area of a parallelogram is 216 square inches. The base is 24 inches. What is the height?

Solution. $h = A \div b = 216 \div 24 = 9$ inches.

TRAPEZOID

A **trapezoid** is a quadrilateral which has two of its sides parallel.

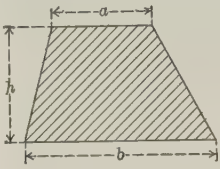
The **legs** are the nonparallel sides.

The **bases** are the parallel sides.

The **mid line** of a trapezoid is a straight line joining the mid-points of the legs.

An **isosceles trapezoid** is a trapezoid whose legs are equal.

The **altitude** of a trapezoid is the perpendicular distance between the parallel sides.



A = area, a = one base, b = other base, h = altitude.

$$A = \frac{(a + b)\,h}{2}.$$

Problem. The lengths of the parallel sides of a trapezoid are 20 and 30 feet, and the height is 12 feet. What is the area?

Solution.

$$A = \frac{(a+b)\,h}{2} = \frac{(20+30)\,12}{2} = \frac{600}{2} = 300 \text{ sq. ft.}$$

The areas of many irregular figures may be obtained by drawing a series of parallel lines across the given figure, thus dividing the figure into a series of trapezoids. The area of each trapezoid is then computed separately and the total area is obtained by addition. This process is simplified by the *Trapezoidal Rule*, provided the parallels are equally spaced, which may be stated as follows:

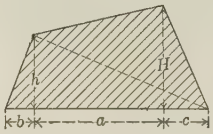
To half the sum of the lengths of the first and last parallels add the sum of the lengths of all intermediate parallels, and multiply this result by the common distance between the parallels.

The reader is referred to the article on *Chain Surveying* for a specific illustration of the foregoing rule.

TRAPEZIUM

A **trapezium** is a quadrilateral having no two sides parallel.

A = area; a, b, and c are line-segments of the base; h and H are perpendiculars to the base.



$$A = \frac{(H + h)\,a + bh + cH}{2}.$$

A trapezium may be divided, as shown, by the diagonal line into two triangles. It may be divided also into two triangles and a trapezoid by the perpendiculars h and H. The formula shown above is based on the latter arrangement. The reader is referred to the article on *Chain Surveying* for an illustration of the triangle method of computing the area of a trapezium. Care must be taken to measure the height of each triangle at a right angle to its base.

Problem. The dimensions of a trapezium are: $a = 11$ feet, $b = 2$ feet, $c = 3$ feet, $h = 6$ feet, $H = 9$ feet. What is the area of the trapezium?

Solution.

$$A = \frac{(9+6)\,11 + (2\times6) + (3\times9)}{2} = 102 \text{ sq. ft.}$$

OTHER PLANE FIGURES

CIRCLE

A **circle** is a closed curved line all of whose points lie in a plane and are equally distant from a point within called the **center.** The perimeter, or length, of a circle is called the **circumference.**

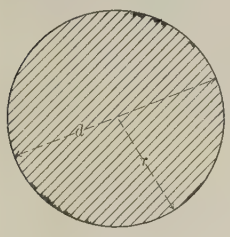
The **area** of a circle is the area of the plane surface enclosed by the circle.

A **radius** of a circle is a straight line drawn from the center to the circle.

A **diameter** of a circle is a straight line passing through the center of the circle and terminated at both ends by the circle.

The ratio of the circumference to the diameter is expressed by the Greek letter π, pronounced pī; an approximate value of this ratio, or of π, is 22/7. A more accurate value, which is very generally used, is 3.1416. The value of π cannot be expressed exactly but may be computed to any desired number of decimal places. To 15 decimal places the value of π reads 3.141592653589793.

A = area, C = circumference, d = diameter, r = radius.



$$A = \pi r^2 = 3.1416\, r^2$$
$$= \frac{\pi d^2}{4} = 0.7854\, d^2.$$
$$C = 3.1416d = 6.2832r.$$
$$r = C \div 6.2832$$
$$= \sqrt{A \div 3.1416}$$
$$= 0.5642\sqrt{A}$$
$$= 0.1592\, C.$$
$$d = C \div 3.1416$$
$$= \sqrt{A \div 0.7854}$$
$$= 1.1284\sqrt{A}$$
$$= 0.3184\, C.$$

The diameter of the circle is the dimension usually given. The formula $A = 0.7854\, d^2$ is another way of stating that the area of a circle equals .7854 times the area of the circumscribing square.

Problem. A 15-inch circle is cut from a 15-inch square of metal which weighs 1 pound, 8 ounces. What is the area of the circle and what is its weight?

Solution.

$A = 0.7854d^2 = 0.7854 \times 15 \times 15 = 176.7$ sq. in.

The weight is 78.54% of 1.5 pounds, or 1.17 + pounds.

Problem. The area of a circle is 44.2 square inches. What is its diameter?

Solution. $d = 1.128\sqrt{A} = 1.128\sqrt{44.2}$
$= 1.128 \times 6.65 = 7.5$ in.

Note.—Since the area is here given to only one decimal point, no advantage of accuracy is to be gained by using the value of $2\sqrt{\pi}$ to more than two decimal places, that is, 1.13. But, when very exact measurements are available, it is customary to perform the calculation using for these measurements numbers correct to one decimal place more than accuracy would seem to require. For this reason the value 1.128 is used rather than 1.13 or 1.1284.

ELLIPSE

An **ellipse** is a closed plane curve so constructed that the sum of the distances from any point on the curve to two fixed points within, called the *foci*, is a fixed length.

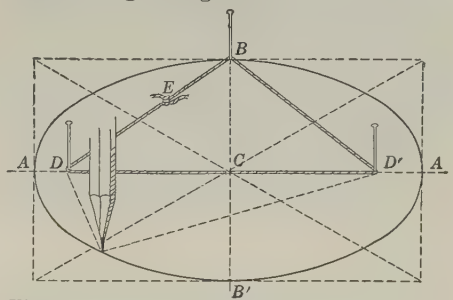
A **diameter** of an ellipse is any line passing through the point midway between the *foci* and terminated at each end by the curve.

The **major axis** of an ellipse is its greatest diameter, or its length.

The **minor axis** of an ellipse is its shortest diameter, or its width.

To Construct an Ellipse.

Draw a rectangle whose length and breadth are equal respectively to the major and the minor axis of the ellipse to be drawn. Drive a pin at the middle of the upper line at B. Then locate the points D and D' by striking an arc of radius AC with the center at B. Drive pins at D and D' and adjust a loop of thread passing around the points B, D, and D'. Remove the pin B and replace it by a pencil point; then, by moving the pencil so as to keep the string taut, the complete ellipse may be drawn within the bounding rectangle.

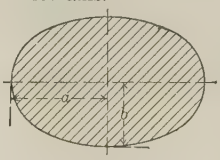


The points D and D' are the foci, and the sum of the distances from the foci to any point of the curve is constant and is equal to the length of $DB + BD' = AA'$, the length of the major axis.

Many interesting applications in scientific work feature ellipses. The ellipse is of especial interest because the orbits of the planets are approximately elliptical.

If a plane cuts all of the elements of a right circular cone (or cylinder) and is not perpendicular to its axis, the curve of intersection will be an ellipse.

A = area, a = half of major axis, b = half of minor axis.



$A = \pi ab$.
$= 3.1416\, ab$, approximately.

Like the circle, the area enclosed by the ellipse is approximately equal to 78.54% of the area of the circumscribing rectangle.

To obtain the perimeter of an ellipse it is necessary to evaluate an elliptic integral.

Problem. What is the area of the largest ellipse that can be drawn on a card measuring 7 inches by 10 inches?

Solution.

$A = 3.1416 \times 3.5 \times 5 = 54.98$ sq. in.

REGULAR POLYGONS

A **polygon** is a plane, closed figure having many angles and sides.

A **regular polygon** is a polygon all of whose sides and angles are equal. If any one of its dimensions is known, the area and other dimensions may be determined approximately by use of the table below.

A = area of polygon.
R = radius of circumscribed circle.
r = radius of inscribed circle.
s = length of one side.

Table of Regular Polygons

No. of Sides	Area	Area	Area	Radius of Circumscribed Circle	
3	$0.433\, s^2$	$1.299\, R^2$	$5.196\, r^2$	$0.577\, s$	$2.000\, r$
4	$1.000\, s^2$	$2.000\, R^2$	$4.000\, r^2$	$0.707\, s$	$1.414\, r$
5	$1.720\, s^2$	$2.378\, R^2$	$3.633\, r^2$	$0.851\, s$	$1.236\, r$
6	$2.598\, s^2$	$2.598\, R^2$	$3.464\, r^2$	$1.000\, s$	$1.155\, r$
7	$3.634\, s^2$	$2.736\, R^2$	$3.371\, r^2$	$1.152\, s$	$1.110\, r$
8	$4.828\, s^2$	$2.828\, R^2$	$3.314\, r^2$	$1.307\, s$	$1.082\, r$
9	$6.182\, s^2$	$2.893\, R^2$	$3.276\, r^2$	$1.462\, s$	$1.064\, r$
10	$7.694\, s^2$	$2.939\, R^2$	$3.249\, r^2$	$1.618\, s$	$1.052\, r$

Problem. What is the area of a regular octagon each of whose sides is 5 inches long?

Solution. $A = 4.828 \times 5 \times 5 = 120.7$ sq. in.

Problem. If a circle is drawn to circumscribe the regular octagon of the preceding problem, what will be its radius?

Solution. $R = 1.307 \times 5 = 6.535$ in.

MENSURATION OF SOLIDS

SOLIDS WHOSE SURFACES ARE PLANE AREAS

A **solid** has three dimensions.

If a solid is bounded by surfaces, all of which are plane areas, the bounding plane surfaces are called **faces.** The **edges** of the solid are the lines produced by the intersection of the planes which form the faces, and the **vertices** are the points of intersection of the edges. The dimensions of the solid are usually denoted as length, breadth, and thickness.

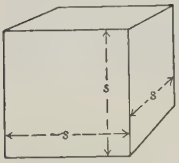
The **volume** of a solid is the volume of the space enclosed by its surfaces, and is expressed by the number of cubic units that it contains.

CUBE

A **cube** is a solid bounded by six squares.

A **diagonal** of a cube is a straight line joining two opposite vertices which do not lie in the same face.

V = volume; s = length of edge; d = diagonal.



$V = s^3$.

$s = \sqrt[3]{V}$.

$d = 1.732s$.

Problem. The side of a cube measures 5½ in. What is its volume?

Solution. $V = 5\frac{1}{2} \times 5\frac{1}{2} \times 5\frac{1}{2} = 166\frac{3}{8}$ cu. in.

Problem. The volume of a cube is 120 cubic inches. What is the length of its side?

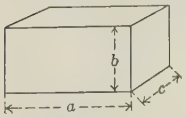
Solution. $s = \sqrt[3]{120} = 4.93 +$ inches.

Note.—The reader is referred to the article on *Logarithms* for the most convenient method of computing a cube root.

RECTANGULAR SOLID

A **rectangular solid** is a solid bounded by six rectangles. A rectangular solid is also called a **rectangular parallelepiped** and is, of course, a cube if all the faces are squares.

V = volume; a, b, and c are the lengths of the edges.



$V = abc$.

$a = \frac{V}{bc}$; $b = \frac{V}{ac}$; $c = \frac{V}{ab}$.

Problem. What is the volume of a rectangular box measuring 2 inches by 4 inches by 8 inches?

Solution. $V = 2 \times 4 \times 8 = 64$ cubic inches.

Problem. A box 10 inches by 12 inches is designed to hold a cubic foot. What is the height?

Solution. $b = \frac{1728}{10 \times 12} = 14.4$ inches.

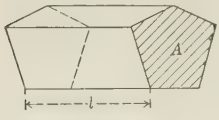
PRISM

A **prism** is a solid whose two ends, or bases, are equal, similar polygons parallel to each other and whose sides are parallelograms.

A **parallelepiped** is a prism whose bases are parallelograms.

The **length** or **altitude** of a prism is the perpendicular distance between the bases.

V = volume, A = area of the base, l = length or altitude. $V = Al$.



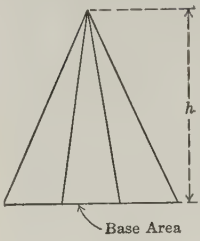
The area of the base, A, is found by the use of the formulas given under plane figures. The length, l, must be measured perpendicularly to the base.

Problem. A prism having for its base a triangle whose area is 10.5 square inches has a length of 9 inches. What is its volume?

Solution. $V = 10.5 \times 9 = 94.5$ cubic inches.

PYRAMID

A **pyramid** is a solid whose base is a polygon and whose faces are triangles meeting at a point, called the *vertex.*



V = volume.

h = height.

A = area of base.

$V = A \times \frac{1}{3}h$.

Determine the area of the base by consulting the proper figure as given above, or, if the base is a regular polygon, consult *Table of Regular Polygons* under *Other Plane Figures.*

Problem. A pyramid having a height of 6 inches has a base formed by a regular hexagon, each of whose sides measures 1 inch. What is the volume of the pyramid?

Solution.

Area of hexagon $= 1 \times 1 \times 2.598 = 2.598$ sq. in.

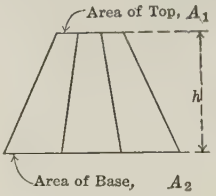
Volume of pyramid $= \frac{2.598 \times 6}{3} = 5.20$ cu. in.

FRUSTUM OF A PYRAMID

The **frustum** of a pyramid is the portion of the pyramid next the base, formed by cutting off the top by any plane parallel to the base. The surface resulting from this cutting is one of the two bases of the frustum.

The **altitude** of a frustum is the perpendicular distance between the planes of its bases.

V = volume, A_1 = area of upper base, A_2 = area of lower base, h = altitude.



$V = \frac{h}{3}\left(A_1 + A_2 + \sqrt{A_1 \times A_2}\right)$.

Problems of this character may easily be solved by the prismoidal formula described later in this section.

Problem. The pyramid in the previous problem having an altitude of 6 inches and a base measuring 1 inch on a side is cut off 2 inches from the top. What volume remains?

Solution (1). The small pyramid formed by the cut is similar in every way to the large pyramid. Consequently, as the small pyramid has a height of 2 inches, or ⅔ the height of the larger pyramid, the length of a side of the smaller base will be ⅔ that of a side of the larger base, or ⅓ inch. Therefore the volume of the smaller removed pyramid = $\frac{1}{3} \times 2\ (\frac{1}{3} \times \frac{1}{3} \times 2.598) = 0.19$ cu. in.

Then the volume of the frustum remaining = $5.20 - 0.19 = 5.01$ cu. in.

Solution (2). Using the formula, we have

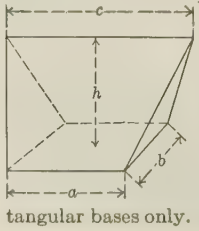
$A_1 = \frac{1}{3} \times \frac{1}{3} \times 2.598 = 0.29$ sq. in.

$A_2 = 2.60$ sq. in.

$V = \frac{2}{3}(2.60 + 0.29 + \sqrt{0.29 \times 2.60}) = 5.01$ cu. in.

WEDGE

A **wedge** is a solid having a base that is a parallelogram, and four other plane faces, two of which are triangles.



V = volume.

h = height.

c = sharp edge.

a and b = sides of base, a being parallel to c.

$V = \frac{(2a + c)bh}{6}$.

This formula is true for rectangular bases only. Other shapes of wedges should

be solved by the prismoidal formula described later in this section.

Problem. A wedge whose height is 8 inches has a sharp edge measuring 9 inches and a rectangular base whose dimensions are 4×6 inches. The sharp edge is parallel to the 6-inch sides. What is the volume of the wedge?

Solution. $V = \dfrac{(12 + 9) \times 4 \times 8}{6} = 112$ cu. in.

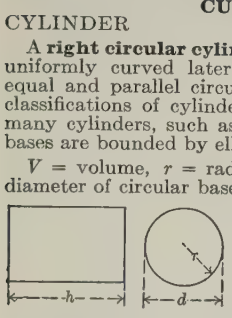
In case $a = c$, as in an ordinary wedge, the formula becomes $V = \dfrac{abh}{2}$.

SOLIDS WITH SOME OR ALL SURFACES CURVED

CYLINDER

A **right circular cylinder** is a solid bounded by a uniformly curved lateral surface, its ends being equal and parallel circular areas. There are other classifications of cylinders; in particular there are many cylinders, such as tanks for gasoline, whose bases are bounded by ellipses.

V = volume, r = radius of circular base, d = diameter of circular base, h = length, or altitude.



$V = 3.1416\, r^2\, h$
$= 0.7854\, d^2\, h.$
Area of side (lateral surface) $= 3.1416 dh.$
Area of end (base) $= 0.7854 d^2.$

Problem. What is the volume of a cylindrical tank whose length is 6 feet and whose diameter is 4.5 feet? What is the area of the metal in the side and in one end?

Solution.

$V = 0.7854 \times 4.5 \times 4.5 \times 6 = 95.426$ cu. ft.

Surface $= (0.7854 \times 4.5 \times 4.5) + (3.1416 \times 4.5 \times 6) = 100.73$ sq. ft.

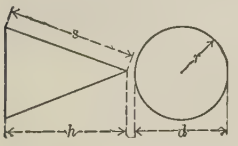
CONE

A **right circular cone** is a solid whose base is a circular area and whose curved lateral surface tapers uniformly to a point, called the **vertex.**

The **altitude** of a cone is the perpendicular distance from its vertex to its base.

The **slant height** of a cone is the distance from the vertex to any point in the circumference of the base.

V = volume, A = area of lateral surface, h = altitude, s = slant height, d = diameter of circular base, r = radius of circular base.



$V = \dfrac{h}{3}\,(3.1416\, r^2)$
$= 1.0472\, r^2\, h$
$= 0.2618\, d^2\, h.$
$A = 3.1416\, rs.$
$s = \sqrt{r^2 + h^2}.$
$h = \sqrt{s^2 - r^2}.$

Problem. A conical flower holder has a slant length of 6 inches and a diameter of 3 inches. Determine the area of the metal surface and the volume.

Solution.

$r = \dfrac{d}{2} = \dfrac{3}{2} = 1.5$ in.

$h = \sqrt{36 - 2.25} = 5.81$ in.

$V = 0.2618 \times 3 \times 3 \times 5.81 = 13.69$ cu. in.

$A = 3.1416 \times 1.5 \times 6 = 28.27$ sq. in.

FRUSTUM OF A CONE

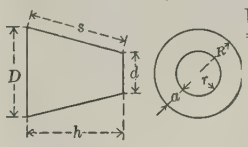
The **frustum** of a cone is the portion of a cone included between the base and the plane of a section, or cut, made through the cone, parallel to the base. The surface resulting from this section is one of the two bases of the frustum.

The **altitude** of a frustum is the perpendicular distance between the bases.

The **lateral surface** of a frustum is the portion of the surface of the frustum included between the bases.

The **slant height** is the shortest distance along the lateral surface from one base of the frustum to the other.

V = volume, A = area of lateral surface, D = diameter of lower base, d = diameter of upper base, R = radius of lower base, r = radius of upper base, $a = R - r$, s = slant height, h = altitude.



$V = 1.0472\, h\, (R^2 + Rr + r^2)$
$= 0.2618\, h\, (D^2 + Dd + d^2).$
$s = \sqrt{h^2 + a^2}.$
$A = 3.1416\, s\, (R + r)$
$= 1.5708\, s\, (D + d).$

Problem. Find the volume and the metal area of a pail 10 inches deep, the top diameter being 9 inches and the bottom diameter being 7.5 inches.

Solution. $V = 0.2618 \times 10 \times (81 + 67.5 + 56.25) = 536.0$ cu. in. $= 2.32$ gallons capacity.

$a = \dfrac{9}{2} - \dfrac{7.5}{2} = .75$ in.

$s = \sqrt{100 + .5625} = 10.03$ in.

$A = 1.5708 \times 10.03 (9 + 7.5) = 259.95$ sq. in.

Area of base $= .7854 \times 7.5^2 = 44.18$ sq. in.

Total area $= 259.95 + 44.18 = 304.1$ sq. in.

SPHERE

A **sphere** is a solid bounded by a uniformly curved surface, every point of which is equally distant from a point within, called the **center.**

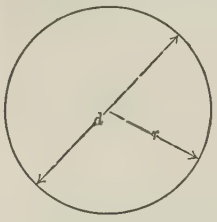
A **radius** of a sphere is a straight line joining the center with any point on the surface.

A **diameter** of a sphere is a straight line passing through the center and terminated at both ends by the bounding surface.

A **hemisphere** is one of the two equal parts into which a sphere may be divided by a plane passing through the center.

A **great circle** is a circle that divides the surface area of a sphere into two equal parts, and is formed by the intersection of the surface of the sphere by a plane passing through the center.

V = volume, A = surface area, r = radius, d = diameter.



$V = \dfrac{4\pi r^3}{3} = \dfrac{\pi d^3}{6}$
$= 4.1888\, r^3$
$= 0.5236\, d^3.$
$A = 4\pi r^2 = \pi d^2$
$= 12.5664\, r^2$
$= 3.1416\, d^2.$
$d = 1.2408 \sqrt[3]{V}$
$= 0.5642 \sqrt{A}.$

The volume formula, $V = \dfrac{\pi d^3}{6}$, states in algebraic language that the sphere occupies 52.36% of the circumscribing cube. Similarly, the formula $A = 4\pi r^2$ states that the area of the convex surface of the sphere is equivalent to the sum of the areas of four great circles.

Problem. Find the volume and the weight of a cast iron ball 4 inches in diameter if 1 cu. in. of cast iron weighs 0.26 lb.

Solution.

Volume $= 0.5236 \times 4 \times 4 \times 4 = 33.51$ cu. in.

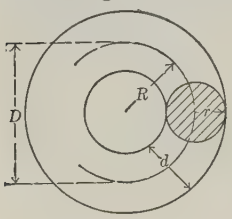
Weight $= 33.51 \times 0.26 = 8.7$ lb.

TORUS OR RING

A **torus** is a solid generated by the revolution of a circular area of radius r about an axis in the plane

of the circle and situated at a distance R from its center, where $R > r$.

V = volume, A = surface area, D = average diameter of torus at its equator, that is, one half the sum of the diameter of the outside circumference and the diameter of the hole encircled. In other words, D is the diameter of the circle generated by the center of the revolving circle. d = diameter, and r = radius, of the circular cross section of the body of the torus, or r is the radius of the revolving circle. R = average radius of the torus = D/2.



$$V = 2\pi^2 Rr^2 = 19.739\,Rr^2 = \frac{\pi^2}{4}\,Dd^2 = 2.4674\,Dd^2.$$

$$A = 4\pi^2 Rr = 39.478\,Rr = \pi^2 Dd = 9.8696\,Dd.$$

Problem. Find the volume and the surface of a ring, the inner diameter being 3 inches and the outer diameter being 4 inches.

Solution. If the inner and outer diameters are 3 in. and 4 in. respectively, the corresponding radii are ⅜ and ½, or 1.5 in. and 2 in. The diameter or thickness of the solid part of the ring, d, will therefore equal $2 - 1.5 = 0.5$ in.

$d = 0.5$ in.

$D = \frac{3+4}{2} = 3.5$ in., the average of the internal and external diameters.

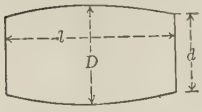
$\therefore V = 2.4674 \times 3.5 \times 0.5 \times 0.5 = 2.16$ cu. in.

$A = 9.8696 \times 3.5 \times 0.5 = 17.27$ sq. in.

BARREL

V = volume.
D = greatest diameter.
d = diameter of head.
l = length.

$V = 0.26\,l\,(2D^2 + d^2)$, approximately.



Problem. The length of a barrel is 26 inches, its greatest diameter is 19½ inches, and its head diameter is 16½ inches. Find the volume.

Solution. $V = 0.26 \times 26 \times (2 \times 19.5 \times 19.5 + 16.5 \times 16.5) = 6.76 \times (760.5 + 272.25) = 6981$ + cu. in.

This is probably a standard barrel, as an error of ¼ inch in measurement would account for the difference between the volume found and the standard volume, or 7056 cu. in.

PRISMOIDAL FORMULA

The prismoidal formula affords a method of calculating accurately the volume of many regular solids and of calculating the approximate volume of many irregular solids. It may be used, for example, to determine the volume of a frustum of a cone or a pyramid, of a segment of a sphere, of a wedge, or of a conoid, which last figure has a form similar to a rifle bullet. It serves also as a method of determining the cubic contents of a tank with flaring sides, of a pail or a barrel, and of piles or heaps of material. The end surfaces must be parallel (one may be a point or a line), and the area of a section midway between these must be determined.

V = volume.
h = length of solid.
A_1 = area at one end of the solid.
A_2 = area at the other end of the solid.
A_m = area of the mid section.

$$V = \frac{h}{6}\,(A_1 + 4\,A_m + A_2).$$

Problem. What is the approximate volume of a pile of coal 6 feet high whose base measures 10 feet by 12 feet? The mid section measures 6 feet by 7½ feet. The top area is assumed to be 0, since theoretically it is a point or line. However, in most cases a larger number could be used.

Solution. $V = \frac{6}{6}\,(0 + 4 \times 45 + 120) = 300$ cubic feet. Supposing the coal were stove size, red ash anthracite, its weight would be 300×52.5, or 15,750 pounds. See table of *Weights of Various Substances.*

FORMULAS

An equation which expresses algebraically some arithmetical or scientific rule is called a **formula,** and the expression of this formula in words is called a rule. Since these formulas hold true for whatever numbers the letters represent, the process of evaluating the formula consists in substituting, for the letters of the formula, the quantities mentioned in the problem, using the same unit of measurement employed in the formula. Metric measures cannot always be used in formulas based on English units; for example, distances must be expressed in feet, inches, or meters, as the formula indicates. Oftentimes it is possible to combine all the constant figures into one coefficient, thereby greatly reducing the amount of computation. It should be noted that all formulas are in the algebraic form and that when two letters are placed together the sign of multiplication is implied.

Following is a list of some of the formulas used in the sciences, engineering, and business. The reader is referred to the preceding paragraphs for the relations of the various common figures and also to the article *Arithmetic.* If the formula does not express the factor desired, it should be algebraically transformed so that the desired factor stands on the left of the equality sign.

CONVERSION OF FAHRENHEIT AND CENTIGRADE TEMPERATURES

$$C = \tfrac{5}{9}\,(F - 32);\ F = \tfrac{9}{5}C + 32.$$

Problem. What is the equivalent of 68° Fahrenheit in degrees Centigrade?

Solution. $C = \frac{5}{9}\,(68 - 32) = \frac{5}{9} \times 36 = 20$. Therefore 20° Centigrade represents the same temperature as 68° Fahrenheit.

FALLING BODIES AND PROJECTILES

The following formulas are true for movement in a vacuum and approximately true for movement in air.

S = distance fallen in feet.
g = acceleration due to gravity, 32.16 feet per second per second.
t = time in seconds.
v = velocity in feet per second.
h = height to which a projectile will rise when given an initial velocity v.

$$S = \frac{gt^2}{2} = 16.08t^2. \quad (1)$$

$$v = gt = 32.16t. \quad (2)$$

$$h = \frac{v^2}{2g} = .01555v^2. \quad (3)$$

Problem. How long will it take a stone to fall a distance of 100 feet?

Solution. Since the time is the unknown factor, equation (1) must be transformed to read as follows:

$$t = \sqrt{\frac{S}{16.08}} = .249\,\sqrt{S}$$

$$= .249\,\sqrt{100} = 2.49 \text{ seconds.}$$

Problem. A baseball thrown vertically upward returns in 5 seconds. With what velocity did it start? How high did it rise?

Solution. The time required for the ball to rise to its highest position is exactly equal to the time it takes in falling back to the starting point. Consequently, the time of rising or falling equals one-half the total time, or 2.5 seconds.

From (2), $v = 32.16 \times 2.5 = 80.4$ ft. per second; from (3), $h = .01555 \times 80.4 \times 80.4 = 100.5$ feet.

HORSEPOWER OF AN ENGINE

The **indicated horsepower** of a reciprocating engine may be computed by use of the formula

$$\text{H. P.} = \frac{\text{PLAN}}{33{,}000},$$

where,

P = mean effective pressure in pounds per square inch,
A = area of piston in square inches,
L = length of stroke of engine in feet,
N = number of revolutions of the flywheel, (there are N double strokes, forward and back).

The **mean effective pressure** is obtained experimentally by use of a pressure indicator, and the number of revolutions are found by using a counting device. Pressure is produced by some expanding substance such as steam, or other vapor. An important source of pressure for operating an engine is the explosive mixture of air with vapor from gasoline which is used in an internal combustion engine. The mean effective pressure is a fictitious pressure which, if such a pressure were maintained constant throughout a stroke, would perform the same work as is done by the expanding substance during the stroke.

HORSEPOWER OF A STEAM ENGINE

Steam engines, like other engines, are used for generating power. Two types of steam engines are the reciprocating engine and the rotary engine, or turbine. The problem below will illustrate the use of the formula in computing the horsepower of a two-cylinder, double-acting, reciprocating engine.

Problem. What is the indicated horsepower of a two-cylinder, double-acting steam engine if the mean effective pressure for one cylinder is 72.4 lb./sq. in. for the head end ($P_h = 72.4$), and 71 lb./sq. in. for the crank end ($P_c = 71$), the crank is 18 in., the cylinder and piston-rod are respectively 12 in. and 2 in. in diameter, and the engine makes 90 rev./min.?

Solution.

Head end.

P_h = 72.4 lb./sq. in.
L = 3 ft. (stroke = double the crank length in feet).
$A = \pi \cdot 6^2 = 113.1$ sq. in. (area of piston).
N = 90 r.p.m. (strokes or revolutions per minute).

$$\text{H.P.} = \frac{72.4 \times 3 \times 113.1 \times 90}{33{,}000} = 66.9$$

Crank end.

P_c = 71 lb./sq. in.
L = 3 feet.
$A = \pi \cdot 6^2 - \pi \cdot 1^2 = \pi \cdot 35 = 109.956$
= 110 sq. in.
N = 90 r.p.m.

$$\text{H.P.} = \frac{71 \times 3 \times 110 \times 90}{33{,}000} = 63.9.$$

Each cylinder,
H.P. = 66.9 + 63.9 = 130.8.
Indicated horsepower for engine,
H.P. = 130.8 × 2 = 261.6.

HORSEPOWER OF A GAS ENGINE

To compute the horsepower of a gas engine is not quite as simple a problem as is the problem with a steam engine, as there are many more things to be considered. However, if the mean effective pressure, the piston area, the length of stroke, the number of cylinders, and the number of strokes per minute are known, then the general formula for horsepower may be used.

Some years ago the Society of Automotive Engineers (S.A.E.) adopted the following formula for horsepower of a gas engine.

$$\text{H.P.} = \frac{nd^2}{2.5} = 0.4\,nd^2,$$

where n = number of cylinders, and d = diameter of cylinder in inches.

This formula is used by some taxing authorities for computing the rated horsepower of gas engines. The horsepower as obtained by this formula is smaller than the actual indicated horsepower.

Problem. What is the rated horsepower of a four-cylinder automobile engine whose cylinders are 3.5 inches in diameter?

Solution. H. P. = 0.4 × 4 × 3.5 × 3.5 = 19.6.

CAPACITY OF A PIPE IN GALLONS

$C = 0.0408\,L\,D^2$, in which C = capacity in gallons, L = length in feet, D = diameter in inches.

Problem. How many gallons of water will be contained in a 2″ pipe line 300′ long?

Solution. $C = 0.0408 \times 2 \times 2 \times 300 = 48.96$ gal. (Reduction of feet to inches and other steps in the mensuration are included in the coefficient 0.0408).

RELATION OF WATER PRESSURE TO HEAD

$P = 0.433\,h$; $h = 2.31\,P$ where h = head, or vertical height in feet, of a column of water and P = pressure in pounds per square inch.

Problem. The level of the water in a house tank is 40 feet above a laundry tub faucet. What is the pressure in pounds per square inch at the faucet?

Solution. $P = 40 \times 0.433 = 17.32$ lb. per sq. in.

Problem. How high must a tank be placed above a laundry motor if the motor requires a pressure of 20 lb. per sq. in. to operate it?

Solution. $h = 2.31 \times 20 = 46.2$ ft.

CURVATURE OF THE EARTH AND VISIBILITY

The greatest distance from which an object, such as a ship, may be seen by a person who sights from sea level, depends on the height of the object and is expressed approximately by the formula

$$d = \sqrt{\frac{3h}{2}}, \text{ in which}$$

d = the distance of the object from the observer in miles and
h = the height of the object in feet.

Problem. A lightship carries a light 30 feet above the water. What is the greatest distance at which this light can be seen from a position on the shore at the water level?

Solution.

$$d = \sqrt{\frac{3 \times 30}{2}} = \sqrt{45} = 6.7+ \text{ miles.}$$

Used in another way, this formula will show the distance from an observer on the seashore to the *horizon*, or the point where the sky and the water seem to meet.

Problem. What is the distance to the horizon for a man whose eyes are 5½ feet above the sea level?

Solution.

$$d = \sqrt{\frac{3 \times 5.5}{2}} = \sqrt{8.25} = 2.87 \text{ miles.}$$

WIND PRESSURE

A stream of air in motion will exert a force upon any surface which it strikes. Engineers must be able

to estimate with reliable accuracy the force exerted by wind of various speeds upon fixed surfaces, such as buildings, bridges, radio towers, and other structures, and also upon moving surfaces such as automobiles and airplanes. The general formulas and computations are too complicated for inclusion here, but simple applications will be given.

The force exerted by wind upon a fixed or moving surface depends upon many factors, notably, the speed of the wind, the shape and size of the surface area subjected to wind pressure, and whether or not the surface is perpendicular to the direction of the wind, the density of the air, and the speed of the moving object.

If the moving air strikes perpendicularly against a plane surface so as to lose all of its velocity, a formula* for computing the approximate force exerted is

$$F = 1.28 \frac{\rho}{2} AV^2,$$

where F = force in pounds,
ρ = density of air in slugs per cubic foot,
A = surface area in square feet,
V = speed in miles per hour.

For standard air density this formula becomes

$$F = 1.28 \times \frac{0.002378}{2} \times A \times \left(\frac{88}{60}V\right)^2$$
$$= 0.00327\ AV^2,$$

and if A is taken as unity the value found for F will be in pounds per square foot.

Problem. An air stream flowing horizontally with a velocity of 45 miles per hour, strikes a vertical wall 9 ft. by 12 ft. in size. If atmosphere is normal density, what is the force acting against the wall?

Solution.

Using
$A = 9 \times 12 = 108$ sq. ft.,
$V = 45$ mi./hr.,
in the second formula above, we find,
$F = 0.00327 \times 108 \times 45 \times 45$
$= 715$ lb.,
which is approximately 6.6 pounds per square foot of the area.

From the formula it can be seen that the force on a flat surface area varies as the square of the air speed. If the force acting when the speed of a moving object relative to the speed of the wind is one mile per hour, then that at any other speed of the car can be found by multiplying by the square of the air speed (or speed of the object).

Problem. The force against an automobile windshield has been found to be 0.015 lb. when the car was moving forward at 1 mile per hour. What is the force when the car is traveling at 40 miles per hour?

Solution.

$F = 0.015 \times 40 \times 40$
$= 24$ lb.

The lift, or force, exerted on the wings of an airplane will determine whether the plane maintains horizontal flight or will gain or lose altitude. For horizontal flight (excepting for a few small components of thrust that need not be considered here) the weight of the airplane and the lift of the wings are equal. The airplane will rise if the lift is greater than the weight and fall if the weight is greater than the lift.

For horizontal flight

$$W = L = C_L \frac{\rho}{2} SV^2,$$

where L is in pounds,
S is area in square feet,
V is speed in feet per second,
C_L is the lift coefficient.**

*See *Elements of Practical Aerodynamics* by Bradley Jones, John Wiley and Sons, Inc.

**The value of C_L for various angles of attack may be found in Jones, *Elements of Practical Aerodynamics*.

Problem. What weight can an airplane have to fly level with a Clark Y wing 300 sq. ft. in area, at 6° angle of attack, at 120 miles per hour?

Solution.

Substituting
$C_L = 0.79$,
$\rho = 0.00237$,
$S = 300$,
$V = 176$,
in the formula above for L or W we obtain

$$W = 0.79 \times \frac{0.00237}{2} \times 300 \times 176 \times 176$$
$$= 8699 \text{ lb.}$$

STATISTICAL CHARTS OR GRAPHS

In science, in business, and even in ordinary activities of life, one is frequently required to examine an extensive collection of data in an effort to discover significant facts. Important facts that could be overlooked by a competent statistician when reading data in tabular form, are often evident, even to an untrained mind, when the data are exhibited in an appropriate chart or graph. Ever since Rene Descartes (1596–1650) introduced coordinates, and through them the means of representing functions of variables graphically, mathematicians, and other scientists, have used graphs in studying the relations between variables. Graphical representations of related variables have played an important part in the development of the various branches of engineering, and, with the rapid development of the study of statistical methods and applications of statistics which has taken place in the present century, charts have been devised for use with data such as influences business activities. Today everyone should be familiar with one or more of the various charts, diagrams or other means used for exhibiting data graphically, because of the frequent appearance of such charts in daily papers, magazines, and technical journals.

An important use of a graphical representation of data is to enable an observer to make comparisons between different values of something that varies either with time or from object to object. A simple illustration of graphs for this purpose is the pictograph, a common example of which is the one showing the standing armies of several nations as soldiers of various heights. Since the height of each soldier is proportioned to the standing army of his country the sizes of standing armies may be readily compared. Pictographs are classified as one type of graph for exhibiting data. Graphs which are more appropriately classified as statistical charts include such charts as those which exhibit a patient's temperature at frequent intervals of time, or the hourly record of the steam pressure in a boiler, or the daily record of the price of iron, steel, or other commodity used in industry, or the record of the corn, or wheat, or other farm products, as varying between neighboring states.

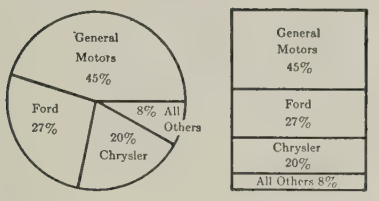
An additional important use of charts is as an aid in making an analysis of data so that predictions of future values may be made on the assumption that the pattern of variation will continue as in the past. In scientific studies many specific applications arise with which the investigator may use charts as aids in analyzing data. A time series chart, or line chart, is a statistical chart, which is often very useful for business executives. With this type of chart something which varies with time, either from hour to hour, day to day, month to month, or at some other interval of time (such as the price of stocks or production of pig iron), is plotted against time and the points are connected by straight or curved lines. Though a time series chart or graph seldom provides for accurate predictions, it is often useful in showing trends. These trends could serve as indices of business conditions and give some indication of what may be expected in the immediate future.

AREA GRAPHS

A circular area may be used to compare the relative sizes of each item of a set, or of any item with the total for the set, if the area of a circle (of any size radius) is divided into as many slices as there are items. The area of each slice must bear the same ratio to the area of the circle as the size of the item which it represents bears to the total for the set. Because of the obvious comparison with a pie such a chart is known as a *pie chart* or *pie graph*.

A report on the production of passenger automobiles gave approximately the figures of the table below. The percentage of the total number of cars which each manufacturer produced is shown in both the pie chart and the rectangular chart.

Manufacturer	Number of Cars
General Motors	1,460,000
Ford	880,000
Chrysler	650,000
All Others	260,000



Pie Graph Rectangular Graph

The size of a slice for the pie graph corresponding to any manufacturer's production may be obtained by using degrees and by taking the same percentage of 360° that the manufacturer's production figure is of the total productions. For example, the angle which corresponds to the output for General Motors is obtained by multiplying 360° by .45 and is 162°. This can be measured by using a protractor.

A **rectangular graph** is another one which may be used for comparing sizes of items of a set. The rectangular graph above shows (for the data which were used with the pie chart) various rectangles with the area of each having the same ratio to the area of the over-all rectangle that the number of cars produced by the indicated manufacturer bears to the total number of cars produced. The reader should note how readily comparisons can be made by using either graph.

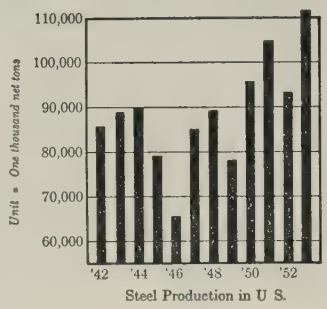
BAR GRAPHS

Bar graphs, with the bars either vertical, as in the graph shown, or horizontal, are used to indicate direct comparisons. The height, or length, of each bar is proportional to the size of the item which it represents. Sizes may correspond to money values, or to the number or weight of the items produced, or to any other significant measure, and may vary with time or from item to item of a set. Bar graphs are frequently used for making comparisons of various farm products; these may represent comparisons of quantities of a product, such as wheat, raised in each of several states in a particular section, or they may show a comparison of various farm products in one state. The graphs are also used in industry for making comparisons of such things as annual, or monthly, output of materials which are used in manufacturing, of the cost of labor, or the hours worked per week, or of numerous other variables which affect the cost of a manufactured item. Evidently, some of the comparisons which have been indicated as appropriate applications of bar graphs, could also be made by using a rectangular graph, and, if the number of items to be compared is small, a rectangular graph may be preferred. In the case of a bar graph the heights (or lengths) of the bars are used as the basis of comparison, whereas, with a rectangular graph, the areas are more often thought of in making comparisons.

The accompanying bar graph features the annual steel production in the United States during the years 1942 to 1953. The approximate amount of steel produced in each of these years is given in the table. The production for any particular year may be found from the graph by projecting from the top of the bar for that year and reading on the scale at the left. The reader should recognize how much more readily he can discover significant features through a glance at the graph than he can by a rigorous examination of the data in the table.

Table giving the approximate annual production of steel in the United States, in units of 1000 net tons.

Year	Units
1942	86,000
1943	88,800
1944	89,600
1945	79,700
1946	66,600
1947	84,900
1948	88,900
1949	78,000
1950	96,800
1951	105,000
1952	93,200
1953	112,000



LINE GRAPHS

Line graphs (also called **"time series graphs"** or **"time series curves"**) represent another useful means for showing graphically the relationship of one variable to another, or of showing the changes in one variable corresponding to changes in the other. In scientific applications the relationship between two variables is often expressible through an equation and the graph then becomes a smooth curve. However, in applications in business a line graph usually features the changes in some variable through successive periods of time, and the resulting line graph is seldom a smooth curve. These latter graphs may be used as a means of comparing changes in one variable as time changes, as with a patient's temperature chart, or they may serve to show a trend in the price of some commodity, such as steel. They may furnish the means of comparing the changes in two variables, as each varies with regard to time, by drawing a line graph of each of two variables on the same graph and with a common time scale. This last case is illustrated with the accompanying chart.

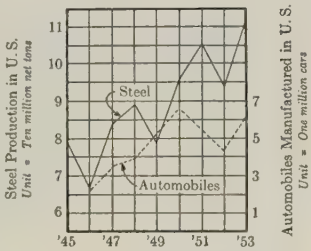
A simple conception of a line graph can be gained by thinking of placing a point at the top of each bar in a bar diagram, connecting these points by a straight line (sometimes a curved line may be used), and then erasing the bars.

A line graph for part of the data on steel production that were used with the bar graph is shown on the accompanying chart, which also includes a line graph for the data in the table for the approximate number of passenger automobiles produced during the years 1946 to 1953. Since automobile production was curtailed, and finally discontinued, during the war, the years 1946 to 1953 were chosen because the graphs would show significant relations between the production of steel and automobiles following the resumption of the manufacture of automobiles after the close of the World War II. Even a hasty examination of the graphs will enable an observer to see the general upward trend in the production of both steel and automobiles, and also that, with two exceptions (1949 and 1953), the production of each either increased or decreased together; facts which are much more readily identified from the graphs than they would be from an examination of the two tables.

Economists, and others who might be interested in discovering significant relationships between the two variable productions, would make a careful analysis in an effort to discover if the upward trend could be expected to continue, and to see why in 1949 steel production decreased while automobile production increased, whereas in 1951 the reverse was true. Factors which might be significant in the case of the discrepancies could be overproduction of one commodity during one year which made it necessary to decrease its production during the next year, or a crippling strike which affected one industry more seriously than it did the other. The important thing is that when the two line graphs have a common trend with a few contrary readings a careful analysis could be made to see what significance, if any, could be read from the common trends and the discrepancies in them.

Table giving the approximate number of passenger automobiles produced in the United States from 1946 to 1953.

Year	Number
1946	2,155,000
1947	3,555,000
1948	3,910,000
1949	5,128,000
1950	6,674,000
1951	5,338,000
1952	4,337,000
1953	6,133,000



Line Graphs, Steel and Automobile Production

PRACTICAL PROBLEMS

In this section are given formulas and directions for dealing with situations in everyday industry which call for special methods of measurement or computation.

HOW TO ESTIMATE WALLPAPER

All wallpaper is made in double rolls or bolts, 16 yards long and 18 inches wide. Under average conditions of matching and waste, a double roll will cover 60 square feet, and the number of double rolls needed may be found by dividing the total number of square feet to be papered by 60; the quotient will be the number of double rolls required. The price quoted for wallpaper is usually the price per single roll, and in buying paper the purchaser should note whether the advertised price is for a single or a double roll.

The following table will facilitate the estimating of the quantity of paper needed. Measure around all four walls with a rule or yardstick. Find the height of the room by measuring from the ceiling or molding to the baseboard or floor. The number of yards of border will be found by dividing the distance around the room in feet by 3. Do not use the table for the ceiling of a long hallway, but apply the rule stated above.

Distance around Room in Feet	Double Rolls of Side-wall Paper Necessary, according to Height of Room				Double Rolls of Ceiling Paper
	8 Ft.	9 Ft.	10 Ft.	12 Ft.	
30	3	3	4	4	1
33	3	4	4	5	2
36	4	4	4	5	2
39	4	4	5	6	2
42	4	5	5	6	2
45	5	5	6	7	3
48	5	6	6	7	3
51	5	6	7	8	3
54	5	6	7	8	3
57	6	7	7	9	4
60	6	7	8	9	4
63	7	7	8	10	4
66	7	8	9	10	5
69	7	8	9	11	5
72	7	8	9	11	6

In practice it is hardly worth while to compute the exact amount of paper that will be wasted in papering a room. A single illustration will show how the accompanying table was computed, average conditions of waste being considered.

Problem. How many rolls of paper will be required to paper the walls of a room 12 feet long by 9 feet wide by 9 feet high?

Solution. Perimeter of room = 9 + 9 + 12 + 12 = 42 feet; number of vertical strips required = 42 ÷ 1½ = 28; 28 strips each 9 feet long will require 28 × 9 = 252 feet, or 84 yards. The number of rolls required will be 84 ÷ 16 = 5¼ rolls. The allowance for openings will probably make the quantity given in the table a safe estimate of the number of rolls required for the walls. Since a double roll will cover 60 to 72 sq. ft., the ceiling, with an area of 9 × 12, or 108, sq. ft. will require more than 1 and less than 2 rolls. Hence 2 double rolls must be purchased, making a total of 7 rolls.

HOW TO ESTIMATE WOOD-LOT PRODUCTS

The products of the wood-lot may be cordwood, poles, piling, crossties, mine timbers, or lumber. They are sold in a number of different units. The amount may be measured in cords or in board feet; or it may be sold by the linear foot or pieces in the form of posts, piling, ties, or other products. In the latter case, the specifications of the purchaser will determine just which pieces fulfill the requirements. Some problems relating to the measurement of lumber are given below.

LUMBER

Specifications for lumber deal with quality and size, in addition to the kind of wood. Lumber is generally classified as select or common. Common lumber as used for house construction is graded as No. 1 Common, No. 2 Common, and No. 3 Common. There are numerous defects to which lumber is liable and these affect the quality. Lumber of good quality should have no defects due to growth; these include twists, large knots, shakes (split between annular rings), and decay. Defects due to manufacture, which include crook (curvature of the edges of lumber), cup (cross section of board becomes curved during seasoning), and roughness of surface, also affect the quality of lumber. The grading of common lumber depends upon the number or extent of the various defects that may be permissible.

By-Products. For every thousand feet of hardwood lumber, between two-thirds and three-fourths of a cord of wood may be cut from the tops. For every 10 ties, about 1 cord of wood may be cut from the tops. For every 10 poles, about 1 cord of wood may be cut from the tops.

LUMBER MEASURE

Rough lumber is usually sawed in thicknesses of 1 in., 1¼ in., 1½ in., 2 in., etc. Dressed stock is usually sold on a basis of the value of the rough material before it was dressed plus the cost of dressing.

Lumber is usually sold by the hundred (C) or thousand (M) feet, board measure.

A **board foot** is a square foot of lumber one inch or less in thickness. Thus, ⅞ in. and ¾ in. lumber is measured and priced the same as 1-inch lumber, but for thinner material, such as ½ in. and ⅜ in. stock, a reduced price is made. The number of feet, board measure, for 1¼ in. stock is 1¼ times that of an inch board.

Matched lumber, such as is used for flooring, sheathing, etc., is usually sold on the basis of the size in the rough. Thus, "flooring 4 in. wide" means that the rough lumber was 4 in. wide. The process of planing and matching this board has nar-

rowed its face to about 3¼ in., which is the width of floor such a board will cover. In estimating the quantity of lumber required for a floor, add ¼ to ⅓ of the area to be covered for narrow flooring (3 in. or less) and ⅙ for wider flooring.

To Find the Number of Board Feet in a Piece of Lumber 1 Inch or Less in Thickness.

Multiply the length in feet by the width in feet.

To Find the Number of Board Feet in a Piece of Lumber More Than 1 Inch in Thickness.

Multiply the length in feet by the width in feet by the thickness in inches.

Problem. How many board feet are there in 2 joists 15 ft. long, 8 in. wide, and 3 in. thick?

Solution.

Amount of lumber = $15 \times \frac{8}{12} \times 3 \times 2 = 60$ board feet.

Problem. What will be the quantity of lumber required to cover a floor 25′ × 32′ with 3″ matched boards? Allow 33⅓% for matching and 5% for waste in cutting.

Solution. Total waste is 38⅓%. Area to be covered = 25 × 32 = 800 sq. ft. Waste = 800 × .38⅓ = 306⅔ sq. ft. Equivalent area in rough lumber (800 + 306⅔) × 1 = 1106⅔ board feet, or approximately 1100 board feet.

Problem. How many feet, board measure, are there in a stick of timber 32 ft. long, 8 in. thick, 12 in. wide at one end, and 9 in. wide at the other end?

Solution. Average width $= \frac{12 + 9}{2} = 10\frac{1}{2}$ in.

$32 \times \frac{8}{12} \times 10\frac{1}{2} = 224$ board feet.

LATHING AND PLASTERING

Plastering is usually computed by the square yard, and estimates for plastering, which may include the lathing, are figured to the nearest square yard. The allowance for openings depends on the size of the opening and the character of the work. Some contractors make no deductions for openings, and some make no deductions for openings less than two feet wide; for openings more than two feet wide a deduction varying from 50% to 100% of the area of the openings is made.

The regular size of lath is ¼ in. × 1½ in. × 4 ft. Laths are sold by the thousand (M) and are put up in bundles containing 100 laths. It requires 1400 to 1500 such laths and 10 lb. of 3-penny nails for 100 sq. yd.

The quantity of cement or hard wall plaster, mixed 2 parts of sand to 1 part of plaster, required to cover 100 sq. yd. of wood lath varies from 10 to 12 100-pound sacks. The white finish (putty coat) will require 1½ barrels of lime and 200 lb. plaster for each 100 square yards of surface.

Problem. Find the amount of material required to lath and plaster a room 10 ft. wide, 14 ft. long, and 9 ft. high, making no allowances for openings.

Solution.

Distance around room = 10 + 14 + 10 + 14 = 48 ft.

Area of walls = 48 × 9 = 432 sq. ft.

Area of ceiling = 10 × 14 = 140 sq. ft.

Total area = 572 sq. ft. = 63⅝, or 64, sq. yd.

The material ordered will be 64% of that required for 100 sq. yd., as given above, or 10 bundles of lath, 7 lb. of 3-penny nails, 8 sacks of hard plaster, 1 bbl. of lime, 125 lbs. of finishing plaster, and 1 cu. yd. of sand.

ESTIMATING CONCRETE

The methods of using concrete and the proper proportion of cement, sand, and stone to be employed in preparing concrete for definite purposes are explained in the article on *Concrete*.

When calculating the amount of materials required for a certain piece of concrete work, the first step is to compute the total cubic space to be filled. Secondly, decide on the proper mixture to be used. (See *Concrete*.) Thirdly, by means of the table, ascertain the exact quantities of materials that will be needed.

This table shows the amount of cement, sand, and stone required to make 1 cu. yd., or 27 cu. ft., of concrete.

MATERIALS REQUIRED TO MAKE ONE CUBIC YARD OF CONCRETE

Mixture	Quantity of Materials		
	Cement (in sacks)	Sand (cu. ft.)	Stone or Gravel (cu. ft.)
1–1½	15.5	23.2	
1–2	12.8	25.6	
1–3	9.6	28.8	
1–1½–3	7.6	11.4	22.8
1–2 –3	7.0	14.0	21.0
1–2 –4	6.0	12.0	24.0
1–2½–4	5.6	14.0	22.4
1–2½–5	5.0	12.5	25.0
1–3 –5	4.6	13.8	23.0

Problem. What quantities of materials will be required to build a one-layer concrete floor, 30 ft. long, 24 ft. wide, and 5 in. thick?

Solution.

Volume to be filled = $30 \times 24 \times \frac{5}{12} = 300$ cu. ft. = $\frac{300}{27}$, or 11⅑, cu. yd.

Reference to the article on *Concrete* shows that such a floor should be composed of a 1 – 2 – 3 mixture. As shown by the table, 1 cu. yd. of this mixture would require 7 bags of cement.

Cement required = 7 × 11⅑ = 78 bags.

Sand required = 14 × 11⅑ = 156 cu. ft.

Gravel required = 21 × 11⅑ = 233 cu. ft., or 26 cu. yd.

It will be noticed that the results are expressed in integers, although if multiplied exactly the values would be 77⅞, 155⅝, and 233⅜. The values given are sufficiently accurate for practical purposes because, for example, an even greater error in the volume might be occasioned by a slight difference in the amount of water used to wet the mixture.

Problem. A man who has 8 bags of cement wishes to make concrete fence posts 8 ft. long and tapering evenly from 5 × 5 inches at the bottom to 3 × 3 inches at the top. How many posts can he make? How much sand and gravel will he need?

Solution.

Average thickness of posts $= \frac{5 + 3}{2} = 4$ in., or ⅓ ft.

Volume of each post = ⅓ × ⅓ × 8 = ⅜ cu. ft.

From the article on *Concrete*, it is seen that fence posts are best made from a 1 – 2 – 3 mixture. The table shows that 1 bag of cement will make 3.9 cu. ft. of this mixture.

Volume of mixture obtainable from 8 bags of cement = 3.9 × 8 = 31.2 cu. ft.

Number of posts = 31.2 ÷ ⅜ = 35.

Sand required = 2 × 8 = 16 cu. ft.

Gravel required = 3 × 8 = 24 cu. ft.

HOW TO DETERMINE THE WEIGHT OF AN IRON OR STEEL BAR

To problems of this character, either of the following methods may be applied:

(1) An iron or steel bar 1 inch square and 12 inches long weighs 3.4 lb. Hence the weight of any iron or steel bar will be found by multiplying the area of its cross section by 3.4 and multiplying this result by the length of the bar in feet.

(2) An iron or steel bar has a weight of 0.283 lb. per cu. in. Hence, to determine the weight of such a bar, multiply its volume in cubic inches by 0.283.

Problem. What is the weight of a round steel bar ¾″ in diameter and 7 feet, 6 inches long?

Solution (1).

Area of cross section =
$0.75 \times 0.75 \times 0.7854 = 0.442$ sq. in.
Weight of given bar 1 foot long =
$0.442 \times 3.4 = 1.50$ lb.
Weight of given bar 7.5 feet long =
$1.50 \times 7.5 = 11.25$ lb., or 11 lb., 4 oz.

Solution (2).

7 ft., 6 in. = 90 in.
Area of cross section =
$0.75 \times 0.75 \times .7854 = .442$ sq. in.
Volume = $90 \times .442 = 39.78$ cu. in.
Weight = $39.78 \times 0.283 = 11.25$ lb.

Problem. What is the weight of a steel bar whose dimensions are ¼″ × 1¼″ × 8′9″?

Solution. Weight = $0.25 \times 1.25 \times 3.4 \times 8.75 = 9.3$ lb. = 9 lb., 5 oz., nearly.

HOW TO DETERMINE THE CAPACITY OF A COAL BIN

Problem. A coal bin 8 feet, 6 inches long and 5 feet, 10 inches wide is filled to an average depth of 5 feet, 9 inches with white ash anthracite coal of nut size. The dealer claims to have delivered 8 tons of coal. Check the accuracy of this statement.

Solution. Change all dimensions to feet and decimals of a foot. Consult conversion table *Inches Reduced to Decimals of a Foot*, if necessary. Consult table *Weights of Various Substances* for the weight of nut size white ash anthracite coal. Proceed as follows:

Area of the bottom =
$8.5 \times 5.83 = 49.6$ sq. ft.
Volume of coal =
$49.6 \times 5.75 = 285.2$ cu. ft.
Weight of coal =
$285.2 \times 55.5 = 15{,}829$ lb.

This seems to be about 171 pounds short of the supposed weight. To determine how high the bin should have been filled, compute the weight of coal per foot of vertical height.

Weight of coal per vertical foot =
$49.6 \times 55.5 = 2753$ pounds.
Error in height =
$171 \div 2753 = 0.06+$ feet, or about ¾ inch.

This amount clearly might have been an error in measurement, and the weight has been checked as closely as a volume measurement will do it.

Problem. It is desired to store 10 tons of red ash anthracite coal of stove size in a cellar having an available height of 6 feet. How large a bin must be built?

Solution. Weight of a column of red ash anthracite coal 1 foot square and 6 feet high = $1 \times 1 \times 6 \times 52.5 = 315$ pounds. The bottom of the bin must have an area of $20{,}000 \div 315 = 63.5$ square feet. A bin 8 feet square will hold the required amount of coal. If one dimension is fixed by the location, the other dimension may be found by dividing 63.5 by the fixed dimension.

HOW TO DETERMINE THE CAPACITY OF CIRCULAR TANKS

Problem. Find the capacity per foot of height of a cylindrical tank made of 1½ inch material with an outside circumference of 17 ft., 3½ in.

Solution.

Circumference = 17.292 ft.
External diameter = $17.292 \div 3.1416 = 17.292 \times 0.318 = 5.50$ ft.
Internal diameter = $5.50 - .125 \times 2 = 5.25$ ft.
Area of base = $0.7854 \times 5.25 \times 5.25 = 21.648$ sq. ft.
Volume for 1 ft. of depth = 21.648 cu. ft.

Capacity for 1 ft. of depth = $21.648 \times 7.48 = 161.9$ gal.

HOW TO LAY OUT A BASEBALL DIAMOND

The four bases of a ball field mark the four corners of a 90-foot square. The official rule books give explicit directions as to the amount of fair territory and other situations needed, but for impromptu games and outings the following method is sufficient. According to the article on the *Square*, the diagonal of a square is $1.414\,s$, where s = one side of the square. Therefore, the distance from "first" to "third" is 1.414×90, or 127.26 (127 ft., 3 in.). Secure a cord or rope over 180 feet in length. Knot or otherwise mark the cord at the following distances from one end: 60 feet, 6 inches; 90 feet; 127 feet, 3 inches; 180 feet.

Select for the home plate a location as favorable as possible to the fielders' eyes, and there drive a peg. Attach one end of the cord to the peg and then proceed to lay out in line the pitcher's slab at 60 feet, 6 inches and second base at 127 feet, 3 inches. Attach the 180-foot point at second base, leaving the other end still fastened at "home." Now grasp the line at the 90-foot point, and then, proceeding to the right of "home" until the cord is taut, mark the location of first base. In a similar manner, proceeding across the "diamond" to the left of "home," locate third base. For boys under 16 years of age, the following modifications are recommended: distance between bases, 82 feet; home plate to second base, 116 feet (115.94 exactly); home plate to pitcher's slab, 50 feet.

CHAIN SURVEYING

The old-fashioned surveyor's chain has been practically supplanted by the steel tape. The term chain is still in use, and the men who do the measuring are called chainmen. The term chain surveying as here used applies only to surveys done without the use of instruments to measure angles or to determine magnetic bearings. The accurate survey of a large tract of land, however, cannot be made without the use of surveying instruments and without the aid of a skilled surveyor.

Methods. A preliminary rough sketch of the field should be made, showing the approximate relative dimensions. Keeping in mind the lay of the land, divide the tract into a number of triangles as shown in the sketch below and mark all corners with stakes.

Many of the common errors of measurement occur for the following reasons:

1. The tape is not held in a horizontal position. All distances must be measured on a horizontal line. If the tape is not held level, the measurement will exceed the actual distance.

2. The tape is not held with a proper and constant tension.

3. The plumb bobs are too light.

4. The number of tape lengths are not carefully counted.

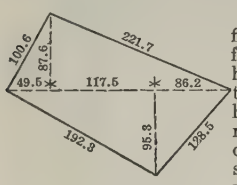
The plumb bobs are used to transfer the measurement from the horizontal tape to the ground. With the foot a small spot on the ground is smoothed in order to receive a clear impression of the bob, which must not be allowed to swing. This spot is then marked with a chalk mark, nail, or pin.

Measure all sides of the tract and all of the diagonals or tie lines. If the figure is thought to be a rectangle, measure both diagonals; if they are equal, the figure is a rectangle. The methods of computing the areas of plane figures are given in the section on *Mensuration of Plane Surfaces*.

It is usually best to divide the figure, as previously suggested, into triangles by tie lines. The computation of the area of a triangle when the three sides are known is a tedious process. It is therefore advisable

to drive a stake on each line to establish the perpendicular height of the triangle and to compute the area according to the simpler formula. If the distances are measured in feet and inches, reduce all measurements to feet and decimals of a foot. See table *Inches Reduced to Decimals of a Foot.*

COMPUTATION OF THE AREA OF A FIELD



A possible four-sided figure is shown here. The four sides and the diagonal have been measured, and the perpendiculars also have been staked and measured. Two methods of computing the areas are shown—one with and one without the perpendiculars.

Using the formula $A = \frac{bh}{2}$, where $b = 49.5 + 117.5 + 86.2 = 253.2$ and $h = 87.6$ or 95.3, we have, as the area of the upper triangle, $253.2 \times 87.6 \div 2 = 11{,}090$ sq. ft. and, as the area of the lower triangle, $253.2 \times 95.3 \div 2 = 12{,}065$ sq. ft. The total area then is $11{,}090 + 12{,}065 = 23{,}155$ sq. ft. To reduce this area to acres divide the total area by 43,560. We thus obtain for the area 0.531 acres, or, as usually stated on maps, $\frac{531}{1000}$ A.

Using the formula $A = \sqrt{S(S-a)(S-b)(S-c)}$, where S is half the sum of the three sides, and solving by the use of logarithms, we proceed as follows:

UPPER TRIANGLE

		Factor	Logarithm
a = 100.6.	$S - a$ =	187.15.	2.2722
b = 221.7.	$S - b$ =	66.05.	1.8199
c = 253.2.	$S - c$ =	34.55.	1.5385
2)575.5	S =	287.75.	2.4590
S = 287.75.			2)8.0896
			4.0448

4.0448 is log A. Therefore A = 11,087 sq. ft.

LOWER TRIANGLE

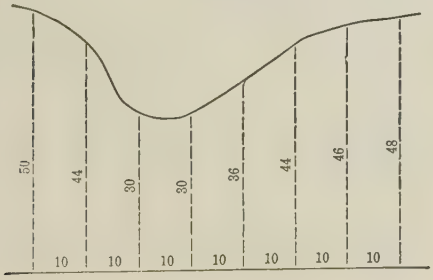
		Factor	Logarithm
a = 128.5.	$S - a$ =	158.5.	2.2001
b = 192.3.	$S - b$ =	94.7.	1.9763
c = 253.2.	$S - c$ =	33.8.	1.5289
2)574.0	S =	287.0.	2.4579
S = 287.0.			2)8.1632
			4.0816

4.0816 is log A. Therefore A = 12,067 sq. ft. and the total area = 11,087 + 12,067 = 23.154 sq. ft., which checks the former computation.

SURVEY OF IRREGULAR TRACT

The area of an irregular piece of ground, such as a tract of land bounded on one side by a curved and irregular line marked by a stream of water, may be computed by the mid-ordinate rule as follows:

Divide the plot preferably into a series of strips of equal width, as shown. Measure the width of each strip and the length of each figure. The area of each trapezoidal figure will be the width of each strip multiplied by the average of the parallel dimensions.



The middle lengths are $\frac{50+44}{2} = 47$, $\frac{44+30}{2} = 37$, $\frac{30+30}{2} = 30$, $\frac{30+36}{2} = 33$, $\frac{36+44}{2} = 40$, $\frac{44+46}{2} = 45$, $\frac{46+48}{2} = 47$; and the area = $10(47 + 37 + 30 + 33 + 40 + 45 + 47) = 2790$ sq. ft.

Or, using the trapezoidal rule as given in the article on *Trapezoid*, the area is computed as follows: $(25 + 44 + 30 + 30 + 36 + 44 + 46 + 24) \times 10 = 279 \times 10 = 2790$ sq. ft.

LEVELING

Many small local improvements depend for their execution upon a determination of the difference of elevation between two or more points. To do this within certain rough limits demands an improvised leveling instrument and the ability to add and subtract.

A vertical line is a line that points to the center of the earth. A level line is a line parallel to the surface of still water, which is a curved surface. A level line as determined by a leveling instrument is at right angles to a vertical line. It is a straight line tangent to the earth's surface and follows the level line so closely that the small error is ordinarily neglected.

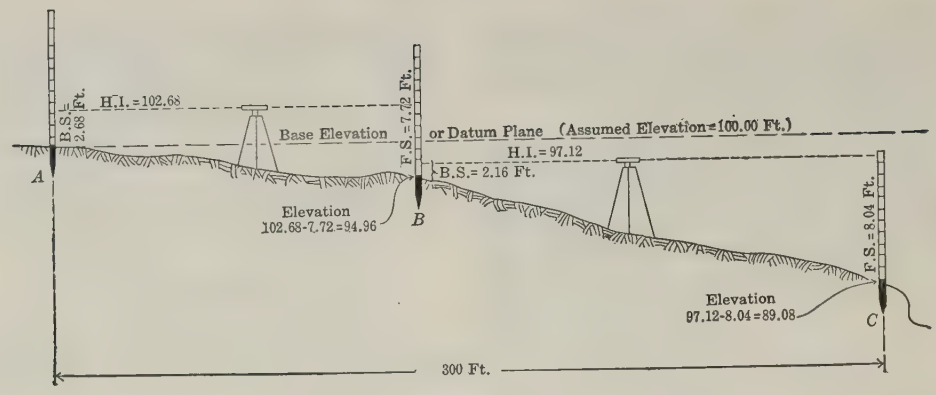
Leveling Instruments. There are many kinds of leveling instruments, varying from the engineer's instrument to a simple water level. A carpenter's spirit level may be fitted with sights and mounted on a driven stake, on a tripod, or supported by some other improvised means; a long rubber tube, free from kinks, fitted with glass tubes and filled with water, makes a good device for short distances; a float, fitted with sights and placed in a pail of water, may serve the purpose. There are also moderately priced leveling instruments on the market. A measuring pole with some kind of movable sighting target must be provided.

Whatever kind of instrument is used, it must answer one test, which may be performed as follows: A nail is driven into a pole. By means of the leveling instrument, a line is sighted across the nail to another pole some distance away. The intersection of the line on the distant pole is marked with a second nail. The instrument is now moved beyond the second pole, and the line is sighted in the reverse direction. If both nails are still on the line, the instrument is correct. If not, a third nail is driven above or below the first, to mark the second line. A line connecting the second nail with a point midway between the first and the third is level, and the instrument must be adjusted to "line up" with the corrected points. A level that will not reverse correctly should not be used.

Process of Leveling. In most cases the elevation of the starting point is unknown, and it is usually assumed at some figure sufficiently large to obviate the necessity of using minus numbers. The process of leveling is illustrated by the accompanying diagram.

H. I. means height of the instrument; F. S. means foresight; B. S. means back sight. We add 2.68 to the starting elevation to find the first H. I. We subtract 7.72 from this H. I. to find the elevation of the second point. We add 2.16 to this second elevation to find the second H. I. We subtract 8.04 from the second H. I. to find the elevation of the third point. This operation may be repeated for any number of points. From the differences of elevation the proper system of grades is planned.

In order that the fall may be uniform, it is necessary to measure the distance between the stakes. By dividing the total fall by the total distance, the fall per foot or per hundred feet may be determined.



This procedure may be illustrated as follows: A ditch drops 4′ 10″ in 460′. 4′ 10″ = 4.83′. 4.83′ ÷ 460′ = 0.0105+. The fall is 0.0105′ per foot or 1.05′ per 100′. 1.05′ = 1′ 0-5⁄8″. See table *Decimal Equivalents*.

WEIGHTS AND MEASURES

Accurate and definite standards of weight, measure, and value are an absolute necessity of modern science, commerce, and industry. Rough standards of weights and measures have been in use since man first began to have commercial relations with his fellows, the only essential requirement being that all persons of a given locality should comprehend the amounts represented.

Originally, an acre meant the amount of land that a man with a yoke of oxen could plow in one day; the total length of the left feet of sixteen men selected at random constituted a legal rod; and a fathom was the distance between the middle finger tips of a man's outstretched hands. The extension of commerce created a need for much more accurate methods of measurement. As a result, each nation gradually established legal standards for use within its own boundaries.

With the great development of science, of modern mechanical methods of production, and of rapid universal transportation and communication, the degree of accuracy required even for ordinary measurements had a corresponding increase. An error of an inch made in measuring a piece of land in New York City might result in *a difference in value* greater than that of an entire prairie farm. Many of the interchangeable parts of modern machines must not vary in size by so much as the thousandth part of an inch. This necessary uniformity is assured by having definite standards and methods of weighing and measuring.

The two principal modern systems of weights and measures are the English system, based on the standard yard and the standard avoirdupois pound, and the metric system, based on the meter and the kilogram. Values expressed in either system may be converted into the other by means of the table of equivalents given below. It should be remembered that no measurement is absolutely accurate; but scientific methods are so exact that, should the standard meter and the yard be destroyed, they could be replaced within one ten-millionth of their present values.

STATISTICAL QUALITY CONTROL

The increase in the requirements for accuracy, as indicated above, caused the modern manufacturer to become more aware of the necessity of controlling the quality of his product, and more interested in methods for doing so. The best method that has been devised for controlling the quality of a manufactured item is one that makes an application of statistical methods. This is known as **"Quality Control by Statistical Methods,"** and is commonly abbreviated as **"Statistical Quality Control,"** and designated by **"S. Q. C."**

DICTIONARY OF WEIGHTS AND MEASURES

Acre. (*A.*) A measure of surface area of land. The U. S. and the English acre are the same; each contains 160 sq. rds., or 4840 sq. yds. A Scotch acre is .27 larger and an Irish acre is .62 larger.

Acre Foot. The volume required to cover an acre 1 foot deep: 43,560 cu. ft., or 325,851 U. S. gallons of water.

Are. (*a*) Meaning "area." A land measure 10 meters (about 33 ft.) square.

Astronomical Unit. The average distance of the earth from the sun: 92.9 million miles.

Avoirdupois Weight. From the French *avoir-de-pois*, "goods of weight." The name of the system of weights generally applied in Great Britain and in the United States to all goods except precious metals, precious stones, and medicines.

Bale. A large compressed bundle or package fastened with cords, wire, or straps. The approximate weight of a bale of cotton is 500 pounds gross.

Barleycorn. The length of a grain of barley; 1⁄3 inch. Survives only in *shoe sizes*, which increase from 4 inches, by barleycorns, in series of 13's. For example: "Youth's size 12" equals 4 + 1 2⁄3 = 8 inches long. "Adult size 8" equals 4 + 1 2⁄3 + 2⁄3 = 11 inches.

Barrel. (*bbl.*) The size of this unit varies greatly. A barrel for fruits and dry commodities in the United States must contain 7056 cu. in. A liquid barrel is usually considered as 31½ gal. A barrel of flour weighs 196 pounds net; petroleum is measured by the barrel of 42 gallons.

Board Foot. (*bd. ft.*) The contents of a board 144 square inches on the surface and 1 inch thick. Lumber is usually sold by the thousand board feet.

Bushel. (*bu.*) The U. S. bushel is based on the Winchester bushel of 2150.42 cu. in., while the Imperial bushel of Canada and Great Britain equals 8 Imperial gallons, or 2218.192 cu. in. The amount delivered from a *heaped bushel* is usually considered as 1¼ *struck bushels*. A struck bushel consists of a bushel measure filled to the rim. A heaped bushel consists of a struck bushel on which the commodity is piled in the form of a cone, as high as the nature of the article will naturally permit. Because of the great chance for error, the legal weight of a bushel of most commodities is now generally fixed by statute. See table of *Legal Weights per Bushel*.

Carat. (*c.*) (1) A small unit of weight used for weighing precious stones. Originally a seed of the Abyssinian coral tree or of the carob tree of the Mediterranean region. On

July 1, 1913, the international metric carat of *200 milligrams*, equivalent to 3.086 grains, was made official in the United States. (2) A term used to indicate the fineness of gold. Pure gold is said to be 24 carat fine. Therefore, 18 carat gold contains 18 parts of pure gold together with 6 parts of some other metal or metals.

Catty. A Chinese weight of 1⅓ pounds. A *tea caddy* was originally a box or canister containing a catty of tea.

Cental. 100 pounds avoirdupois, or a short hundredweight.

Centare. (*ca*) 1 square meter. About 1⅕ square yards, or 10.7643 sq. ft.

Centimeter. (*cm*) About ⅖ inch. 1 inch = 2.54 cm.

Chain. (*ch.*) The 66-foot surveyor's chain, legal in the United States, has 100 links, each of 7.92 inches. The engineer's chain has 100 one-foot links.

Cord. (*cd.*) A measure of wood equal to a pile 4 ft. high, 4 ft. wide, and 8 ft. long. A *cord foot* is a pile 4× 4×1 feet. A cord of masonry usually contains 100 cu. ft.

Dekaliter. (*dkl*) A metric unit of capacity equal to 10 liters, or about .9 U. S. pecks.

Drop. A convenient unit for practical use, although it varies greatly with the liquid and with the method of dropping. It corresponds roughly to a minim.

Ell. A measure, chiefly for cloth, now rarely used. It varies from 27 to 48 inches in different countries. The English ell = 1¼ yards, or ⅛₂ bolt.

Firkin. A wooden, hooped container for butter, lard, etc. A standard Danish firkin of butter weighs 50 kilograms. In British liquid measure, a firkin is 9 gal.

Foot. A measure of length which is one third of a yard, or twelve inches. It was derived from the length of the human foot. It is designated by *ft.* or by the symbol ′. One foot is equal to 30.480 cm.

Gallon. (*gal.*) The British Imperial gallon equals the volume of 10 lbs. of water at 62° F., or 277.274 cu. in., and is 20% larger than the standard U. S. gallon of 231 cu. in. In some states a dry gallon and a milk gallon of 282 cu. in. are in use. A proof gallon contains a gallon of proof spirit.

Grain. (*gr.*) A small unit which has the same value in the troy, apothecaries', and avoirdupois systems: .0648 gram.

Gram. (*g*) The metric unit generally used to express ordinary weights of less than 1 kilogram. It is equal to 15.4324 grains. 28.35 g = 1 oz. avoir.

Hand. A measure of 4 inches; used chiefly in measuring the height of horses.

Hank. Used in measuring yarn. A hank of cotton yarn contains 840 yards, of worsted yarn 560 yards, and of linen yarn 3000 yards. A hank of linen yarn consists of 10 *leas* of 300 yards each. The Scottish hank contains 12 leas. Other lengths also are used.

Hectare. (*ha*) A unit of area used similarly to the English acre: 100 meters square or 10,000 square meters (m^2), about 2½ acres (2.471).

Hectoliter. (*hl*) A metric measure of capacity equal to 100 liters, or 26.418 U. S. gal.; about ⁹⁄₇ bbl. dry, or ⅝ bbl. liquid.

Hundredweight. (*cwt.*) Commonly ⅟₂₀ long ton, or 112 lb. avoir. A short cwt. = 100 lb.

Inch. A unit of length which is the twelfth part of a foot. It is designated by *in.* or by the symbol ″. One inch is equal to 2.54 cm.

Kilogram. (*kg*) The fundamental standard of weight in the United States; equal to 2.20462 lb. avoir.

Kilometer. (*km*) The metric unit of distance corresponding to the English mile; 1000 meters; ⅝ (.62137) mile.

Knot. The only unit of speed in the English language. *Ten knots* means a speed of 10 nautical miles per hour. A nautical mile is 6080.27 feet in the United States and 6080 feet in Great Britain.

Libra. The "pound" weight of Spain, Portugal, and the Latin American countries. Equal to about 1.016 lb. avoir.

Line. (*l.*) A small unit of length equal to: (1) ⅟₁₂ inch. (2) Button measure, ¼₀ inch.

Liter. (*l*) The metric unit of capacity, both of liquid and of dry measure. It is equal to 1.0567 liquid qt., which is the volume of 1 kilogram of water at 4° C. This is 1.000027 times the volume of 1000 cubic centimeters.

Meter. (*m*) The fundamental standard of length in the United States and in almost all civilized countries outside of the British Empire. It is equivalent to 39.37 inches, or about 1¹⁄₁₁ yards.

Metrology. The branch of science which is concerned with weights and measures; also a system of weights and measures.

Mil. (1) A measure equal to .001 inch. The *circular mil*, used to express the area of the cross section of electrical conductors, is equal to the area of a circle 1 mil in diameter. A wire *1 inch* in diameter has a cross section of 1,000,000 circular mils.

(2) An angular measure used by artillerists. It is the angle subtended by a single unit at a distance of a thousand units.

Mile. (*mi.*) From the Latin *mille passuum*, or "1000 paces." As the Roman pace was a double step, the mile became a unit of about 5000 feet. The length of a mile used in different European countries has varied from about ⅔ U. S. mile, in Holland, to 7 U. S. miles, in Norway. The geographical, or nautical, mile is defined as 1 minute of the arc of a great circle of a sphere having a surface equal to that of the earth. One statute mile = 5280 ft.

Milliliter. (*ml*) .001 liter. This unit is slightly (.000027) larger than the cubic centimeter. Consequently, in accurate work the abbreviation *cc*, or cm^3, for cubic centimeter is incorrectly used when substituted for *ml.* This measure is usually referred to as a *mil.*

Miner's Inch. The amount of water which will flow from an opening 1 inch square at a pressure usually fixed by state laws. The unit varies, but it is about 1.5 cubic feet per minute.

Minim. (*min.*) Approximately 1 drop; ⅟₆₀ fluid dram.

Ounce. (*oz.*) One oz. avoir. = 437.5 grains, or 28.35 grams. One oz. troy or apoth. = 480 grains, or 31.1 grams.

Perch. A unit having various meanings: (1) One rod. (2) One sq. rod. (3) In stonework, about 25 cu. ft., often 16½ × 1½ × 1 ft.

Pig. A British weight: 301 lb. of lead; 2½ lb. of hemp; 60 lb. of salt.

Point. (1) One of the 32 principal divisions of the compass: equal to 11¼°. (2) In type founding, an arbitrary unit, .0138, or practically ⅟₇₂ inch, used to designate the size of type. Printing done with 6-point type will have 12 lines per inch; with 12-point, 6 lines per inch.

Pood. A Russian weight: 36.1128 lb.

Pound. (*lb.*) One pound avoir. = 453.5924277 grams. The pound troy, 373.24177 grams, was legalized in 1828 as the standard unit to be used by the U. S. mint. In practice, however, weights of precious metals are always expressed in troy ounces. The troy pound was declared illegal in England in 1878.

Puncheon. A large cask holding from 72 to 120 gallons.

Second Foot. A flow of water equal to 7.48 U. S. gallons per second, or 1.98347 acre feet per day.

Shoemaker's Sizes. See *Barleycorn.*

Skein. A variable quantity of reeled yarn or thread. A skein of woolen yarn equals 256 yds. A skein of cotton yarn is equal to 80 turns on a reel 1½ yds. in circumference. It is 120 yards, or ⅓ hank.

Square. A surface 10 feet square, or 100 sq. ft. of flooring, ceiling, or roofing.

Ton. (*t.*) A variable unit, of which the *short* or *net ton* of 2000 lbs., the *long ton* of 2240 lbs., and the *metric ton* of 2204.6 lbs. are most common. Others are: *shipping ton*, calculated as 40 cubic feet; *displacement ton*, equal to 35 cubic feet of water displaced by a vessel; *register ton*, 100 cubic feet of a ship's volume; *gross ore ton* of 2688 lbs., to allow for sand in the ore; *timber ton* of 42 cubic feet. An *assay ton* contains 29.166 grams because the number of milligrams of gold or silver obtained from a sample of this size represents the number of troy ounces of the metal contained in a short ton of the ore. The customary abbreviation of ton is *t.*; but in scientific usage the abbreviation *t* represents a metric ton and *tn.* represents a short ton.

Tun. A liquid ton; a large cask for holding wine or other liquids, nominally 8 bbl., or 252 gal., but often much larger.

Verst. A Russian measure of distance: ⅔ mile, or 1.06 kilometers.

Yard. (*yd.*) A legal measure of length in the United States and one of the two fundamental units of length in the British Empire. In the United States, the yard = ³⁶⁰⁰/₃₉₃₇, or .9144018, meters and is consequently very slightly longer than the British Imperial yard, which = .9143835 meters. According to legend, the original English yard was established by King Henry I as the extreme distance from the point of his nose to the end of his thumb.

TABLES OF WEIGHTS AND MEASURES

LINEAR MEASURE

Used for measuring distances.

12 inches (″) = 1 foot (*ft.*, ′).
3 feet = 1 yard (*yd.*).
5½ yards, 16½ feet, 40 rods, 660 feet = 1 rod (*rd.*), perch, or pole.
8 furlongs, 1760 yards, 5280 feet = 1 statute mile (*mi.*).
3 miles = 1 league (*lea.*).
3 barleycorns, 12 lines, 72 points, 1000 mils = 1 inch (*in.*).
2¼ inches = 1 nail.
3 inches = 1 palm.
4 inches = 1 hand.
9 inches = 1 span.
18 inches = 1 cubit.
40 yards = 1 bolt (cloth).
2½ feet = 1 military pace.
5 feet = 1 geometrical pace.

SQUARE MEASURE

Used for computing areas.

144 square inches = 1 square foot (*sq. ft.*).
9 square feet = 1 square yard (*sq. yd.*).
30¼ square yards = 1 square rod (*sq. rd.*) or perch.
160 square rods = 1 acre (*A.*).
640 acres = 1 square mile (*sq. mi.*).

CUBIC MEASURE

Employed for computing volumes.

1728 cubic inches = 1 cubic foot (*cu. ft.*).
27 cubic feet = 1 cubic yard (*cu. yd.*).
144 cubic inches = 1 board foot (*bd. ft.*).
128 cubic feet = 1 cord (*cd.*).
40 cubic feet, merchandise = 1 shipping ton.

SURVEYORS' LINEAR MEASURE

Commonly employed by surveyors in measuring land.

7.92 inches = 1 link (*l.*).
25 links = 1 rod (*rd.*).
4 rods, 66 feet, 100 links = 1 chain (*ch.*).
80 chains = 1 mile (*mi.*).

SURVEYORS' SQUARE MEASURE

Used by surveyors in computing the area of land.

625 square links = 1 square rod (*sq. rd.*).
16 square rods = 1 square chain (*sq. ch.*).
10 square chains = 1 acre (*A.*).
640 acres = 1 square mile (*sq. mi.*).
36 square miles (6 miles square) = 1 township (*tp.*).

NAUTICAL MEASURE

Used for expressing distances on the sea.

6 feet = 1 fathom.
120 fathoms = 1 cable's length.
6080.27 feet, 1.1516 statute miles = 1 nautical, or geographic, mile.
3 nautical miles = 1 league (marine).
1 nautical mile *per hour* = 1 knot (speed).

CIRCULAR MEASURE

Used in astronomy, navigation, engineering, and wherever angles or arcs of circles must be measured.

60 seconds (60″) = 1 minute (1′).
60 minutes = 1 degree (1°).
90 degrees = 1 quadrant.
4 quadrants, 360 degrees = 1 circle or circumference.
1 radian = 57.29577 degrees.
3.14159 (π) radians = ½ circumference.

AVOIRDUPOIS WEIGHT

The system of weights most commonly used in Great Britain and the United States.

27⅓ grains (27.34375), 16 drams = 1 dram (*dr. avoir.*).
437.5 grains, 16 ounces = 1 ounce (*oz. avoir.*).
7000 grains, 14 pounds = 1 pound (*lb. avoir.*).
14 pounds = 1 stone (*st.*) (Eng.).
25 pounds = 1 short quarter (*sh. qr.*).
28 pounds = 1 long quarter (*l. qr.*).
100 pounds, 4 short quarters = 1 short hundredweight (*sh. cwt.*).
112 pounds, 4 long quarters = 1 long hundredweight (*l. cwt.*).
2000 pounds, 20 short hundredweight = 1 short ton (*sh. tn.*).
2240 pounds, 20 long hundredweight = 1 long ton (*l. tn.*).

TROY WEIGHT

Used for expressing the weight of precious metals.

24 grains = 1 pennyweight (*pwt.* or *dwt.*) = 24 grains.
20 pennyweights = 1 ounce (*oz. t.*) = 480 grains.
12 ounces = 1 pound (*lb. t.*) = 5760 grains.

APOTHECARIES' WEIGHT

Used for weighing medicines when filling physicians' prescriptions.

20 grains = 1 scruple ℈ (*sc. apoth.*) = 20 grains.
3 scruples = 1 dram ʒ (*dr. apoth.*) = 60 grains.
8 drams = 1 ounce ℥ (*oz. apoth.*) = 480 grains.
12 ounces = 1 pound ℔ (*lb. apoth.*) = 5760 grains.

APOTHECARIES' FLUID MEASURE

Employed for measuring liquid medicines.

		SYMBOL
60 minims ♏	= 1 fluid dram (*fl. dr.*).	f ʒ
8 fluid drams	= 1 fluid ounce (*fl. oz.*).	f ℥
16 fluid ounces	= 1 liquid pint (*pt.*).	O
8 liquid pints	= 1 gallon (*gal.*).	C

In writing prescriptions in the apothecaries' system, Roman, not Arabic, numbers are used. These are placed *after* the symbol. Thus: f ʒ ii means 2 fluid ounces; ℈ ss means one-half scruple; ℥ iss means one ounce and one-half.

LIQUID MEASURE—UNITED STATES

4 fluid ounces = 1 gill (*gi.*).
4 gills = 1 pint (*pt.*) = 28.875 cu. in.
2 pints = 1 quart (*qt.*) = 57.75 cu. in.
4 quarts = 1 gallon (*gal.*) = 231.00 cu. in.
31½ gallons = 1 barrel (*bbl.*).
2 barrels = 1 hogshead (*hhd.*).
2 hogsheads = 1 pipe.
2 pipes = 1 tun.

DRY MEASURE

The system of units commonly employed for measuring the bulk of "dry commodities," such as grain, vegetables, nuts, and fruit. The dry peck and the dry quart are 16.36 per cent larger than the corresponding liquid measures.

2 pints = 1 quart (*qt.*) = 67.2 cu. in.
8 quarts = 1 peck (*pk.*) = 537.6 cu. in.
4 pecks = 1 bushel (*bu.*) = 2150.42 cu. in.
105 quarts = 1 barrel (*bbl.*) = 7056.0 cu. in.

LIQUID AND DRY MEASURE—BRITISH AND CANADIAN

The system of units adopted by Great Britain is the same as that of the United States, but it is based on the Imperial gallon of 277.274 cu. in. and on the Imperial bushel of 2218.192 cu. in.

KITCHEN MEASURE

3 teaspoonfuls, ½ fluid ounce = 1 tablespoonful.
16 tablespoonfuls, 2 gills, ½ liquid pint, 8 fluid ounces = 1 cupful.
2 cupfuls, 16 fluid ounces = 1 pint.
4 cupfuls = 1 quart.

PAPER MEASURE

For small paper the old measure is still in use:

24 sheets = 1 quire (*qr.*).
20 quires } = 1 ream (*rm.*).
480 sheets }
2 reams = 1 bundle.
5 bundles = 1 bale.

For papers packed in cases, bundles, or frames, the following measure is now used:

25 sheets = 1 quire.
20 quires } = 1 standard ream.
500 sheets }

ASTRONOMICAL DISTANCE

92.9 million miles = 1 astronomical unit.
63,500 astronomical units = 1 light year = 5.9 trillion miles
3.26 light years = 1 parsec = 19.2 trillion miles

MISCELLANEOUS

12 units = 1 dozen.
20 units = 1 score.
12 dozen = 1 gross (144).
12 gross = 1 great gross (1728).

CONVERSION FACTORS

To change cubic feet to gallons.
Multiply the number of cubic feet by 7.48. For approximate results multiply by 7½.

To change gallons to cubic feet.
Multiply the number of gallons by 0.1337.

To change cubic inches to gallons.
Divide the number of cubic inches by 231, or multiply by 0.004329.

To change cubic feet to bushels.
Divide the number of cubic feet by 1.244. For approximate results multiply the number of cubic feet by ⅘.

To change cubic inches to bushels.
Divide the number of cubic inches by 2150.42, or multiply the number of cubic inches by 0.000465.

To change bushels to cubic feet.
Multiply the number of bushels by 1.244. For approximate results multiply the number of bushels by ⅘.

METRIC SYSTEM

A system of weights and measures invented by the French during the latter part of the 18th century. The fundamental unit or base of the system is the *meter*, which was intended to be exactly one ten-millionth part of a quadrant of the earth's meridian. Seven years were spent by famous scientists in obtaining the length as exactly as possible; but the resulting value was subsequently found to be slightly incorrect, so that the meter is now defined as the distance between two engraved lines on a bar of platinum-iridium alloy which is preserved in the archives of the International Metric Commission at Paris.

The unit of weight—the *gram*—was intended to be the mass, at 4° C., of a cubical volume of pure water measuring exactly .01 meter, or 1 centimeter, on each side. As this unit is comparatively small, it was decided that the standard actually constructed should have the mass of 1000 grams, or 1 *kilogram*. Here again a *very slight* error was made, so the kilogram is now defined as the mass of a certain piece of platinum, which also is deposited with the International Metric Commission.

The unit of capacity, the *liter*, is defined as the volume of 1 kilogram of water at its greatest density and is practically equal to 1000 cubic centimeters.

All of the units are theoretically based on the unit of length, and the tables are built on the decimal plan. Since our system of notation is a decimal system, metric computations are very easily made although the results are no more accurate than those obtained by any other system.

The following prefixes are used: Latin, *milli* (.001); *centi* (.01); *deci* (.1); Greek, *deka* (10); *hecto* (100); *kilo* (1000); and *myria* (10,000). These ratios are not difficult to remember; for, just as a cent is .01 dollar and a mill .001 dollar, so is a centimeter .01 meter, a centigram .01 gram, and a milliliter .001 liter. It is not generally known that the U. S. five-cent piece, or nickel, weighs, when new, just 5 grams; the dime, 2.5 grams; the quarter, 6.25 grams; and the half dollar, 12.5 grams.

METRIC MEASURE

UNITS COMMONLY USED

Length	10 millimeters (*mm*)	= 1 centimeter (*cm*).
	100 centimeters	= 1 meter (*m*).
	1000 meters	= 1 kilometer (*km*).
Capacity	1000 milliliters (*ml*)	= 1 liter (*l*).
	100 liters	= 1 hectoliter (*hl*).
Weight	1000 milligrams (*mg*)	= 1 gram (*g*).
	1000 grams	= 1 kilogram (*kg*).
	1000 kilograms	= 1 metric ton (*t*).

METRIC TABLES

Length	10 millimeters (*mm*)	= 1 centimeter (*cm*).
	10 centimeters	= 1 decimeter.
	10 decimeters	= 1 meter.
	10 meters	= 1 dekameter.
	10 dekameters	= 1 hectometer.
	10 hectometers	= 1 kilometer.
	10 kilometers	= 1 myriameter.

In microscopic work, and for expressing the length of light waves, the micron (Greek. Very small) is used.

	1 micron (μ)	= .001 millimeter
	1 millimicron (μμ)	= .001 micron
Capacity	1 milliliter (*ml*)	= .001 liter.
	10 milliliters	= 1 centiliter (*cl*).
	10 centiliters	= 1 deciliter (*dl*).
	10 deciliters	= 1 liter (*l*).
	10 liters	= 1 dekaliter (*dkl*).
	10 dekaliters	= 1 hectoliter (*hl*).
	10 hectoliters	= 1 myrialiter.
Weight	1 milligram (*mg*)	= .001 gram.
	10 milligrams	= 1 centigram (*cg*).
	10 centigrams	= 1 decigram (*dg*).
	10 decigrams	= 1 gram (*g*).
	10 grams	= 1 dekagram (*dkg*).
	10 dekagrams	= 1 hectogram (*hg*).
	10 hectograms	= 1 kilogram (*kg*).
	1000 kilograms	= 1 metric ton (*t*).
Area	100 square millimeters (mm^2)	= 1 square centimeter.
	100 square centimeters (cm^2)	= 1 square decimeter.
	100 square decimeters (dm^2)	= 1 square meter.
	100 square meters (m^2) } 1 are (*a*) }	= 1 square dekameter.
	100 ares } 1 hectare }	= 1 square hectometer.
	100 hectares	= 1 square kilometer.
	1 square kilometer (km^2)	= 1,000,000 m^2.

Volumes

1000 cubic millimeters (mm^3)	= 1 cubic centimeter (cm^3).
1000 cubic centimeters	= 1 cubic decimeter (dm^3).
1000 cubic decimeters	= 1 cubic meter (m^3).
1000 cubic meters	= 1 cubic dekameter (dkm^3).
1000 cubic dekameters	= 1 cubic hectometer (hm^3).
1 cubic meter	= 1 stere.

COMPARISON OF METRIC AND CUSTOMARY (U. S.) WEIGHTS AND MEASURES

These tables are based on the U. S. legal standard, which is slightly different from the British standard. Equivalents such as those here given should be used only to the required degree of accuracy. For example, 4 inches is equal to about 10 centimeters. If greater accuracy is desired, 10.2 centimeters or 102 millimeters may be used.

LENGTH

1 centimeter	= 0.394 inch.
1 inch (″)	= 2.540 centimeters.
1 meter	= 3.281 feet.
1 foot (′)	= 0.305 meter.
1 meter	= 1.094 yards.
1 yard	= 0.914 meter.
1 kilometer	= 0.621 statute mile.
1 statute mile	= 1.609 kilometers.
1 kilometer	= 0.540 nautical mile.
1 nautical mile	= 1.853 kilometers.

CAPACITY

1 milliliter	=	0.271 U. S. fluid dram.
1 U. S. fluid dram	=	3.697 milliliters.
1 milliliter	=	0.034 U. S. fluid ounce.
1 U. S. fluid ounce	=	29.573 milliliters.
1 liter	=	1.057 U. S. liquid quarts.
1 U. S. liquid quart	=	0.946 liter.
1 liter	=	0.908 U. S. dry quart.
1 U. S. dry quart	=	1.101 liters.
1 liter	=	0.264 U. S. gallon.
1 U. S. gallon	=	3.785 liters.
1 hectoliter	=	2.838 U. S. bushels.
1 U. S. bushel	=	0.3524 hectoliter.

WEIGHT

1 gram	=	15.432 grains.
1 grain	=	0.065 gram.
1 gram	=	0.643 pennyweight.
1 pennyweight	=	1.555 grams.
1 gram	=	0.772 apothecaries' scruple.
1 apothecaries' scruple	=	1.296 grams.
1 gram	=	0.257 apothecaries' dram.
1 apothecaries' dram	=	3.888 grams.
1 gram	=	0.035 avoirdupois ounce.
1 avoirdupois ounce	=	28.350 grams.
1 gram	=	0.032 troy ounce.
1 troy ounce	=	31.103 grams.
1 kilogram	=	2.205 avoirdupois pounds.
1 avoirdupois pound	=	0.454 kilogram.
1 kilogram	=	2.679 troy pounds.
1 troy pound	=	0.373 kilogram.
1 metric ton	=	0.984 gross or long ton.
1 gross or long ton	=	1.016 metric tons.
1 metric ton	=	1.102 short or net tons.
1 short or net ton	=	0.907 metric ton.

AREA

1 square centimeter	=	0.155 square inch.
1 square inch	=	6.452 square centimeters.
1 square meter	=	10.764 square feet.
1 square foot	=	0.0929 square meter.
1 square meter	=	1.196 square yards.
1 square yard	=	0.8361 square meter.
1 square kilometer	=	0.3861 square mile.
1 square mile	=	2.590 square kilometers.
1 hectare	=	2.471 acres.
1 acre	=	0.4047 hectare.

VOLUME

1 cubic centimeter	=	0.0610 cubic inch.
1 cubic inch	=	16.3872 cubic centimeters.
1 cubic meter	=	35.3145 cubic feet.
1 cubic foot	=	0.02832 cubic meter.
1 cubic meter	=	1.3079 cubic yards.
1 cubic yard	=	0.7646 cubic meter.
1 liter	=	0.03532 cubic foot.
1 cubic foot	=	28.3162 liters.
1 stere	=	0.2759 cord.
1 cord	=	3.6245 steres.

ROMAN NUMERALS

I	1	IX	9	XVII	17	LXX	70	DC	600
II	2	X	10	XVIII	18	LXXX	80	DCC	700
III	3	XI	11	XIX	19	XC	90	DCCC	800
IV	4	XII	12	XX	20	C	100	CM	900
V	5	XIII	13	XXX	30	CC	200	M	1000
VI	6	XIV	14	XL	40	CCC	300	MM	2000
VII	7	XV	15	L	50	CD	400	$\overline{V}$	5000
VIII	8	XVI	16	LX	60	D	500	$\overline{X}$	10,000

The above is the most generally used way of expressing by Roman notation the numbers indicated, although some of them differ from the ancient Roman usage. The Romans, for instance, wrote IIII instead of IV.

It should be noted that repeating a symbol repeats its value. Thus CCC (300) triples the value of C (100). A symbol following one of greater value adds its value to that of the preceding symbol. Thus VI (6) indicates V (5) + I (1). A symbol preceding one of greater value subtracts its value from that of the following symbol. Thus IV (4) indicates V (5) − I (1). A dash placed over a symbol multiplies its value by 1000. Thus $\overline{M}$ indicates 1,000,000.

WEIGHTS AND SPECIFIC GRAVITIES

Substance	Average Specific Gravity	Average Weight per Cubic Foot in Pounds	Average Weight per Cubic Inch in Pounds
Metals, Alloys			
Aluminum	2.7	168	.097
Brass	8.5	530	.31
Copper	8.9	556	.32
Gold	19.3	1205	.70
Gold, coin (U. S.)	17.2	1073	.62
Iron, gray cast	7.1	443	.26
Iron, wrought	7.8	487	.28
Lead	11.3	707	.41
Mercury	13.6	849	.49
Platinum	21.2	1320	.78
Silver	10.5	655	.38
Steel	7.8	487	.28
Zinc	7.1	443	.25
Various Solids			
Butter	.....	59	.....
Cereals in bulk	.....	.....	.....
Oats	.....	26	.....
Barley	.....	39	.....
Corn, Rye	.....	45	.....
Wheat	.....	48	.....
Cork	.25	16	.009
Fats	.90–.97	58	.034
Flour, loose	.....	28	.....
Flour, pressed	.....	47	.....
Glass	2.6	162	.094
Hay and Straw	.....	20	.....
Ice	.91	57	.033
Potatoes (piled)	.....	42	.....
			Weight per Board Foot in Pounds
Timber (Seasoned, moisture 15 to 20%)			
Ash	.63	40	3.3
Birch	.51	32	2.7
Cedar	.35	22	1.8
Chestnut	.66	41	3.4
Cypress	.48	30	2.5
Hemlock	.47	29	2.4
Hickory	.75	48	4.0
Maple	.68	43	3.6
Oak, red, black	.65	41	3.4
Oak, white	.74	46	3.8
Pine, white	.41	26	2.2
Pine, long-leaf	.70	44	3.7
Pine, shortleaf	.61	38	3.2
Spruce, white, black	.43	27	2.3
Walnut, black	.67	42	3.5
Willow	.50	31	3.6
			Weight per Gallon in Pounds
Various Liquids			
Cider Vinegar	1.01	63	8.42
Cream (18% fat)	1.01	63	8.42
Cream (40% fat)	.99	62	8.25
Gasoline	.7	44	5.83
Kerosene	.8	50	6.66
Linseed Oil	.93	58	7.7
Milk	1.03	64.5	8.6
Sirup (65.6% sugar)	1.32	82.5	11.0
Turpentine	.86	54	7.2
Water (4°C., 39.2°F.)	1.00	62.357	8.34
Water (100° C., 212° F.)	.958	59.765	7.99
Water, sea	1.03	64	8.59
Masonry			
Brick, pressed		140	.....
Brick, common		120	.....
Concrete, cement, stone, sand		144	.....
Concrete, cement, cinder, etc.		100	.....
Limestone, mortar rubble		125	.....
Sandstone, mortar rubble		110	.....
Various Building Materials			
Ashes, cinders		43	.....
Cement, Portland, loose		94	.....
Clay, damp, plastic		110	.....
Earth, moist, packed		96	.....
Sand, gravel, dry, packed		100–120	.....
Coal, piled			
Anthracite, white ash, egg		57	.....
Anthracite, white ash, stove		56.5	.....
Anthracite, white ash, nut		55.5	.....
Anthracite, white ash, pea		53.5	.....
Anthracite, red ash, egg		53	.....
Anthracite, red ash, stove		52.5	.....
Anthracite, red ash, nut		52	.....
Anthracite, red ash, pea		51	.....
Bituminous		47–55	.....

INCHES REDUCED TO DECIMALS OF A FOOT

In.	Feet	In.	Feet	In.	Feet
0	0.0000	4	0.3333	8	0.6667
1/16	0.0104	1/16	0.3438	1/16	0.6771
1/8	0.0208	1/8	0.3542	1/8	0.6875
3/16	0.0313	3/16	0.3646	3/16	0.6979
1/4	0.0417	1/4	0.3750	1/4	0.7083
5/16	0.0521	5/16	0.3854	5/16	0.7188
3/8	0.0625	3/8	0.3958	3/8	0.7292
7/16	0.0729	7/16	0.4063	7/16	0.7396
1/2	0.0833	5/2	0.4167	9/2	0.7500
1/16	0.0938	1/16	0.4271	1/16	0.7604
1/8	0.1042	1/8	0.4375	1/8	0.7708
3/16	0.1146	3/16	0.4479	3/16	0.7813
1/4	0.1250	1/4	0.4583	1/4	0.7917
5/16	0.1354	5/16	0.4688	5/16	0.8021
3/8	0.1458	3/8	0.4792	3/8	0.8125
7/16	0.1563	7/16	0.4896	7/16	0.8229
2	0.1667	6	0.5000	10	0.8333
1/16	0.1771	1/16	0.5104	1/16	0.8438
1/8	0.1875	1/8	0.5208	1/8	0.8542
3/16	0.1979	3/16	0.5313	3/16	0.8646
1/4	0.2083	1/4	0.5417	1/4	0.8750
5/16	0.2188	5/16	0.5521	5/16	0.8854
3/8	0.2292	3/8	0.5625	3/8	0.8958
7/16	0.2396	7/16	0.5729	7/16	0.9063
3	0.2500	7	0.5833	11	0.9167
1/16	0.2604	1/16	0.5938	1/16	0.9271
1/8	0.2708	1/8	0.6042	1/8	0.9375
3/16	0.2813	3/16	0.6146	3/16	0.9479
1/4	0.2917	1/4	0.6250	1/4	0.9583
5/16	0.3021	5/16	0.6354	5/16	0.9688
3/8	0.3125	3/8	0.6458	3/8	0.9792
7/16	0.3229	7/16	0.6563	7/16	0.9896

Opposite each inch or fraction of an inch will be found its decimal equivalent in feet. Thus, 7 3/8 in. = 0.6146 ft.

TABLE OF DECIMAL EQUIVALENTS

DECIMAL AND MILLIMETER EQUIVALENTS OF FRACTIONAL PARTS OF AN INCH.

Fractions of an Inch	Decimal Equivalents in Inches	Equivalents in Millimeters
1/32	0.03125	0.794
1/16	0.0625	1.588
3/32	0.09375	2.381
1/8	0.125	3.175
5/32	0.15625	3.969
3/16	0.1875	4.763
7/32	0.21875	5.556
1/4	0.25	6.350
9/32	0.28125	7.144
5/16	0.3125	7.938
11/32	0.34375	8.731
3/8	0.375	9.525
13/32	0.40625	10.319
7/16	0.4375	11.113
15/32	0.46875	11.906
1/2	0.5	12.700
17/32	0.53125	13.494
9/16	0.5625	14.288
19/32	0.59375	15.081
5/8	0.625	15.875
21/32	0.65625	16.669
11/16	0.6875	17.463
23/32	0.71875	18.256
3/4	0.75	19.050
25/32	0.78125	19.844
13/16	0.8125	20.638
27/32	0.84375	21.431
7/8	0.875	22.225
29/32	0.90625	23.019
15/16	0.9375	23.813
31/32	0.96875	24.606
32/32	1	25.400

TABLE OF POWERS, ROOTS, AND RECIPROCALS

No.	Square	Cube	Square Root	Cube Root	Reciprocal	No.	Square	Cube	Square Root	Cube Root	Reciprocal
1	1	1	1.0000	1.0000	1.0000	51	2601	132651	7.1414	3.7084	0.0196
2	4	8	1.4142	1.2599	0.5000	52	2704	140608	7.2111	3.7325	0.0192
3	9	27	1.7321	1.4422	0.3333	53	2809	148877	7.2801	3.7563	0.0189
4	16	64	2.0000	1.5874	0.2500	54	2916	157464	7.3485	3.7798	0.0185
5	25	125	2.2361	1.7100	0.2000	55	3025	166375	7.4162	3.8030	0.0182
6	36	216	2.4495	1.8171	0.1667	56	3136	175616	7.4833	3.8259	0.0179
7	49	343	2.6458	1.9129	0.1429	57	3249	185193	7.5498	3.8485	0.0175
8	64	512	2.8284	2.0000	0.1250	58	3364	195112	7.6158	3.8709	0.0172
9	81	729	3.0000	2.0801	0.1111	59	3481	205379	7.6811	3.8930	0.0169
10	100	1000	3.1623	2.1544	0.1000	60	3600	216000	7.7460	3.9149	0.0167
11	121	1331	3.3166	2.2240	0.0909	61	3721	226981	7.8102	3.9365	0.0164
12	144	1728	3.4641	2.2894	0.0833	62	3844	238328	7.8740	3.9579	0.0161
13	169	2197	3.6056	2.3513	0.0769	63	3969	250047	7.9373	3.9791	0.0159
14	196	2744	3.7417	2.4101	0.0714	64	4096	262144	8.0000	4.0000	0.0156
15	225	3375	3.8730	2.4662	0.0667	65	4225	274625	8.0623	4.0207	0.0154
16	256	4096	4.0000	2.5198	0.0625	66	4356	287496	8.1240	4.0412	0.0152
17	289	4913	4.1231	2.5713	0.0588	67	4489	300763	8.1854	4.0615	0.0149
18	324	5832	4.2426	2.6207	0.0556	68	4624	314432	8.2462	4.0817	0.0147
19	361	6859	4.3589	2.6684	0.0526	69	4761	328509	8.3066	4.1016	0.0145
20	400	8000	4.4721	2.7144	0.0500	70	4900	343000	8.3666	4.1213	0.0143
21	441	9621	4.5826	2.7589	0.0476	71	5041	357911	8.4261	4.1408	0.0141
22	484	10648	4.6904	2.8020	0.0454	72	5184	373248	8.4853	4.1602	0.0139
23	529	12167	4.7958	2.8439	0.0435	73	5329	389017	8.5440	4.1793	0.0137
24	576	13824	4.8989	2.8845	0.0417	74	5476	405224	8.6023	4.1983	0.0135
25	625	15625	5.0000	2.9240	0.0400	75	5625	421875	8.6603	4.2172	0.0133
26	676	17576	5.0990	2.9625	0.0385	76	5776	438976	8.7178	4.2358	0.0132
27	729	19683	5.1962	3.0000	0.0370	77	5929	456533	8.7750	4.2543	0.0130
28	784	21952	5.2915	3.0366	0.0357	78	6084	474552	8.8318	4.2727	0.0128
29	841	24389	5.3852	3.0723	0.0345	79	6241	493039	8.8882	4.2908	0.0127
30	900	27000	5.4772	3.1072	0.0333	80	6400	512000	8.9443	4.3089	0.0125
31	961	29791	5.5678	3.1414	0.0323	81	6561	531441	9.0000	4.3267	0.0123
32	1024	32768	5.6569	3.1748	0.0313	82	6724	551368	9.0554	4.3445	0.0122
33	1089	35937	5.7446	3.2075	0.0303	83	6889	571787	9.1104	4.3621	0.0120
34	1156	39304	5.8310	3.2396	0.0294	84	7056	592704	9.1652	4.3795	0.0119
35	1225	42875	5.9161	3.2711	0.0286	85	7225	614125	9.2195	4.3968	0.0118
36	1296	46656	6.0000	3.3019	0.0278	86	7396	636056	9.2736	4.4140	0.0116
37	1369	50653	6.0828	3.3322	0.0270	87	7569	658503	9.3276	4.4310	0.0115
38	1444	54872	6.1644	3.3620	0.0263	88	7744	681472	9.3808	4.4480	0.0114
39	1521	59319	6.2450	3.3912	0.0256	89	7921	704969	9.4340	4.4647	0.0112
40	1600	64000	6.3246	3.4200	0.0250	90	8100	729000	9.4868	4.4814	0.0111
41	1681	68921	6.4031	3.4482	0.0244	91	8281	753571	9.5394	4.4979	0.0110
42	1764	74088	6.4807	3.4760	0.0238	92	8464	778688	9.5917	4.5144	0.0109
43	1849	79507	6.5574	3.5034	0.0233	93	8649	804357	9.6437	4.5307	0.0108
44	1936	85184	6.6333	3.5303	0.0227	94	8836	830584	9.6954	4.5468	0.0106
45	2025	91125	6.7082	3.5569	0.0222	95	9025	857375	9.7468	4.5629	0.0105
46	2116	97336	6.7823	3.5831	0.0217	96	9216	884736	9.7980	4.5789	0.0104
47	2209	103823	6.8557	3.6088	0.0213	97	9409	912673	9.8489	4.5947	0.0103
48	2304	110592	6.9282	3.6342	0.0208	98	9604	941192	9.8995	4.6104	0.0102
49	2401	117649	7.0000	3.6593	0.0204	99	9801	970299	9.9499	4.6261	0.0101
50	2500	125000	7.0711	3.6840	0.0200	100	10000	1000000	10.0000	4.6416	0.0100

LEGAL WEIGHTS (IN POUNDS) PER BUSHEL

(From Bureau of Standards, Department of Commerce)

States	Apples	Dried Apples	Barley	Beans	Beets	Bran	Buckwheat	Carrots	Clover Seed	Coal	Corn in Ear	Shelled Corn	Corn Meal	Cotton Seed	Flaxseed (Linseed)	Hemp Seed	Hungarian Grass Seed	Millet	Oats	Onions	Orchard Grass Seed	Parsnips	Peaches	Dried	Pears	Peas	Potatoes	Sweet Potatoes	Rye	Timothy Seed	Tomatoes	Turnips	Wheat
	Apples										Corn												Peaches										
Federal Statutes*	50	..	48	..	..	..	..	..	..	..	..	56	..	..	56	..	..	..	32	..	..	..	..	..	..	60	..	..	56	..	..	..	60
Alabama	50	24	47	60	50	20	50	50	60	80	70	56	..	32	56	44	..	50	32	57	14	45	50	..	50	60	60	55	56	45	56	55	60
Arkansas	50	24	48	60	..	20	52	..	60	..	70	56	48	33½	56	..	..	50	32	57	14	..	..	33	..	60	60	50	56	60	..	57	60
California	..	..	50	..	..	..	40	..	..	..	..	52	..	..	..	..	..	..	32	..	..	..	..	..	..	..	..	..	54	..	..	..	60
Colorado	..	..	48	60	..	..	52	..	60	80	70	56	50	..	..	44	..	..	32	57	..	..	..	..	..	..	60	..	56	45	..	..	60
Connecticut	48	25	48	60	60	20	48	50	60	..	..	56	50	30	55	..	..	..	32	52	..	45	52	33	52	60	60	54	56	..	56	50	60
Delaware	..	..	..	..	..	..	..	..	..	..	..	56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	60
District of Columbia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Florida	48	24	48	60	..	20	..	..	..	..	..	56	48	32	..	..	..	50	32	56	..	..	54	24	55	..	60	56	56	..	..	54	60
Georgia	..	24	47	60	..	20	52	..	60	80	70	56	..	30	56	44	..	..	32	57	..	..	..	..	..	60	60	55	56	45	..	55	60
Idaho	48	24	48	60	56	20	50	50	60	..	70	56	48	..	56	44	50	50	32	57	..	50	48	33	..	60	60	50	56	45	56	55	60
Illinois	47	24	48	60	60	20	52	50	60	80	70	56	48	32	56	44	50	50	32	57	14	50	48	33	58	60	60	50	56	45	56	55	60
Iowa	48	24	48	60	56	20	48	50	60	80	70	56	48	..	56	44	50	50	32	52	14	45	48	33	45	60	60	50	56	45	50	55	60
Kansas	48	24	48	60	56	..	48	50	60	..	70	56	..	..	56	44	..	50	32	55	..	48	48	33	50	60	60	50	56	45	56	55	60
Kentucky	..	24	47	60	..	20	56	..	60	76	a70	56	50	..	56	44	50	50	32	57	14	..	..	39	..	60	60	55	56	45	..	60	60
Louisiana	..	..	32	..	..	..	..	..	..	..	..	56	..	..	..	..	..	..	32	..	..	..	..	..	..	..	..	..	32	..	..	..	60
Maine	44	25	48	60	60	20	48	50	60	..	..	56	50	30	56	44	48	50	32	52	14	45	48	33	58	60	60	54	56	45	56	50	60
Maryland	50	28	48	60	..	20	48	50	60	80	70	56	48	..	56	44	50	50	32	54	14	..	40	..	..	60	60	60	56	45	60	60	60
Michigan	48	22	48	60	56	..	48	50	60	80	70	56	50	..	56	44	50	50	32	54	14	50	..	28	..	60	60	56	56	45	..	58	60
Minnesota	50	28	48	60	50	..	50	45	60	..	70	56	..	..	56	50	48	48	32	52	14	42	48	28	45	60	60	55	56	45	50	55	60
Mississippi	..	26	48	60	..	20	48	..	60	80	72	56	48	32	56	44	50	50	32	57	..	..	..	33	..	60	60	54	56	45	..	55	60
Missouri	48	24	48	60	..	20	52	50	60	80	70	56	50	33	56	44	48	50	32	57	14	44	48	33	48	60	60	56	56	45	45	42	60
Montana	45	..	48	60	50	20	52	50	60	76	70	56	50	.	56	44	50	..	32	57	..	50	..	..	45	60	60	..	56	45	..	50	60
Nebraska	48	24	48	60	56	20	50	50	60	80	70	56	48	..	56	44	..	50	32	57	14	50	48	33	45	60	60	50	56	45	56	55	60
Nevada	48	24	48	60	56	20	50	50	60	..	70	56	48	..	56	48	50	50	32	57	..	50	48	33	..	60	60	50	56	45	56	56	60
New Hampshire	48	25	48	60	60	20	48	50	60	..	..	56	50	..	56	..	..	..	32	52	..	45	48	33	58	60	60	54	56	45	56	55	60
New Mexico	45	24	48	60	56	20	52	50	60	80	70	56	50	32	56	44	50	50	32	57	14	42	48	33	48	60	60	50	56	45	50	56	60
New York	..	25	48	60	..	20	48	50	60	..	..	56	50	30	55	..	..	..	32	57	..	..	..	33	..	60	60	54	56	45	..	..	60
North Carolina	..	24	48	60	50	20	50	50	60	80	70	56	..	30	56	44	48	50	32	57	14	50	50	25	56	60	56	56	56	45	56	50	60
North Dakota	50	28	48	60	60	20	42	45	60	80	70	56	..	..	56	50	48	50	32	52	14	42	..	28	45	60	60	46	56	45	50	60	60
Ohio	48	24	48	60	56	..	50	50	60	70	68	56	48	..	56	44	50	50	32	56	..	50	48	33	..	60	60	50	56	45	56	60	60
Oklahoma	48	24	48	60	60	20	52	50	60	80	70	56	50	32	56	44	48	50	32	57	14	44	48	33	48	60	60	55	56	45	45	42	60
Pennsylvania	45	25	48	60	56	20	48	50	60	76	70	56	50	..	56	44	50	50	32	50	14	50	48	..	50	60	60	54	56	45	56	56	60
Rhode Island	48	25	48	60	50	20	48	50	60	80	70	56	50	..	56	44	50	50	32	50	..	50	48	33	..	60	60	54	56	45	56	50	60
South Carolina	50	24	48	60	50	20	50	50	60	80	70	56	..	30	56	44	48	50	32	56	14	50	50	25	36	60	60	50	56	45	56	50	60
South Dakota	48	24	48	60	56	..	48	50	60	..	70	56	50	..	56	44	50	50	32	52	14	48	48	33	45	60	60	54	56	45	50	55	60
Tennessee	50	24	48	60	50	20	50	50	60	80	70	56	..	28	56	44	48	50	32	56	14	50	50	26	56	60	60	50	56	45	56	50	60
Texas	50	28	48	60	60	20	52	50	60	80	b70	56	50	32	56	44	48	50	32	57	14	50	50	28	58	60	60	50	56	45	56	55	60
Vermont	48	25	48	60	60	..	48	50	60	..	70	56	50	..	55	..	50	50	32	52	..	45	48	..	58	60	60	54	56	45	56	60	60
Virginia	45	28	48	60	..	20	48	50	60	80	70	56	48	30	56	44	48	50	32	57	14	50	..	..	..	..	60	56	56	45	60	55	60
Washington	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
West Virginia	48	24	48	60	56	20	48	50	60	80	c68	56	48	32	56	44	50	50	32	55	14	42	48	33	50	60	60	50	56	45	56	55	60
Wisconsin	44	25	48	60	50	20	50	50	60	..	..	56	50	..	56	44	48	50	32	50	..	44	48	33	48	60	60	54	56	45	56	42	60
Wyoming	48	..	48	60	56	..	..	50	..	..	70	56	..	..	56	..	..	..	32	57	..	50	48	..	..	..	60	50	56	..	56	55	60

* Weights fixed for customs purposes. *a* From Nov. 1 to May 1 following; 68 pounds from May 1 to Nov. 1 following. *b* Seventy pounds after Dec. 1, and 72 pounds for new crop before Dec. 1. *c* In ear, dry; 72 pounds in ear, green.

ALGEBRA

THE word algebra is derived from the Arabic *al-jebr*, the first part of a phrase meaning transposition and removal. The phrase was used as the title of a book on the science by one of the 9th-century Arabian mathematicians, to whom the early development of algebra is chiefly due.

Algebra may be considered as an extension and generalization of arithmetic and defined as the branch of mathematics in which letters, signs of operation, or other symbols, replace numbers of arithmetic in the general solution of problems involving computations of arithmetic. It is the science of solving mathematical problems by means of symbols and equations. A knowledge of algebra is essential for the student of geometry, trigonometry, physics, and other branches of mathematics and science.

DEFINITIONS AND NOTATION

An **algebraic expression** is the representation of any number or quantity by a symbol or a combination of symbols. The symbols commonly employed are the letters of the alphabet. Examples of algebraic expressions are $3b$; $2a-bc$.

A **coefficient** is a number, a letter or letters, or a number and one or more letters, prefixed to a quantity to show how many times the given quantity is taken: $5x$; ax; $5ax$; $5abx$. In these quantities, 5, a, $5a$, $5ab$, are respectively the coefficients of x.

A **numerical coefficient** is a coefficient composed only of a number: $5x$; $12y$.

A **literal coefficient** is a coefficient composed only of a letter or letters: ay; aby.

A **mixed coefficient** is a coefficient composed of both a number and a letter, or letters: $5ax$; $5acx$.

A **term** is an algebraic expression whose parts are not separated by a + or − sign: $5a$; $3b$.

A **positive term** is a term either preceded by a plus sign or having no sign. A term is assumed to be positive if no sign precedes it: $+ 2x$; $3a + 2y$; $4b$.

A **negative term** is a term preceded by a minus sign: $- 6a$; $- abc$.

Similar terms are terms that differ only in their numerical coefficients: $8ax$; $- 9ax$.

A **monomial** is an algebraic expression of one term: $2x$; ab.

A **polynomial** is an algebraic expression of two or more terms: $2a + 3b$; $a^2 + 2ab + b^2$.

A **binomial** is a polynomial of two terms: $2m+3a$.

A **trinomial** is a polynomial of three terms: $2a + 3y - 4z$.

A **formula** is an expression of a general principle or rule by the aid of symbols. Thus, as the area (A) of a rectangle is equal to the product of its length (l) and width (w), the area is expressed by the formula $A = lw$.

The **factors** of a number are the parts which, when multiplied together, produce the number: 3, 2, x, and y are the factors of $6xy$.

A **power** is the product obtained by using a number or an algebraic expression a certain number of times as a factor: $3 \times 3 \times 3 \times 3 = 3^4 = 81$, the fourth power of 3, which may be read "3 to the fourth power."

A **square,** or **second power,** is the product obtained by taking a number or an algebraic expression twice as a factor: $5 \times 5 = 5^2 = 25$, the square of 5; $2a \times 2a = (2a)^2 = 4a^2$, the square of $2a$.

A **cube,** or **third power,** is the product obtained by taking a number or an algebraic expression three times as a factor: $4 \times 4 \times 4 = 4^3 = 64$, the cube of 4; $2b \times 2b \times 2b = (2b)^3$, $= 8b^3$ the cube of $2b$.

An **exponent** is the small character or characters (letters, figures, or both) written above and to the right of a quantity to show the power to which the quantity is raised. It is omitted when it equals unity. An exponent may be a positive number, a negative number, or a fraction: x^2; x^{-2}; $x^{\frac{1}{2}}$; $x^{-\frac{1}{2}}$. x^2 means the product of x taken as a factor twice; x^{-2} means $\frac{1}{x^2}$; $x^{\frac{1}{2}}$ indicates the number which, when multiplied by itself, is equal to x; and $x^{-\frac{1}{2}}$ means $\frac{1}{x^{\frac{1}{2}}}$.

Observe the distinction between *coefficient* and *exponent*. A coefficient is placed before the quantity and *multiplies* the quantity: $2b$ means 2 times b. An exponent, when an integer, indicates that the quantity is to be multiplied by itself: b^2 means b times b.

A **root** of a number is one of the equal factors whose product is the number; 2 is a root of 4, 8, 16, 32, 64, and all other numbers composed of 2 as a factor any number of times.

The symbol $\sqrt{4}$ ($\sqrt{4}$ is sometimes written $4^{\frac{1}{2}}$), is read "the square root of 4." It represents the number or numbers which, when squared, or raised to the second power, will equal 4. The symbol $\sqrt[3]{4}$ ($\sqrt[3]{4}$ is sometimes written $4^{\frac{1}{3}}$), is read "the cube root of 4," and represents the number, which, when cubed, or raised to the third power, will equal 4.

A **known quantity** is a quantity whose value is given. It is usually represented by one of the first letters of the alphabet; as, a, b, c, d.

An **unknown quantity** is a quantity whose value is to be determined. It is usually represented by one of the final letters of the alphabet; as, x, y, z.

Positive and Negative Quantities. *Positive* and *negative* are terms used in algebra to distinguish between quantities that have the property of being opposite in direction, character, or quality; as, gain and loss, money earned and money owed, right and left, water running into a tank and water running out. Such quantities are called (1) *signed numbers*, (2) *directed numbers*, or (3) *+ and − numbers*. These signs in this relation are not to be interpreted as indicating *addition* or *subtraction* but as indications of *direction*, *character*, or *quality*.

The difference between positive and negative numbers in algebra may be illustrated by a line, the center of which is marked zero. If units of length marked off to the right of zero are called positive, then units marked off to the left are negative. −3 will indicate 3 units to the left of zero and + 5 will indicate 5 units measured to the right of zero.

In arithmetic, the integration of 5 − 3, for example, is called subtraction. In algebra, such an integration may be regarded as addition, due regard being had to the quality or direction of each number. Thus 5 − 3 may be considered (+ 5) +(− 3). It may be interpreted to mean measuring 5 units to the right of zero and then 3 units in the negative direction from the point previously reached. The final result is 2 units to the right of zero, or + 2.

Problem. A man gains $200 and loses $325. What is his net loss?

Solution.—In arithmetic, we obtain the net loss by subtracting $200 from $325. In algebra, the problem may be solved by finding the so-called *algebraic sum* of the numbers. If the gain is considered positive, the loss must be represented by a negative number. By his gain, the man's financial condition advances $200 in a positive direction from its original state, represented by zero. It then moves from this point $325 in the opposite, or negative, direction. Its final position is $125 on the negative side of zero, or —$125. Since a gain was considered positive, —$125 means a net loss of $125.

In *arithmetic*, numbers may be arranged in a series beginning at zero and extending indefinitely *toward the right*. Thus: 0, 1, 2, 3, 4, 5, 6, 7, 8, ...

In *algebra*, numbers may be arranged in a series beginning at zero and extending indefinitely *both to the right and to the left.* Thus: $-4, -3, -2, -1, 0, +1, +2, +3, +4, \ldots$

Such scales could also be made of both fractions and whole numbers.

Signs of Operation. The signs $+$, $-$, $\times$, and $\div$ have in algebra the same meanings that they have in arithmetic. The $+$ and $-$ signs are the main points of separation in a simple algebraic expression.

Multiplication is usually indicated by the absence of any sign between terms. When a sign is needed, the dot, $\cdot$, is often used in preference to the symbol $\times$, which may easily be mistaken for the letter x.

Since every fraction represents an indicated division, the symbol $\div$ is seldom used in algebra. The process of division is generally indicated by writing the dividend as the numerator of a fraction, with the divisor as the denominator. Thus $a \div b$ is written $\frac{a}{b}$ or a/b. The division process is implied also by the notation $a:b$, which is read "a is to b."

The order of the letters *m d a s* expresses the order in which the operations indicated in any algebraic expression should be performed, that is, (1) multiplication, (2) division, (3) addition, (4) subtraction. Thus, the expression $3 + 4 \times 5 - 8 \div 2 + 7 = 3 + 20 - 4 + 7 = 26$.

Signs of Aggregation. The *parenthesis*, ( ), is the most commonly used sign of aggregation. In addition to the parenthesis, the following also are used: the *bracket*, [ ]; the *brace*, { }; and the *vinculum*, —.

Any expression within a parenthesis or within similar signs or under a vinculum is to be treated as a single quantity. If this quantity is raised to a certain power, the exponents of each factor within the parenthesis are multiplied by the index of that power. A minus sign in front of a parenthesis reverses the sign of every term within when the parenthesis is removed. Thus:

$$(a^2b)^3 = a^6b^3.$$
$$(a^9b^6)^{\frac{1}{3}} = a^3b^2.$$
$$-(+b-c) = -b+c.$$

Other Signs. The sign of *equality*, $=$, is read "equals" or "is equal to."

The symbol $\neq$ means "not equal to";
$\pm$ means "plus or minus";
$\propto$ means "varies as";
$\therefore$ means "therefore."

$|a|$ means "absolute value of a" and refers to its numerical value regardless of sign. Thus:

$$|5| = 5, \quad |-5| = 5.$$

The symbol $n!$ or $\underline{n}$ (where n is a whole number) is read "n factorial" and means the product of the natural numbers from 1 to n inclusive. Thus:

$$1! = 1; \quad 3! = 1 \times 2 \times 3; \text{ etc.}$$

Commutative Law. The product or the sum of any set of numbers will not vary with any change in the order of the operations. Thus:

$$ab = ba; \quad a + b = b + a.$$

Associative Law. The product or the sum of several numbers or expressions is the same in whatever manner they are grouped. Thus:

$$(a + b) + c = a + (b + c); \quad (ab)c = a(bc).$$

Distributive Law. The product of a polynomial and a monomial is the algebraic sum of the products obtained by multiplying each term of the polynomial by the monomial. Thus:

$$a(b + c) = ab + ac.$$

These laws hold when a, b, and c are any of the quantities that occur in ordinary algebra. The laws may be checked by substituting concrete numerical values.

ADDITION

MONOMIALS

(1) The *algebraic sum* of two terms with like signs is the sum of their absolute values, with the common sign prefixed:

$+5a$	$-4c$
$+2a$	$-8c$
$+7a$	$-12c$

(2) The *algebraic sum* of two terms with unlike signs is the difference between their absolute values, with the sign of the greater in absolute value prefixed:

$+5x$	$+5w$
$-3x$	$-7w$
$+2x$	$-2w$

POLYNOMIALS

Arrange similar terms in the same column. Find the algebraic sum of each column and write the results in succession, with their proper signs.

Problem. Add $5x^2 + 4x + 3$, $4x^2 - 6x + 4$, $-3x^2 - 2x - 6$.

Solution.— *Check using* $x = 2$.

$5x^2 + 4x + 3$	$20 + 8 + 3 = 31$
$4x^2 - 6x + 4$	$16 - 12 + 4 = 8$
$-3x^2 - 2x - 6$	$-12 - 4 - 6 = -22$
$6x^2 - 4x + 1$	$24 - 8 + 1 = +17$

To check the accuracy of the work, substitute some convenient value for x in each algebraic expression added and in the algebraic sum. In the above problem, 2 has been so used. The sum of the numerical values of the added expressions should equal the numerical value of the algebraic sum.

SUBTRACTION

MONOMIALS

On account of the extension of the scale of numbers below zero, subtraction is always possible in algebra. Using the number series of positive and negative numbers previously referred to, we observe that the subtraction of a positive number is equivalent to counting backward along the number series. Conversely, the subtraction of a negative number is equivalent to counting forward along the number series.

This rule may be stated thus: When subtracting, change the sign of the subtrahend and add the result to the minuend. The change of sign should be made mentally:

$+5a$	$-4c$	$+5x$	$-3x$ minuend
$+2a$	$-8c$	$-3x$	$+7x$ subtrahend
$+3a$	$+4c$	$+8x$	$-10x$ difference

POLYNOMIALS

Arrange similar terms in the same column. Change the sign of each term of the subtrahend and add.

Problem. From $6x^3 - 3x^2 + 2x + 4$, subtract $3x^3 - 2x + 5$.

Solution.— *Check using* $x = 2$.

$6x^3-3x^2+2x+4$	$48-12+4+4=44$	minuend
$3x^3 \quad -2x+5$	$24 \quad -4+5=25$	subtrahend
$3x^3-3x^2+4x-1$	$24-12+8-1=19$	difference

MULTIPLICATION

MONOMIALS

Multiplication has been referred to in *Arithmetic* as a process of addition. The extension of this idea in algebra is consistent with the sense attached to multiplication when the multiplier is a positive, or $+$, quantity. When the multiplier is a negative, or $-$, quantity, the extension of the same idea indicates that the repetitions of the multiplicand are to be subtracted. Thus:

$+3 \times +8 = +24$; $+3 \times -8 = -24$;
$-3 \times +8 = -24$; $-3 \times -8 = +24$;

or, using letters,

$(+a) \times (+b) = +ab$; $(+a) \times (-b) = -ab$;
$(-a) \times (+b) = -ab$; $(-a) \times (-b) = +ab$.

Law of exponents. The exponent of a product is equal to the *sum* of the exponents in the multiplicand and the multiplier:

$$a \times a \times a = a^3; \quad a^2 \times a^3 = a^5.$$

Law of coefficients. The coefficient of a product is equal to the product of the coefficients of the multiplier and the multiplicand:

$$2x^2 \times 3x = 6x^3.$$

Law of signs. The sign of the product of two quantities is + when the quantities have *like signs*; the sign is − when the quantities have *unlike signs*:

$3a \times 2b = 6ab$; $(-3a) \times (-2b) = 6ab$;
$-3a \times 2b = -6ab$.

The sign of the product of three or more quantities is − if each of an odd number of the quantities has a − sign, otherwise the product is positive:

$(3a) \times (2b) \times (4c) \times (d) = 24\,abcd$;
$(-3a) \times (b) \times (4c) \times (2d) = -24\,abcd$;
$(-a) \times (-5b) \times (-3c) \times (d) = -15\,abcd$;
$(3a) \times (-2b) \times (4c) \times (-d) = 24\,abcd$.

POLYNOMIALS

Two cases are to be considered: (1) when the multiplier is a monomial; (2) when the multiplier is a polynomial.

Multiplication by Monomials.

Multiply each term of the polynomial by the monomial and to each product prefix its proper sign.

Problem. Multiply $5a - 3b$ by $2a^2$.

Solution and Check. $(a = 2)$, $(b = 3)$.

$$\begin{array}{r} 5a - 3b \\ 2a^2 \\ \hline 10a^3 - 6a^2b \end{array} \qquad \begin{array}{r} 10 - 9 = 1 \\ 8 = 8 \\ \hline 80 - 72 = 8 \end{array}$$

Multiplication by Polynomials.

Multiply every term of the multiplicand by each term of the multiplier and add the products.

Problem. Multiply $5a - 6b$ by $3a - 4b$.

Solution and Check. $(a = 3)$, $(b = 2)$.

$$\begin{array}{r} 5a - 6b \\ 3a - 4b \\ \hline 15a^2 - 18ab \\ \quad - 20ab + 24b^2 \\ \hline 15a^2 - 38ab + 24b^2 \end{array} \qquad \begin{array}{r} 15 - 12 = 3 \\ 9 - 8 = 1 \\ \hline 135 - 108 \\ \quad - 120 + 96 \\ \hline 135 - 228 + 96 = 3 \end{array}$$

The terms $-18ab$ and $-20ab$ are called *cross products* because they are obtained by multiplying diagonally opposite terms.

DIVISION

Division is the reverse of multiplication; that is, the product of the divisor and the quotient is equal to the dividend.

Law of exponents. If two powers of the same quantity are divided, one by the other, the exponent of the quotient is obtained by *subtracting* the exponent of the divisor from the exponent of the dividend:

$$\frac{36x^3y^4z^3}{-3x^2yz^3} = -12xy^3.$$

Law of coefficients. The coefficient of the quotient is obtained by dividing the coefficient of the dividend by the coefficient of the divisor:

$$\frac{36x^2}{3x} = 12x.$$

Law of signs. The sign of the quotient is + when the divisor and the dividend have like signs; when they have unlike signs, the sign of the quotient is −.

POLYNOMIALS

In general, the algebraic process of division is similar to the process of division in arithmetic.

Division by Monomials.

Divide each term of the dividend by the divisor and to each partial quotient prefix its proper sign.

Problem. Divide $4x^3 - 6x^2$ by $2x$.

Solution. $\dfrac{4x^3 - 6x^2}{2x} = 2x^2 - 3x.$

Division by Polynomials.

Arrange the terms of the dividend and the divisor in ascending or descending order, according to the powers of some letter common to both.

Divide the first term of the dividend by the first term of the divisor. Write the result for the first term of the quotient.

Multiply all the terms of the divisor by the first term of the quotient.

Subtract the product from the dividend. If there is a remainder, affix to it the term next in order "brought down" from the dividend. Having thus obtained a new dividend, proceed as before until there is no remainder or until the first term of the divisor is not contained in the first term of the new dividend.

If there is a remainder after the last step in the process, write it over the divisor in the form of a fraction, which should be added to the quotient previously obtained.

Problem. Divide $9a^3 - 18a^2 + 26a - 24$ by $3a^2 - 2a + 6$.

Solution and Check. $(a = 2)$.

$$\begin{array}{r|l} \text{dividend } 9a^3 - 18a^2 + 26a - 24 & 3a^2 - 2a + 6 \text{ divisor} \\ \cline{2-2} 9a^3 - 6a^2 + 18a & 3a - 4 \text{ quotient} \\ \cline{1-1} \quad -12a^2 + 8a - 24 & \\ \quad -12a^2 + 8a - 24 & \\ \cline{1-1} \end{array}$$

$$\begin{array}{lrl} \text{dividend} & 72 - 72 + 52 - 24 & = 28. \\ \text{divisor} & 12 - 4 + 6 & = 14. \\ \text{quotient} & 6 - 4 & = 2. \\ & 28 \div 14 & = 2. \end{array}$$

SPECIAL CASES IN MULTIPLICATION

(1) The Square of the Sum of two Terms.

The multiplication

$$\begin{array}{r} a + b \\ a + b \\ \hline a^2 + ab \\ \quad + ab + b^2 \\ \hline a^2 + 2ab + b^2 \end{array}$$

gives the formula $\mathbf{(a + b)^2 = a^2 + 2ab + b^2}$.

This may be expressed by the following rule: *The square of the sum of two terms is the sum of the squares of the terms plus twice their product.*

$$(20 + 5)^2 = 400 + 25 + \overline{2 \times 5 \times 20} = 625.$$

(2) The Square of the Difference of two Terms.

By a process of multiplication similar to that in (1), we derive the formula $\mathbf{(a - b)^2 = a^2 - 2ab + b^2}$.

This may be expressed as follows: *The square of the difference of two terms is the sum of their squares minus twice their product.*

$$(20 - 5)^2 = 400 + 25 - \overline{2 \times 5 \times 20} = 225.$$

(3) The Product of the Sum and the Difference of two Terms.

The multiplication

$$\begin{array}{r} a + b \\ a - b \\ \hline a^2 + ab \\ \quad - ab - b^2 \\ \hline a^2 \qquad - b^2 \end{array}$$

gives the formula $\mathbf{(a + b)(a - b) = a^2 - b^2}$.

This may be expressed by the following rule: *The product of the sum and the difference of two terms is equal to the difference of their squares taken in the same order.*

$$(20 + 5)\ (20 - 5) = 400 - 25 = 375.$$

(4) The Product of two Binomials having a Common Term.

By a process of multiplication similar to that in (1) and (3) we derive the formula

$$(\mathbf{x + a})\ (\mathbf{x + b}) = \mathbf{x^2 + (a + b)\ x + ab.}$$

This may be expressed by the following rule: *The product of two binomials having a common term equals the square of the common term, plus the algebraic sum of the unlike terms multiplied by the common term, plus the product of the unlike terms.*

(5) The Product of two Binomials Whose Corresponding Terms are Similar.

By a process of multiplication similar to that in (1) and (3) we derive the formula

$$(\mathbf{ax - d})\ (\mathbf{bx + c}) = \mathbf{abx^2 + x\ (ac - bd) - cd.}$$

This result may be expressed as follows: *In the product of two binomials whose corresponding terms are similar, the first term is the product of the first terms of the binomials; the last term is the product of the second terms of the binomials; the middle term is the sum of the cross products of the terms of the binomials.*

SPECIAL CASES IN DIVISION

From the preceding special products we may derive corresponding special quotients by observing that if either factor is used as a divisor of the product the other factor will be the quotient. Several cases not previously included are here given.

$\mathbf{a^n - b^n}$ is always exactly divisible by $a - b$ when n is any positive integer:

$$(a^2 - b^2) \div (a - b) = a + b;$$
$$(a^3 - b^3) \div (a - b) = a^2 + ab + b^2.$$

$\mathbf{a^n - b^n}$ is exactly divisible by $a + b$ only when n is even:

$$(a^2 - b^2) \div (a + b) = a - b.$$

$\mathbf{a^n + b^n}$ is never exactly divisible by $a - b$.

$\mathbf{a^n + b^n}$ is exactly divisible by $a + b$ only when n is odd:

$$(a^3 + b^3) \div (a + b) = a^2 - ab + b^2.$$

FACTORING

Factoring is the process of finding two or more expressions whose product is equal to a given expression.

A **prime factor** is an expression that has no factor except itself and 1.

Square roots. Every expression has two square roots which differ only in sign. Thus the square root of 4 is + 2 or − 2 because (+2) (+2) = 4 and (−2) (−2) = 4. It is unfortunate that in the elementary study of algebra this is expressed as $\sqrt{4} = \pm 2$, because in work with equations it is frequently necessary to distinguish between the positive and negative roots as expressed with a radical sign. Consequently under conventions adopted in later work in algebra it is the custom to place a + or − sign in front of a radical in agreement with the sign that is associated with the root. With this convention $\sqrt{4} = 2$ and $-\sqrt{4} = -2$.

(1) To Factor a Polynomial Whose Terms Have a Common Monomial Factor.

The type form is $\mathbf{ab + ac - ad = a\ (b + c - d).}$

Divide the expression by the common factor.

Problem. Factor $3xy - 6x^2y^2 + 9y^3$.

Solution.—

$$3y \mid \frac{3xy - 6x^2y^2 + 9y^3}{x - 2x^2y + 3y^2}$$

The factors are $3y$ and $x - 2x^2y + 3y^2$.

(2) To Factor the Difference Between two Squares.

The type form is $\mathbf{a^2 - b^2 = (a + b)\ (a - b).}$

Find the square root of each term. The sum of these roots is one factor; the difference of the roots taken in the same order as in the original expression is the other factor.

Problem. Factor $x^2 - 9y^2$.

Solution.—

$$x^2 - 9y^2 = (x + 3y)\ (x - 3y).$$

The factors are $x + 3y$ and $x - 3y$.

(3) To Factor a Trinomial that is a Perfect Square.

Test.—Arrange the trinomial according to the descending powers of one letter. The trinomial is a perfect square if the absolute value of the middle term is twice the product of the absolute values of the square roots of the other terms. Thus:

$$a^2 + 14a + 49 = a^2 + 2 \times 7a + 7^2 = (a + 7)^2.$$

Here $14a$ is twice the product of $\sqrt{a^2}$ and $\sqrt{49}$.

The type form is $\mathbf{a^2 + 2ab + b^2 = (a + b)^2.}$

Find the square roots of the first and last terms and connect these by the sign of the middle term; take the result twice as a factor.

Problem. Factor $25m^2 - 30m + 9$.

Solution.—

$$25m^2 - 30m + 9 = (5m)^2 - 2 \times 5 \times 3m + (3)^2 = (5m - 3)\ (5m - 3).$$

The factors are $5m - 3$ and $5m - 3$.

(4) To Factor a Quadratic Trinomial.

The type form is $\mathbf{x^2 + bx + c.}$

Find two numbers whose algebraic product is c, the absolute term, and whose algebraic sum is b, the coefficient of x. The first factor is x + one of these numbers; the second factor is x + the other number.

Problem. Factor $x^2 - 7x + 12$.

Solution.—It is necessary to find two numbers whose product is +12, and whose sum is −7.

The numbers whose product is 12 are 2 and 6, 1 and 12, 3 and 4. Of these, the two whose sum is 7 are 3 and 4. The sign of each number is minus. Thus:

$$x^2 - 7x + 12 = (x - 4)\ (x - 3).$$

The factors are $x - 4$ and $x - 3$.

HIGHEST COMMON FACTOR

The **highest common factor** (H. C. F.) of two or more algebraic expressions is the factor of *highest degree and greatest numerical coefficient* that is common to these expressions. It is equal to the product of all the common factors of the expressions. Its value is determined by the following method:

Write each expression as the product of its prime factors. Find the product of the common factors, using each factor the least number of times it occurs in any one expression. This product is the H. C. F. of the expressions.

Problem. Find the H. C. F. of $2x^4 - 12x^3 + 18x^2$ and $4x^5 - 36x^3$.

Solution.—Factoring, we have

$2x^4 - 12x^3 + 18x^2 = 2 \cdot x \cdot x\ (x-3)\ (x-3)$
and $4x^5 - 36x^3 = 2 \cdot 2 \cdot x \cdot x \cdot x\ (x-3)\ (x+3)$.

H. C. F. is $2 \cdot x \cdot x\ (x - 3)$, or $2x^3 - 6x^2$.

LOWEST COMMON MULTIPLE

The **lowest common multiple** (L. C. M.) of two or more algebraic expressions is the expression of *lowest degree and smallest numerical coefficient* that is exactly divisible by each of the given expressions. To find the L. C. M., observe the following method:

Write each expression as the product of its prime factors. Find the product of all the different prime factors, using each factor the greatest number of times it occurs in any one expression.

Problem. Find the L. C. M. of $x^2 + 5x + 6$, $x^2 + 4x + 3$, $x^2 + x$.

Solution.—Factoring, we have

$$\begin{aligned} x^2 + 5x + 6 &= (x + 3)\ (x + 2). \\ x^2 + 4x + 3 &= (x + 3)\qquad (x + 1). \\ x^2 + x \quad &= \qquad\quad (x + 1)\ (x). \\ \text{L. C. M.} &= (x + 3)\ (x + 2)\ (x + 1)\ (x). \end{aligned}$$

FRACTIONS

An **algebraic fraction** is an indicated division of two algebraic expressions in which the dividend is the *numerator* and the divisor is the *denominator*. The type form is written $\frac{a}{b}$, in which a and b may each represent any algebraic expression. This form is read "a divided by b" or "a over b."

The **terms** of a fraction are the numerator and the denominator.

A fraction with a zero numerator becomes zero. If the denominator only is zero, the fraction does not represent any finite quantity. If both numerator and denominator are zero, the fraction may be regarded as equal to any number.

An **integral expression** is an expression which does not contain a fraction: $2x^2 + 3y$.

A **mixed expression** is an expression, part of which is fractional and part integral:

$$2x + y + \frac{3}{x + 1}.$$

An **improper fraction** in algebra is a fraction in which the numerator contains a power equal to or higher than the highest power of the same letter in the denominator; as,

$$\frac{6x^2 + 6}{2x^2}; \quad \frac{6x^3 + 4x^2 - 8}{x - 2}.$$

The **sign of a fraction** is the sign placed before the dividing line. This sign is distinct from the sign of either the denominator or the numerator. By the laws of signs of multiplication and division, we have

$$+\frac{+a}{+b} = +\frac{-a}{-b} = -\frac{-a}{+b} = -\frac{+a}{-b}; \quad \frac{x}{-ay} = -\frac{x}{ay};$$

$$\frac{m + n}{m - n} = \frac{-(m + n)}{-(m - n)} = \frac{-m - n}{-m + n}.$$

TRANSFORMATION OF FRACTIONS

Transformation of a fraction is the process of changing its form without changing its value.

Multiplying or dividing both terms of a fraction by the same number does not change the value of the fraction.

A fraction is in its **lowest terms** when the numerator and denominator have no common factor.

(1) To Express a Fraction in its Lowest Terms.

Express the numerator and the denominator in terms of their prime factors and cancel all factors common to both.

Problem. Express $\frac{9x^2+6x+1}{9x^2 - 1}$ in its lowest terms.

Solution.—

$$\frac{9x^2 + 6x + 1}{9x^2 - 1} = \frac{(3x + 1)\ (3x + 1)}{(3x + 1)\ (3x - 1)} = \frac{3x + 1}{3x - 1}.$$

(2) To Express an Improper Fraction as an Integral or a Mixed Number.

Divide the numerator by the denominator; if there is a remainder, write it over the denominator in the form of a fraction, which, with the proper sign, should be annexed to the integral part of the quotient.

Problem. Change $\frac{16x^2 + 8x - 3}{4x + 5}$ to a mixed expression.

Solution.—

$$\frac{16x^2 + 8x - 3}{4x + 5} = 4x - 3 + \frac{12}{4x + 5}.$$

(3) To Change a Mixed Expression to a Fraction.

Multiply the integral expression by the denominator of the fraction, add this product to the numerator, and under the result write the denominator.

Problem. Express $a + y - \frac{a^2 + y^2}{a - y}$ as a fraction.

Solution.—

$$\frac{(a + y)\ (a - y) - (a^2 + y^2)}{a - y}$$

$$= \frac{a^2 - y^2 - a^2 - y^2}{a - y} = \frac{-2y^2}{a - y} = \frac{2y^2}{y - a}.$$

(4) To Express Fractions with their Lowest Common Denominator.

Find the L. C. M. of the denominators; this is the L. C. D. of the fractions.

Divide the L. C. D. by the denominator of the first fraction, and multiply both terms of the fraction by the resulting quotient. Treat each of the other fractions similarly.

Problem. Express $\frac{1}{3x - 6}$, $\frac{5}{2x + 4}$, $\frac{3x+1}{x^2 - 4}$, with their lowest common denominator.

Solution.—Find the L. C. D. as follows:

$$\begin{aligned} 3x \ - 6 &= 3\ \ (x - 2). \\ 2x \ + 4 &= 2\qquad (x + 2). \\ x^2 \ - 4 &= \qquad (x - 2)\ (x + 2). \\ \text{L. C. D.} &= 2 \cdot 3\ (x - 2)\ (x + 2), \text{ or } 6(x^2 - 4). \end{aligned}$$

$$\frac{1}{3x - 6} = \frac{2x + 4}{6(x^2 - 4)}; \quad \frac{5}{2x + 4} = \frac{15x - 30}{6(x^2 - 4)}$$

$$\frac{3x + 1}{x^2 - 4} = \frac{18x + 6}{6(x^2 - 4)}.$$

ADDITION AND SUBTRACTION OF FRACTIONS

Change the given fractions, if necessary, to fractions having the L. C. D. Place the algebraic sum of the numerators of the new fractions over the L. C. D. Express the result in its lowest terms.

Problem. Simplify $\frac{a - b}{a + b} - \frac{a + b}{a - b} + \frac{4a^2}{a^2 - b^2}$.

Solution.—Find the L. C. D. as follows:

$$\begin{aligned} (a + b) &= (a + b). \\ (a - b) &= \qquad (a - b). \\ a^2 - b^2 &= (a + b)\ (a - b). \\ \text{L.C.D.} &= (a + b)\ (a - b) \text{ or } a^2 - b^2. \end{aligned}$$

$$\frac{a-b}{a+b} - \frac{(a+b)}{a-b} + \frac{4a^2}{a^2-b^2} =$$

$$\frac{(a-b)(a-b) - (a+b)(a+b) + 4a^2}{(a+b)(a-b)}$$

$$= \frac{\cancel{(a^2 - 2ab + b^2)} - \cancel{(a^2 + 2ab + b^2)} + 4a^2}{(a+b)\ (a-b)} = \frac{-4ab + 4a^2}{(a+b)\ (a-b)}$$

$$= \frac{4a\ \cancel{(a-b)}}{(a+b)\cancel{(a-b)}} = \frac{4a}{a+b}$$

MULTIPLICATION OF FRACTIONS

Express the numerator and the denominator of each fraction as the product of their prime factors. Cancel all factors that are common to both the numerators and the denominators. Multiply the remaining factors of the numerators to obtain the new numerator, and of the denominators to obtain the new denominator.

Problem. Find the product of $\frac{y^2-9}{y^2+y} \cdot \frac{y^2-1}{y-3}$.

Solution.—Where possible, factor and cancel.

$$\frac{y^2-9}{y^2+y} \cdot \frac{y^2-1}{y-3} = \frac{(y+3)\ (y-3)}{y\ (y+1)} \cdot \frac{(y+1)\ (y-1)}{(y-3)} =$$

$$\frac{(y+3)\ (y-1)}{y} = \frac{y^2+2y-3}{y}.$$

DIVISION OF FRACTIONS

Change all integral or mixed expressions to fractional form. Invert the divisor and proceed as in the multiplication of fractions.

Problem. Divide $\frac{x^2-1}{4}$ by $\frac{x-1}{x+2}$.

Solution.—Invert the divisor. Where possible, factor and cancel.

$$\frac{x^2-1}{4} \div \frac{x-1}{x+2} = \frac{(x+1)\ (x-1)}{4} \times \frac{(x+2)}{(x-1)} =$$

$$\frac{(x+1)\ (x+2)}{4} = \frac{x^2+3x+2}{4}.$$

EQUATIONS

An **equation** is an expression of equality between two quantities which are separated by the sign of equality $=$; as

$$3x - 2 = 2x + 3.$$

SIMPLE EQUATIONS

A **simple equation** or **linear equation** is an equation which, when simplified (cleared of fractions if necessary), involves only a constant or the first power of one unknown quantity in any one term. Thus:

$x + y = 7$ is a simple equation;
$xy = 5$ and $x^2 - y^2 = 40$ are not simple equations.

The **first member,** or **left side,** of an equation is the part that precedes the equality sign.

The **second member,** or **right side,** of an equation is the part that follows the equality sign.

An **identical equation,** or an **identity,** is an equation which is true for all values of the letters involved. Thus:

$$3(x+2) = 3x + 6;$$
$$(a+b)^2 = a^2 + 2ab + b^2.$$

A **conditional equation** is an equation that is true for certain particular values of the letters involved. Thus: $3x - 6 = 4x - 12$ is satisfied by the value $x = 6$, and by no other value of x.

An equation is satisfied by any number which, when substituted for the literal part, reduces the equation to an identity. Thus: $3x - 6 = 4x - 12$ is satisfied by 6. $3 \times 6 - 6 = 4 \times 6 - 12$, or $12 = 12$.

A **root** of an equation is any number that satisfies the equation. Thus:

6 is a root of the equation $3x - 6 = 4x - 12$.

Substitution is the process of replacing one number or expression either by another of the same value or, if the first number is indefinite, by another of definite value.

An **axiom** is a statement of a self-evident truth. The axioms below are useful in solving equations.

Addition axiom. If equal quantities are added to equal quantities, the sums are equal.

Subtraction axiom. If equal quantities are subtracted from equal quantities, the remainders are equal.

Multiplication axiom. If equal quantities are multiplied by equal quantities, the products are equal.

Division axiom. If equal quantities are divided by equal quantities, the quotients are equal.

Comparison axiom. Quantities that are equal to the same quantity are equal to each other.

Transposition is the process of changing a term from one member of an equation to the other without destroying the equality.

Any term may be transposed from one side of an equation to the other, provided its sign is changed. This is really equivalent to the addition of the same number to, or the subtraction of the same number from, each side of the equation. Thus:

$3x - 6 = 12;$
$3x - 6 + 6 = 12 + 6.$
$\therefore\ 3x = 18,$ or $x = 6.$

$2x + 8 = 10;$
$2x + 8 - 8 = 10 - 8.$
$\therefore\ 2x = 2,$ or $x = 1.$

A **numerical equation** is an equation in which the known quantities are expressed in numbers:

$$3x - 6 = 0.$$

A **literal equation** is an equation in which some or all of the known quantities are expressed by letters:

$$ax - b = 0.$$

SOLUTION OF SIMPLE EQUATIONS

The equation should be cleared of parentheses, if any, by performing the operations indicated.

Transpose the unknown terms to the first member of the equation and the known terms to the second member of the equation.

Collect the terms.

Divide both members by the coefficient, if any, of the unknown quantity.

Check to show that the results satisfy the conditions stated in the equation.

Problem. Solve the equation

$$3(x+2) = 2(x-3) + 17.$$

Solution.—Clear the equation of parentheses.

$$3x + 6 = 2x - 6 + 17.$$

Transpose. $3x - 2x = -6 - 6 + 17.$
Collect terms. $x = 5.$

Check. $3(5+2) = 2(5-3) + 17.$
$3 \times 7 = 2 \times 2 + 17.$
$21 = 21.$

FRACTIONAL EQUATIONS

The process of changing an equation containing fractions to an equation without fractions is called *clearing of fractions.*

To Clear an Equation of Fractions.

Multiply both members of the equation by the L. C. M. of the denominators. Express the resulting fractions in their lowest terms, thereby eliminating their denominators. If a fraction is preceded by a minus sign, all the signs in the numerator must be changed when the denominator is removed.

Problem. Solve the fractional equation

$$\frac{3+2x}{3} = \frac{3}{2} - \frac{4x^2}{3\ (3-2x)}.$$

Solution.—Multiplying both members of the equation by the L. C. D., $6\ (3-2x)$ and thereby eliminating the denominators of all fractions, we have

$$2\ (9 - 4x^2) = 9\ (3 - 2x) - 8x^2.$$

Remove parentheses $18 - 8x^2 = 27 - 18x - 8x^2.$
Transpose $8x^2 - 8x^2 + 18x = 9.$
Cancel $8x^2$ and $-8x^2$ $18x = 9.$
$x = \frac{1}{2}.$

Check: $\frac{3 + 2\ (\frac{1}{2})}{3} = \frac{3}{2} - \frac{4 \cdot \frac{1}{4}}{3\ [3 - 2\ (\frac{1}{2})]}$

$\frac{4}{3} = \frac{4}{3}.$

QUADRATIC EQUATIONS

A **quadratic equation** is an equation that, when simplified, contains the unknown quantity in the second but no higher power: $ax^2 + bx + c = 0$.

A **constant term** in a quadratic equation is a term that does not contain the unknown quantity. In the equation $3x^2 - 27 = 0$, 27 is the constant term.

A **pure quadratic equation** is a quadratic equation that does not contain the first power of the unknown quantity. Such are, for example, $2x^2 = 8$ and $x^2 - ab = 0$.

Every pure quadratic has two roots, numerically equal but opposite in sign. In the first of the above examples, $x^2 = 4$ and, therefore, $x = \pm 2$; in the second example, $x^2 = ab$, so that $x = \pm \sqrt{ab}$.

Problem. Find the values of x in the equation $7x^2 - 36 = 3x^2$.

Solution.— $7x^2 - 36 = 3x^2$.
Transpose and combine. $4x^2 = 36$.
Divide by 4. $x^2 = 9$.
Extract the square root. $x = \pm 3$.

A **complete quadratic equation** is a quadratic equation that contains both the first and the second power of the unknown quantity: $y^2 + 3y = 10$.

Every quadratic equation may be reduced to the general form $ax^2 + bx + c = 0$, where a may have any known value other than 0, and b and c may have any known values whatsoever. Methods of solving quadratic equations are as follows:

(1) the factoring method;
(2) the method of completing the square;
(3) the Hindu method;
(4) the use of the quadratic formula.

(1) FACTORING METHOD

To solve equations by factoring, transpose all terms to the left member and combine any similar terms. The right member will then be zero.

Factor the left member.

Set each factor in turn equal to zero, and solve.

Problem. Solve $x^2 + 5 = 6x$.

Solution.—
Transpose. $x^2 - 6x + 5 = 0$.
Factor. $(x - 5)(x - 1) = 0$.

Since the product is zero, if either factor is, we place each factor equal to zero and solve.

Then $x - 5 = 0$, or $x = 5$
and $x - 1 = 0$, or $x = 1$.
Check. $5^2 + 5 = 6 \times 5$, and $1^2 + 5 = 6 \times 1$.

(2) COMPLETING THE SQUARE

If the coefficient of x^2 in the equation is not unity, then change the equation by dividing both members by the coefficient of x^2 and proceed as in the problem.

Problem. Solve the equation $3x^2 + 10x - 8 = 0$.

Solution.—

Divide by 3 and transpose $x^2 + \frac{10x}{3} = \frac{8}{3}$.

Take half the coefficient of x (that is, $\frac{5}{3}$), square it, and add the result $\frac{25}{9}$ to both members of the transposed equation.

$$x^2 + \frac{10}{3}x + \frac{25}{9} = \frac{8}{3} + \frac{25}{9}.$$

Take the square root of each side.

$$x + \frac{5}{3} = \pm \frac{7}{3}$$

$$x = -\frac{5}{3} + \frac{7}{3} = \frac{2}{3};$$

or $$x = -\frac{5}{3} - \frac{7}{3} = -4.$$

(3) THE HINDU METHOD

This convenient modification of the preceding method avoids fractions in completing the square.

Multiply both sides of the transposed equation by four times the coefficient of x^2, and add to each member the square of the original coefficient of x.

Problem. Solve the equation $3x^2 + 10x - 8 = 0$.

Solution.—
Transpose $3x^2 + 10x = 8$.
Multiply by 12 $36x^2 + 120x = 96$.
Add 10^2 $36x^2 + 120x + 100 = 196$.
Extract the square root of each member.

$6x + 10 = \pm 14$

$6x = -10 + 14$, $x = \frac{2}{3}$, or

$6x = -10 - 14$, $x = -4$.

(4) FORMULA METHOD

Any quadratic equation may be reduced to the standard form $ax^2 + bx + c = 0$, so that the solution of this equation furnishes a general means of solving any quadratic equation. By using the method of completing the square, we obtain

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

Problem. Solve the equation $3x^2 + 10x - 8 = 0$.

Solution.—Since this equation is in standard form we may use $a = 3$, $b = 10$, and $c = -8$ in the formula and obtain

$$x = \frac{-10 \pm \sqrt{100 - (-96)}}{2 \cdot 3} = \frac{-10 \pm 14}{6},$$

whence, $x = \frac{2}{3}$ or $x = -4$.

SYSTEMS OF LINEAR EQUATIONS

An equation in the form $ax + by + c = 0$, where a, b, and c are considered as constants, and x and y as unknowns, is called the **general equation of the first degree** in two unknowns x and y, or the **general linear equation** in these two unknowns. Every pair of values of x and y which satisfy a linear equation is called a solution of the equation, and each equation has an unlimited number of such solutions.

If we have two linear equations in two unknowns, such as

$$a_1x + b_1y + c_1 = 0,$$
$$a_2x + b_2y + c_2 = 0,$$

the equations are said to form a **system of linear equations.** The two equations may have no common solutions, or each solution of one may also be a solution of the other, but, in general, there will be one pair of values of the unknowns which will satisfy both equations, and this pair of values is known as the **solution** of the system of equations. If the system of equations has a solution, the equations are called **simultaneous.** Finding the common solution is known as solving the system of equations.

Elimination is the process of combining two or more equations so as to make one unknown quantity disappear. Several methods of elimination are here shown.

(1) Elimination by Addition or Subtraction.

Multiply each given equation by a number such that the coefficients of the same unknown quantity in both of the new equations will be numerically equal.

If the equal coefficients thus obtained have the same sign, subtract one equation from the other; if they have unlike signs, add.

Problem. Solve the system of equations:

$$\left.\begin{aligned} 3a + 2b &= 13. \\ 2a - 7b &= -8. \end{aligned}\right\} \begin{matrix} (1) \\ (2) \end{matrix}$$

Solution.—

Multiply (1) by 2. $6a + 4b = 26.$ (3)
Multiply (2) by 3. $6a - 21b = -24.$ (4)
Subtract (4) from (3). $25b = 50.$ (5)
$b = 2.$ (6)

Substitute in (1) the value of b as shown in (6), transpose, and solve. $3a = 13 - 2 \times 2 = 9.$
$a = 3.$

Check by substituting 2 for b and 3 for a in the given equations. $3 \times 3 + 2 \times 2 = 13.$
$2 \times 3 - 7 \times 2 = -8.$

(2) Elimination by Substitution.

Solve either equation for one unknown in terms of the other.

Substitute this value in an equation from which it was not obtained, and solve the resulting equation.

Substitute the value thus found in the other equation, and solve for the other unknown.

Problem. Solve the system of equations:

$$\left.\begin{matrix}5b + 2x = 36.\\ 2b + 3x = 43.\end{matrix}\right\} \begin{matrix}(1)\\(2)\end{matrix}$$

Solution.—From (1), we obtain $5b = 36 - 2x.$

$$b = \frac{36 - 2x}{5}. \quad (3)$$

Substitute in equation (2) the value of b as found in equation (3).

Thus $2\left(\frac{36 - 2x}{5}\right) + 3x = 43.$

$72 - 4x + 15x = 215.$
$11x = 143.$
$x = 13.$

Substitute for x in (3). $b = \frac{36 - 2 \times 13}{5} = 2.$

Check by substituting the values 2 for b and 13 for x in both equations. $5 \times 2 + 2 \times 13 = 36.$
$2 \times 2 + 3 \times 13 = 43.$

(3) Elimination by Comparison.

In each equation find the value of one unknown in terms of the other. Form an equation with these values, and solve it.

Problem. Solve the system of equations:

$$\left.\begin{matrix}3x + 2y = 5.\\ 2x + 5y = 7.\end{matrix}\right\} \begin{matrix}(1)\\(2)\end{matrix}$$

Solution.—

From (1), $3x = 5 - 2y;\ x = \frac{5 - 2y}{3}.$ (3)

From (2), $2x = 7 - 5y;\ x = \frac{7 - 5y}{2}.$ (4)

From (3) and (4), $\frac{5 - 2y}{3} = \frac{7 - 5y}{2}.$

Clear of fractions. $10 - 4y = 21 - 15y.$
Transpose. $-4y + 15y = 21 - 10.$
Collect terms. $11y = 11.$
$y = 1.$

Substitute 1 for y in (4). $x = \frac{7 - 5}{2} = 1.$

Check by substituting the values 1 for x and 1 for y in both equations. $3 \times 1 + 2 \times 1 = 5.$
$2 \times 1 + 5 \times 1 = 7.$

GRAPHS OF EQUATIONS

These may be most conveniently constructed on paper which is ruled in small squares. A horizontal line, called the X-axis, is drawn and is intersected at right angles by a vertical line, called the Y-axis. The sides of the small ruled squares provide units of measurement. If we designate by x any distance measured parallel to the X-axis from the Y-axis, and by y any distance parallel to the Y-axis from the X-axis, we may fix the position of any point by assigning specific values to x and y. A positive value of x locates the point to the right of the Y-axis, and a negative value locates it to the left of the Y-axis; similarly, positive values of y locate points above the X-axis and negative values locate them below. Thus the point located by $x = 4$, $y = -3$ is 4 units to the right of the Y-axis and 3 units below the X-axis.

An equation having two unknowns, x and y, may be represented by a graph by assigning arbitrary values to one unknown and, for each of these values, solving the equation for the corresponding value of the other unknown. Thus, pairs of values for x and y are found, and each pair will locate one point. All such equations of the *first degree* will give points lying in a straight line, and this line is called the **graph of the equation.** Equations of a *higher degree* represent curves, and each graph must be plotted by locating many points and joining them by an appropriate curve.

In $3x + 2y = 5$, we may obtain the following pairs of values: $x = -3,\ y = 7;\ x = 3,\ y = -2.$ Locate the two points corresponding to these two pairs of values. Since this equation is of the first degree, its graph will be a straight line, and it will pass through the two points located.

If the graph of $2x + 5y = 7$ is similarly plotted with reference to the same axes, a second straight line is found which intersects the first at the point corresponding to $x = 1,\ y = 1.$ This fact is a verification of the solution of these two simultaneous equations as obtained in the problem above under *Elimination by Comparison.*

BINOMIAL THEOREM

Where the exponent of a binomial of the form $(a + b)^n$ is a positive integral quantity, we can obtain by successive multiplications the following identities:

$(a + b)^2 = a^2 + 2ab + b^2;$
$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3;$
$(a + b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4.$

Any one of these expansions may be written to show the law of its formation. Thus:

$$(a + b)^4 = a^4 + 4a^3b + \frac{4 \cdot 3}{1 \cdot 2} a^2b^2 + \frac{4 \cdot 3 \cdot 2}{1 \cdot 2 \cdot 3} ab^3 + \frac{4 \cdot 3 \cdot 2 \cdot 1}{1 \cdot 2 \cdot 3 \cdot 4} b^4.$$

If n represents the exponent of $(a + b)$, then it may be observed that

(1) The number of terms in the expansion is $n + 1$.

(2) The first term is a^n, and the exponent of a decreases by 1 in each succeeding term.

The first power of b is found in the second term, and the exponent of b increases by 1 in each succeeding term.

(3) The sum of the exponents of a and b in any term is n.

(4) The coefficients of the terms, taken in order, are 1, n, $\frac{n(n-1)}{1 \cdot 2}$, $\frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3}$, etc.

The formula, therefore, for the expansion of any positive integral power of the binomial expression $a + b$ is as follows:

$$(a + b)^n = a^n + na^{n-1}b + \frac{n(n-1)}{1 \cdot 2} a^{n-2}b^2 + \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3} a^{n-3}b^3 + \cdots + b^n.$$

If b is negative, the signs of the even-numbered terms are negative.

If n is a negative number or a fraction, we may also form such a series, but it will contain an infinite number of terms.

Problem. Expand $(a + b)^5$.

Solution.—

$$(a + b)^5 = a^5 + 5a^4b + \frac{5.4}{1.2}a^3b^2 +$$

$$\frac{5 \cdot 4 \cdot 3}{1 \cdot 2 \cdot 3}a^2b^3 + \frac{5 \cdot 4 \cdot 3 \cdot 2}{1 \cdot 2 \cdot 3 \cdot 4}ab^4 + \frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5}b^5.$$

By cancellation, $(a + b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$.

PROGRESSIONS

A **series** is a succession of numbers formed according to some fixed law.

The **terms** of a series are its successive numbers.

The terms of the binomial expansions above form a series as do those of the progressions, two of which, arithmetical and geometrical, are treated in this section.

ARITHMETICAL PROGRESSIONS

An **arithmetical progression** (A. P.) is a series, each term of which, after the first, is derived from the preceding term by the addition of a constant number called the **common difference:**

2, 5, 8, 11, 14;
19, 14, 9, 4, − 1, −6;
$x, x + y, x + 2y, x + 3y$.

The **common difference** is the number which is added to each term to produce the next one. In the arithmetical progressions given above the common difference is 3 for the first one, − 5 for the second, and y for the third. The first is an ascending progression, the second descending.

The Formula for the nth Term l of an A. P., When the First Term a and the Common Difference d Are Given, is

$$\text{(I)}\quad l = a + (n - 1)\,d.$$

Problem. Find the 10th term of the series 3, 7, 11, 15, etc.

Solution.—Use $a = 3$, $d = 4$, $n = 10$ in (I):

$$l = 3 + (10 - 1)\,4;$$
$$l = 39.$$

The Formula for the Sum s of the Terms in an A. P. is

$$\text{(II)}\quad s = \frac{n}{2}(a + l), \text{ or } n\left(\frac{a + l}{2}\right).$$

Problem. What is the sum of the series 2, 4, 6, 8, etc. containing 12 terms?

Solution.—Since the last term is not given we substitute $a = 2$, $n = 12$, $d = 2$ in formula (I) to find l and then use formula (II) to find s.

$$l = 2 + (12 - 1)\,2 = 24.$$

$$s = \frac{n}{2}(a + l).$$

$$s = \frac{12}{2}(2 + 24) = 156.$$

Formulas (I) and (II), used in solving problems relating to arithmetical progressions involve five quantities. If any three of the five quantities are given the other two may be found by use of (I) and (II).

Problem. The first term of an A. P. is 12, the last term is 144, and the sum of the terms is 1014. Find the series.

Solution.—$s = 1014$, $a = 12$, $l = 144$.

Substituting in formulas (I) and (II),

$$144 = 12 + (n - 1)d, \quad (1)$$

$$1014 = \frac{n}{2}(12 + 144). \quad (2)$$

From (2), $78n = 1014$, or $n = 13$.

Substituting in (1), $144 = 12 + 12d$.

Hence, $d = 11$.

The series is 12, 23, 34, 45, 56, 67, 78, 89, 100, 111, 122, 133, 144.

Problem. Find n if $s = 204$, $d = 6$, $l = 49$.

Solution.—

Substituting in formulas (I) and (II),

$$49 = a + (n - 1)\,6, \quad (1)$$

$$204 = \frac{n}{2}(a + 49). \quad (2)$$

From (1), $a = 49 - (n - 1)\,6 = 49 - 6n + 6 = 55 - 6n$.

Substituting in (2) this value of a,

$$204 = \frac{n}{2}(55 - 6n + 49),$$

$$408 = 55n - 6n^2 + 49n.$$

Collecting and transposing, $6n^2 - 104n = -408$,

$$3n^2 - 52n = -204.$$

Solving by any of the methods found under quadratic equations, we have $n = 6$ or $11\frac{1}{3}$.

But n cannot be fractional, hence $n = 6$.

GEOMETRICAL PROGRESSIONS

A **geometrical progression** (G. P.) is a series, each term of which, after the first, is derived from the preceding term by multiplying it by a constant number, called the *common ratio*: 3, 6, 12, 24, etc.

The **common ratio** is the constant multiplier, and may be integral or fractional, positive or negative.

Geometrical means are all the terms of a geometrical progression intermediate between the first term and the last term.

The Formula for the nth Term l of a G. P., When the First Term a and the Common Ratio r Are Given, is

$$\text{(I)}\quad l = ar^{n-1}.$$

Problem. Find the 6th term of the series 2, 6, 18, etc.

Solution.—Use $a = 2$, $r = 3$, $n = 6$ in formula (I) to find the last term:

$$l = 2 \times 3^5 = 2 \times 243 = 486.$$

The Sum s of the Terms in a G. P. is Expressed by the Formula,

$$\text{(II)}\quad s = \frac{ar^n - a}{r - 1}.$$

Problem. Find the sum of 8 terms of the series 2, 4, 8, etc.

Solution.—Use $a = 2$, $r = 2$, $n = 8$ in formula (II) and find s.

$$s = \frac{2 \times 2^8 - 2}{2 - 1} = \frac{2 \times 256 - 2}{1} = 510.$$

If r is less than unity, it is convenient to write formula (II) of a G. P. in the following form:

$$\text{(III)}\quad s = \frac{a - ar^n}{1 - r}.$$

Formulas (I), (II), and (III), used in solving problems relating to geometrical progressions, involve five quantities. If any three of the five quantities are given the other two may be found by use of (I) and either (II) or (III).

Problem. Insert 5 geometric means between 9 and 576.

Solution.—The total number of terms is 5 + 2.

Hence, $n = 7$, $a = 9$, $l = 576$.

Substituting in (I), $576 = 9r^6$.

$$r^6 = 64.$$

$$r = \pm 2.$$

Hence, the series is 9, 18, 36, 72, 144, 288, 576
or 9, −18, 36, −72, 144, −288, 576,
and the required means are ±18, 36, ±72, 144, ±288.

PERMUTATIONS AND COMBINATIONS

If we have a set of different things, each different arrangement, or selection, in a definite order which can be made from the given number of things is called a **permutation** of the set.

If the order of arrangement is disregarded then each different selection which can be made from a set of things, by taking any part or all of them at a time, is called a **combination.**

The difference between permutations and combinations may be illustrated by arranging the first three letters of the alphabet in different orders. Thus, *abc*, *acb*, *bca*, *bac*, *cab*, and *cba* all form different permutations, but each represents the same combination.

Formulas. The number of permutations of n different things taken r at a time,

$${}_nP_r = n\,(n-1)\,(n-2)\cdots(n-r+1).$$

The number of permutations of n different things taken all at a time is $n!$. The number of permutations of n different things taken r at a time when repetition is allowed is n^r.

The number of combinations of n different things taken r at a time,

$${}_nC_r = \frac{n\,(n-1)\,(n-2)\cdots(n-r+1)}{r!}.$$

Problem. Four people enter a room in which there are seven vacant chairs. In how many different ways can they be seated?

Solution.—In this problem, $n = 7$, $r = 4$, and $n - r + 1 = 7 - 4 + 1 = 4$.

Substituting these values in the formula for permutations given above, we get ${}_7P_4 = 7 \cdot 6 \cdot 5 \cdot 4 = 840$.

Problem. How many committees of nine men each can be selected from twelve men?

Solution.—This is a problem in combinations where $n = 12$, $r = 9$, and $n - r + 1 = 12 - 9 + 1 = 4$.

Substituting these values in the given formula,

$${}_{12}C_9 = \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8 \cdot 9} = \frac{\overset{4}{\cancel{12}} \cdot 11 \cdot \overset{5}{\cancel{10}}}{1 \cdot 2 \cdot 3} =$$

220 possible committees.

SQUARE ROOT

APPROXIMATE METHOD

In the use of the approximate method of finding a root, a value which is near the correct value is first obtained by trial or inspection. Then by division and averaging of quotient and divisor and by a continuation of the process, the number is broken into two nearly equal factors. This method is sometimes called the *inspection method.*

Problem. Approximate the square root of 85.

Solution.—$9^2 = 81$, and $10^2 = 100$. Hence the square root of 85 lies between 9 and 10 and much nearer 9 than 10. Assume 9.3 as an approximate root and proceed as follows: $85 \div 9.3 = 9.14$; the average of 9.14 and 9.30 is half their sum, or 9.22; $85 \div 9.22 = 9.219$, which is a root correct to the third decimal place.

ALGEBRAIC METHOD

A study of the following method of building up a square will guide the reader to an understanding of the method of finding a square root.

The square of 28 may be found as follows:

$$(28)^2 = (20 + 8)^2.$$

$$\begin{array}{r} 20 + 8 \\ 20 + 8 \\ \hline 20^2 + (20 \times 8) \\ \quad (20 \times 8) + 8^2 \\ \hline 20^2 + 2\,(20 \times 8) + 8^2 = 784; \end{array}$$

or, using letters where t = tens and u = units, we have

$$\begin{array}{r} t + u \\ t + u \\ \hline t^2 + tu \\ \quad tu + u^2 \\ \hline t^2 + 2tu + u^2. \end{array}$$

By squaring several numbers composed of tens and units, we find that in every case the square of the number is equal to the square of the tens plus twice the product of the tens and units plus the square of the units. Or, using the letters, the statement becomes, the square of any number equals $t^2 + 2tu + u^2$. By a reversal of the process, the square root of any number may be found by means of dividing it into parts which correspond to $t^2 + 2tu + u^2$. The number whose digits are t and u will then be the root.

TO EXTRACT SQUARE ROOT

The steps in finding the square root of any number are:

1. Separate the number into groups of two digits each, beginning with units or at the decimal point.
2. Find the greatest perfect square in the left-hand period and write its square root as the first figure of the required root. Subtract the square of this number from the left-hand period. Annex to the remainder the next group so as to form a dividend.
3. Double the root already found and write it as a partial divisor at the left of the new dividend. Annex one zero, making a trial divisor, and divide the new dividend by the trial divisor.
4. Write the quotient in the root as a trial term and also substitute this quotient for the zero in the partial divisor, making the latter complete.
5. Multiply the complete divisor by the figure just obtained and, if possible, subtract the product from the last remainder. If this product is too large, the trial term of the quotient must be replaced by the next smaller number and the operations performed as before.
6. Proceed in this manner until all the periods are used. If there is still a remainder, decimal zeros may be employed to carry the extraction to any desired length.

Problem. Find the square root of 655.36.

Solution.—

		6, 55.36 | 25.6
greatest perfect square		4
first partial divisor	40	2 55
first complete divisor	45	2 25
second partial divisor	500	30 36
second complete divisor	506	30 36

Check. $25.6 \times 25.6 = 655.36$.

LOGARITHMIC METHOD

A square root, cube root, or any other root of a numerical quantity, can be found quite readily by use of logarithms. The method of computing a root of a number by use of logarithms and logarithmic tables will be presented in the section on logarithms.

CUBE ROOT

The cube root of any number may be extracted by a method suggested by the form of the cube of the binomial $t + u$, where t represents *tens* in the Arabic notation and u represents units. The form is given in the following identity:

$$(t + u)^3 = t^3 + 3t^2u + 3tu^2 + u^3.$$

If a number can be divided into parts corresponding to the terms of the right-hand member of the above identity, the root will be a number whose digits are the numbers corresponding to t and u. The method described below is a practical means of arriving at this result.

TO EXTRACT CUBE ROOT

The steps in finding the cube root of any number are:

1. Separate the number into groups of three digits each, beginning with units or at the decimal point.
2. Find the greatest perfect cube in the left-hand period and write its cube root as the first figure of the required root. Subtract the cube of this number from the left-hand period. Annex to the remainder the next group so as to form a dividend.
3. To three times the square of the figure in the root annex two zeros and write the result as a partial divisor at the left of the dividend.
4. Estimate the number of times the partial divisor is contained in the dividend and place the estimated quotient in the root as a trial term.
5. To three times the product of the first and second terms of the root annex one zero and place the result beneath the partial divisor. In the next line below, write the square of the second term of the root. The sum of these two numbers and the partial divisor will be the complete trial divisor.
6. Multiply the complete trial divisor by the second term of the root and, if possible, subtract the product from the dividend. If this product is too large, the trial term of the root must be replaced by the next smaller number and the operations performed as before.
7. Proceed in this manner until all the periods are used. If there is still a remainder, decimal zeros may be employed to carry the extraction to any desired length.

Problem. Find the cube root of 12,167.

Solution.—

		12,167 | 23
		8
partial divisor	1200	4 167
	180	4 167
	9	
complete divisor	1389	

The cube root of 12,167 is 23.

Check. $23 \times 23 \times 23 = 12{,}167$.

RADICALS

A **radical,** or **radical expression,** is an indicated root of a quantity, in which the radical sign is used to signify that a certain root is to be found.

The **radicand** is the quantity whose root is required.

$\sqrt{3a}$, $\sqrt[3]{x^5}$, $\sqrt[6]{a^2+2}$, and $\sqrt[4]{a+b}$ are radicals whose radicands are $3a$, x^5, a^2+2, and $a+b$.

The **order** of a radical is shown by the index of the root.

$\sqrt{x+y}$ and $\sqrt[5]{m-n}$ are radicals of the second and fifth orders, respectively.

A radical is **rational** if the root can be extracted exactly: $\sqrt{4}$; $\sqrt[3]{64}$; $\sqrt{(x+y)^2}$.

A radical is **irrational** if the root cannot be extracted exactly: $\sqrt{2}$; $\sqrt[3]{5}$.

A **surd** is a word sometimes used to denote an irrational radical.

A **mixed surd** is the product of a rational factor and a surd factor:

$$2\sqrt{3};\ (a-b)\sqrt{x}.$$

An **entire surd** is a surd whose coefficient is unity:

$$\sqrt{3};\ \sqrt[3]{x-y}.$$

Similar surds are surds which contain the same irrational factors:

$$\sqrt{3};\ 2-a\sqrt{3};\ 5\sqrt{3}.$$

To Express a Radical in its Simplest Form.

Separate the quantity under the radical sign into factors if possible, one of which is the greatest perfect power of the same degree as the radical.

Extract the required root of the factor, and multiply the coefficient of the radical by the result.

Problem. Simplify $5\sqrt{18a^3b^2}$.

Solution.—

$$5\sqrt{18a^3b^2} = 5\sqrt{9a^2b^2\cdot 2a} = 15ab\sqrt{2a}.$$

To Express any Quantity in the Form of a Radical.

Raise the quantity to the power corresponding to the index of the given root, and place the result under the appropriate radical sign.

Problem. Express $3ay^2$ in the form of a cube root.

Solution.—

$$3ay^2 = \sqrt[3]{(3ay^2)^3} = \sqrt[3]{27\,a^3y^6}.$$

To Express Radicals as Equivalent Radicals of the Same Order

Express the given radicals with fractional exponents. Make such changes in exponents as may be needed so that the exponents will have a common denominator and each one will be equivalent to its original form. Raise each quantity to the power indicated by the numerator of its exponent, and indicate the root which is expressed by the common denominator.

Problem. Express $\sqrt{x^2y^3}$ and $\sqrt[3]{xy^2}$ as radicals of the same order.

Solution.—

$$\sqrt{x^2y^3} = (x^2y^3)^{\frac{1}{2}} = (x^2y^3)^{\frac{3}{6}} = \sqrt[6]{x^6y^3}.$$
$$\sqrt[3]{xy^2} = (xy^2)^{\frac{1}{3}} = (xy^2)^{\frac{2}{6}} = \sqrt[6]{x^2y^4}.$$

ADDITION AND SUBTRACTION OF RADICALS

Only similar radicals can be united into one term by addition or subtraction.

Problem. Simplify $\sqrt{45a^3} + 5\sqrt{20a^3} - \sqrt{80a^3}$.

Solution.—

$$\sqrt{45a^3} = \sqrt{9a^2\cdot 5a} = 3a\sqrt{5a}.$$
$$5\sqrt{20a^3} = 5\sqrt{4a^2\cdot 5a} = 10a\sqrt{5a}.$$
$$-\sqrt{80a^3} = -\sqrt{16a^2\cdot 5a} = -4a\sqrt{5a}.$$
$$3a\sqrt{5a} + 10a\sqrt{5a} - 4a\sqrt{5a} = 9a\sqrt{5a}.$$

MULTIPLICATION OF RADICALS

Surds of the same order are multiplied by multiplying the product of the coefficients by the product of the irrational factors.

$$a\sqrt[n]{y}\cdot b\sqrt[n]{x} = ab\sqrt[n]{xy}.$$

Dissimilar surds are reduced to surds of the same order and then multiplied.

Problem. Multiply $5\sqrt[3]{25y^2}$ by $3\sqrt[3]{50y^2}$.

Solution.—

$$5\sqrt[3]{25y^2}\cdot 3\sqrt[3]{50y^2} = 15\sqrt[3]{5^2\cdot 5^2\cdot 2\cdot y^4} = 75y\sqrt[3]{10y}.$$

Problem. Multiply $3\sqrt{2}$ by $\sqrt[3]{3}$.

Solution.—

$$3\sqrt{2}\cdot\sqrt[3]{3} = 3\sqrt[6]{2^3}\cdot\sqrt[6]{3^2} = 3\sqrt[6]{72}.$$

Problem. Multiply $5\sqrt{7} - 2\sqrt{5}$ by $4\sqrt{7} + 8\sqrt{5}$.

Solution.—

$$\begin{array}{r} 5\sqrt{7} - 2\sqrt{5} \\ 4\sqrt{7} + 8\sqrt{5} \\ \hline 140 - 8\sqrt{35} \\ \quad + 40\sqrt{35} - 80 \\ \hline 140 + 32\sqrt{35} - 80 = 60 + 32\sqrt{35}. \end{array}$$

DIVISION OF RADICALS

Monomial surds of the same order may be divided by multiplying the quotient of the coefficients by the quotient of the surd factors. Thus:

$$a\sqrt{b} \div m\sqrt{x} = \frac{a}{m}\sqrt{\frac{b}{x}}.$$

This method is applicable also to monomial surds of different orders, since the latter may always be reduced to the same order and then treated as here shown.

Problem. $12\sqrt{60} \div 15\sqrt{3}$.

Solution.—

$$12\sqrt{60} \div 15\sqrt{3} = \frac{4}{5}\sqrt{20} = \frac{4}{5}\sqrt{4 \cdot 5} = \frac{8}{5}\sqrt{5}.$$

Problem. $(\sqrt{50} + 3\sqrt{12}) \div \sqrt{2}$.

Solution.—

$$(\sqrt{50} + 3\sqrt{12}) \div \sqrt{2} = \sqrt{25} + 3\sqrt{6} = 5 + 3\sqrt{6}.$$

Problem. Divide $\sqrt{6}$ by $\sqrt[3]{2}$.

Solution.—

$$\sqrt{6} \div \sqrt[3]{2} = \sqrt[6]{6^3} \div \sqrt[6]{2^2} = \sqrt[6]{216 \div 4} = \sqrt[6]{54}.$$

RATIONALIZATION OF THE DIVISOR

Rationalization of the divisor is the process of multiplying both dividend and divisor by such a quantity that the divisor will be free of surds.

Problem. Rationalize the divisor of $\frac{3}{\sqrt{2}}$.

Solution.—

$$\frac{3}{\sqrt{2}} = \frac{3 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \frac{3\sqrt{2}}{2} = \frac{3}{2}\sqrt{2}.$$

Explanation: Since the divisor is to be freed of surds, $\sqrt{2}$ must be multiplied by a factor which will render the radical a perfect square. Any quantity multiplied by itself gives a perfect square; hence, in this case, the multiplier is $\sqrt{2}$. To avoid changing the value of the fraction, the numerator also must be multiplied by $\sqrt{2}$.

When the divisor is a binomial involving a surd or surds of no higher order than the second, the multiplier required is made up of the terms of the divisor connected by the opposite sign.

Problem.

Rationalize the denominator of $\frac{x + \sqrt{z}}{x - \sqrt{z}}$.

Solution.—

$$\frac{x+\sqrt{z}}{x-\sqrt{z}} = \frac{x+\sqrt{z}}{x-\sqrt{z}} \times \frac{x+\sqrt{z}}{x+\sqrt{z}} = \frac{x^2 + 2x\sqrt{z} + z}{x^2 - z}.$$

LOGARITHMS

Computations of commerce, industry, and science, which involve numerical quantities in any or all of the operations of multiplication, division, raising to powers, or extracting roots, are greatly facilitated by use of logarithms and a table of logarithms. Since the accuracy of a result will depend upon the number of decimal places to which the entries in the logarithmic table are calculated, applications must be limited to those where the accuracy obtainable by use of a table are acceptable. Thus, in engineering, where a large factor of safety is customary, a four-place table is quite satisfactory, while the solution of problems that arise in the mathematics of finance or investment, where billions of dollars are involved and results must be accurate to cents, would require a table with entries carried to fourteen or fifteen places.

Modern civilization is indebted to John Napier, baron of Merchiston, who invented logarithms in 1614, and to Henry Briggs who later suggested that the number 10 be used as the base of logarithms.

DEFINITIONS AND EXPLANATIONS

Under the definition of the power of a number the exponent is considered to be a positive integer. Thus, with the expression,

$a^x = a \cdot a \cdot a \cdots$ (x factors, each equal to a), a is considered to be a positive number other than unity, and x to be a positive integer. Through applications of the laws of exponents, and through advanced courses in mathematics, it develops that, if a is any positive real number other than unity, and x is any real number (zero, or a positive or negative real number, rational or irrational), then a^x represents a real number. In computations involving logarithms, it is customary to use 10 in place of a. Corresponding to any positive real number there is a real value of x for which 10^x will give the number; x may be zero, or any positive or negative integer, or zero or a positive or negative integer plus a decimal fraction.

The **logarithm** of a number is the exponent of the power to which another number, known as the **base,** must be raised to give the first number. Thus, if $a^x = y$, then x is the logarithm of y with a as a base. It is customary to write this relationship as $x = \log_a y$. If the base is 10, so that $10^x = y$, then it is common practice to omit the base in writing the logarithm of y. Thus $x = \log y$ would ordinarily mean that the base of logarithms here is 10.

When using logarithms to make computations it is necessary to know the logarithms of the numbers which are involved. To provide these logarithms, the logarithms of numbers have been calculated and are given in tables. A table of logarithms usually features one of the two bases that are frequently used. In a table of natural logarithms the base is an irrational quantity whose value to 5 decimal places is 2.71828, while in a table of common logarithms the base is 10. As the name of the latter table would imply, 10 is the base commonly used with numerical computations. In all of the work which follows we shall be interested only in common logarithms; a four-place table of common logarithms accompanies this section. If interpolation is used this four-place table may be used with logarithmic computations which involve numbers whose significant digits do not exceed four. It is customary to say that such a table is a table of common logarithms of numbers from 1 to 10,000.

The logarithm of a number is expressed in two parts, the **mantissa** or decimal portion, and the **characteristic** or integral portion. The mantissa is the only part of a common logarithm that is found in a table, it is positive, and is always independent of the position of the decimal point in the number whose logarithm is required. Thus the mantissa of 32.7 and 0.0327 is the same.

The characteristic of a common logarithm of a number is the integer which expresses the power of 10 next below the number. It may be a positive or negative integer, or zero, and is generally not found in a table of logarithms but must be determined from the powers of 10 between which the number lies. The method of its determination will be clear from a consideration of the table below.

Since	$10{,}000$	$= 10^4$,	then log	$10{,}000$	$= 4$.
Since	$1{,}000$	$= 10^3$,	then log	$1{,}000$	$= 3$.
Since	100	$= 10^2$,	then log	100	$= 2$.
Since	10	$= 10^1$,	then log	10	$= 1$.
Since	1	$= 10^0$,	then log	1	$= 0$.
Since	0.1	$= 10^{-1}$,	then log	0.1	$= -1$.
Since	0.01	$= 10^{-2}$,	then log	0.01	$= -2$.
Since	0.001	$= 10^{-3}$,	then log	0.001	$= -3$.

There are no logarithms of negative numbers.

The logarithm of a number less than one is negative, and is expressed with a negative integer for characteristic, and a positive decimal fraction for mantissa. A negative characteristic may be written with a minus sign placed above it, as $\bar{3}.6281$. However, because of the danger of overlooking the fact that part of this number is positive and part negative, the common practice is to add and subtract 10 to the logarithm. Thus adding and subtracting 10 to the logarithm $\bar{3}.6281$ gives $7.6281 - 10$ as the form in which this logarithm would ordinarily be used.

From the above table and discussion we may derive the rules below for determining the characteristic of a logarithm.

If the number is *greater* than 1, the characteristic is 1 *less* than the number of digits in the integral part of the number. Thus the characteristic of log 1736.1 is one less than the number of figures at the left of the decimal point, that is $4 - 1$, or 3. If the number is *less* than 1 the characteristic is *negative* and is numerically one *more* than the number of zeros between the decimal point and the first significant figure of the given number; this characteristic may be equivalently shown by placing *before* the mantissa the difference between 9 and the number of zeros between the decimal point and the first significant figure of the number and placing a -10 *after* the mantissa. The characteristic of .0027 will be negative and 1 more than the number of zeros between the decimal point and the first significant figure, that is $2 + 1$, or 3; this may be equivalently expressed by subtracting the number of zeros, 2, from nine, placing the result, 7, before the mantissa, and -10 after it.

TO FIND THE LOGARITHM OF A NUMBER

Suppose that we desire to find the logarithm of 3270. Turn to the accompanying table of logarithms, which is in two parts. The column headed N at the extreme left of the first part contains all integers from 10 to 54, while the second column headed N contains the integers from 55 to 99. Follow the first of these columns down to 32, which is composed of the first two digits of the given number when starting at the extreme left digit. Follow the horizontal row of numbers from 32 to the right until the eye reaches the vertical column headed by 7, the third digit of the given number. The number which stands in this column and is directly opposite 32 is 5145 and this is the mantissa of any number whose significant figures are 327. Since 3270 has 4 digits to the left of the decimal point (or lies between 10^3 and 10^4) the characteristic is $4 - 1$ or 3. Hence, we have log 3270 = 3.5145.

We may use the same mantissa and write other logarithms of numbers with the same significant figures. Thus, log 3.270 = 0.5145, log 0.000327 = $\bar{4}.5145 = 6.5145 - 10$.

Next suppose that we wish to find the logarithm of 327.6. Since this number has 4 significant digits and those of the table have only 3, it will be necessary to interpolate in order to find its logarithm. This is done by proportion, because, for a small change in a number, the change in the logarithm is proportional to the change in the number. The number 327.6 lies between 327 and 328 and divides the difference between them in the ratio of 6 to 4. Therefore, the mantissa of 327.6 must also divide the difference in the mantissas for 327 and 328 in the ratio of 6 to 4. From the table we see that the mantissa for 327 and 328 are 5145 and 5159, respectively; the difference between these mantissas is 14 and six-tenths of 14 or 8 + must be added to the mantissa for 327 in order to obtain the mantissa for 327.6. Hence the mantissa for 327.6 is 5145 + 8 or 5153. By the rule for the characteristic of a number we see that the characteristic of 327.6 is 2 and we may write log 327.6 = 2.5153.

We may use the same mantissa and write other logarithms of numbers which contain the same digits. Thus log 32760 = 4.5153, and log 0.3276 = $\bar{1}.5153 = 9.5153 - 10$.

An **antilogarithm** is the number that corresponds to a given logarithm.

TO FIND AN ANTILOGARITHM

Suppose that we wish to find the antilogarithm of 1.6493. This may be done by use of the table of logarithms, but the process is the reverse of that used for obtaining a logarithm. The characteristic has reference only to the position of the decimal point in the required number, and so we disregard the characteristic and look for the mantissa, 6493, in the body of the table of logarithms. As may be observed, the table entries increase continuously from zero to 9996 and hence any mantissa, or the nearest numbers to it, can be readily found. Thus, 6493, in the horizontal row to the right of 44, and in the vertical column headed by 6, is identified as the mantissa of any number whose significant figures are 446.

To locate the decimal point we note that numbers whose logarithms have a characteristic of 1 lie between 10 (10^1) and 100 (10^2) and write 44.6 as the number whose logarithm is 1.6493, that is antilog 1.6493 = 44.6.

If we have a logarithm, such as 2.7448, whose mantissa is not one of the entries in the table, then we have to use interpolation to find the antilogarithm. The nearest mantissas to 7448 that are given in the table are 7443 and 7451, which lie in the horizontal row to the right of 55 and in the vertical columns headed by 5 and 6, respectively, and hence are mantissas of numbers whose significant figures are 555 and 556. The given mantissa, 7448, lies between 7443 and 7451, dividing the difference, 8, in the ratio of 5 to 3. Therefore, the required number lies between 555 and 556 and divides the difference, 1, in the same ratio 5 to 3. Now $1 \times \frac{5}{8} = 0.6 +$ and the required number will have the significant figures 5556. Since the characteristic is 2, the number whose logarithm is 2.7448 will be between 100 and 1000, and we may now write antilog 2.7448 = 555.6.

The rules below are helpful in placing the decimal point in a number whose logarithm is known.

If the characteristic of the logarithm is a *positive number*, or *zero*, the integral part of the antilogarithm must have 1 *more* digit than the number of units in the characteristic.

If the characteristic is *negative* and is represented as a *negative integer*, then place, between the decimal point and the first significant figure, zeros 1 *less* in number than the units in the characteristic. If, however, the negative characteristic is expressed by adding and subtracting 10, then the number of zeros to be inserted between the decimal point and the first significant figure is found by subtracting from 9 the positive, integral part of the characteristic.

A careful examination of the illustrations below should enable an observer to see how these rules are applied.

antilog 2.7448 = 555.6.
antilog $\underline{0}.7448$ = 5.556.
antilog $\bar{1}.7448$ = antilog $(9.7448 - 10) = 0.5556$.
antilog $\bar{3}.7448$ = antilog $(7.7448 - 10) = 0.005556$.

FORMULAS AND APPLICATIONS

Formulas for use in applying logarithms may be obtained from the definition of a logarithm and the laws of exponents. Two of these laws have been stated under the subjects of multiplication and division of this section, but these, and two others, will be given below in the form of the exponential equations which have been numbered I, II, III, and IV.

LAWS OF EXPONENTS

I $a^m \times a^n = a^{m+n}$.

To multiply exponential quantities with the same base, *add* exponents.

II $a^m \div a^n = a^{m-n}$.

To divide one exponential quantity by another, *subtract* exponents.

III $(a^m)^p = a^{mp}$.

To find the power of an exponential quantity, *multiply* the power by the exponent.

IV $\sqrt[p]{a^m} = a^{\frac{m}{p}}$.

To extract a root of an exponential quantity, *divide* the exponent by the index of the root.

FORMULAS FOR LOGARITHMS

For use in developing the formulas below we shall let $10^m = M$, and $10^n = N$, so that

$m = \log M$, and $n = \log N$.

To Multiply Numbers.

From I, $M \times N = 10^m \times 10^n = 10^{m+n}$, hence

$\log M \times N = m+n = \log M + \log N$.

This process may be extended to any number of factors. Therefore, to find the product of two or more numbers by use of logarithms, we add the logarithms of all of the factors and find the antilogarithm of the result.

Problem. Multiply 254 by 781.

Solution.—

log 254	= 2.4048.
log 781	= 2.8927.
log of product	= 5.2975.
Product	= 198,400.

Problem. Find the product of 561.75, 4.356, and 0.0328.

Solution.—

log 561.75	= 2.7495.
log 4.356	= 0.6391.
log 0.0328 = $\bar{2}$.5159	= 8.5159−10.
log of product	= 11.9045−10
	= 1.9045.
Product = antilog 1.9045	= 80.26.

To Divide One Quantity by Another.

From II, $\frac{M}{N} = \frac{10^m}{10^n} = 10^{m-n}$, hence

$$\log \frac{M}{N} = m-n = \log M - \log N.$$

To find the value of a fraction (or quotient) by use of logarithms, subtract the logarithm of the denominator (divisor) from the logarithm of the numerator (dividend) and find the antilogarithm of the result.

Note: In a fraction (or quotient) the numerator and denominator (dividend and divisor), either one or both, may be one factor or two or more factors.

Problem. Divide 46.72 by 0.0998.

Solution.—

log 46.72	= 1.6695 = 11.6695−10.
log 0.0998	= $\bar{1}$.9991 = 8.9991−10.
log of quotient	= 2.6704 = 2.6704.
Quotient	= 468.2.

Problem. Divide 637.4 by the product of 867.2 and 0.0347.

Solution.—

$$\log \frac{637.4}{867.2 \times 0.0347} = \log 637.4 - \log (867.2 \times 0.0347)$$
$$= \log 637.4 - (\log 867.2 + \log 0.0347)$$
$$= \log 637.4 - \log 867.2 - \log 0.0347.$$

log 867.2	= 2.9381
log 0.0347	= 8.5403−10
log of denominator	= 11.4784−10 = 1.4784.
log 637.4	= 2.8044.
log (867.2 × 0.0347)	= 1.4784.
log of quotient	= 1.3260.
Quotient	= 21.18.

To Raise a Number to any Power.

From III, $M^p = (10^m)^p = 10^{pm}$, hence

$\log M^p = pm = p \log M$.

To compute the power of a number by use of logarithms, multiply the power by the logarithm of the number and find the antilogarithm of the result.

Note: The quantity M to be raised to a power may be composed of one or more factors, and may represent a quotient or a product.

Problem. Find the value of $\left(\frac{7.23^2 \times 581}{2300}\right)^3$.

Solution.—

$$\log \left(\frac{7.23^2 \times 581}{2300}\right)^3 = 3 \log \frac{7.23^2 \times 581}{2300}$$
$$= 3\,[\log (7.23^2 \times 581) - \log 2300]$$
$$= 3\,[2 \log 7.23 + \log 581 - \log 2300].$$

log 7.23	= 0.8591.
2 log 7.23 = 2 × 0.8591	= 1.7182.
log 581	= 2.7642.
log ($7.23^2 \times 581$)	= 4.4824.
log 2300	= 3.3617.
log of fraction	= 1.1207
log of power of fraction	= 3.3621.

Hence, $\left(\frac{7.23^2 \times 581}{2300}\right)^3$ = antilog 3.3621

= 2302.

To Find any Root of a Number.

From IV, $\sqrt[p]{M} = \sqrt[p]{10^m} = 10^{\frac{m}{p}}$, hence

$$\log \sqrt[p]{M} = \frac{m}{p} = \frac{\log M}{p}.$$

To extract a root of a number by use of logarithms, divide the logarithm of the number by the index of the desired root and find the antilogarithm of the result.

Problem. Find the square root of 348.

Solution.—

log 348	= 2.5416.
$\log \sqrt{348}$	= ½ log 348 = ½ (2.5416)
	= 1.2708.
$\sqrt{348}$	= antilog 1.2708
	= 18.66.

Problem. Find the value of $\sqrt[5]{\frac{7425}{386}}$.

Solution.—

$$\log \sqrt[5]{\frac{7425}{386}} = \frac{1}{5} \log \frac{7425}{386}$$
$$= \frac{1}{5} (\log 7425 - \log 386).$$

log 7425	= 3.8707.
log 386	= 2.5866.
log of quotient	= 1.2841.

log of fifth root of fraction = $\frac{1.2841}{5}$ = 0.2568.

$\sqrt[5]{\frac{7425}{386}}$ = antilog 0.2568

= 1.806.

TABLE OF COMMON LOGARITHMS

N	0	1	2	3	4	5	6	7	8	9
10	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755
12	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732
15	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014
16	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279
17	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529
18	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765
19	2788	2810	2833	2856	2878	2900	2923	2945	2967	2989
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900
31	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786
38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522
45	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316
54	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686
74	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952
99	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996

N	0	1	2	3	4	5	6	7	8	9

GEOMETRY

Geometry had its beginning in practical problems associated with land surveying and the construction of pyramids, temples, and other structures. The ancient Egyptians, who had a high civilization in the fertile valley of the Nile, were subjected to annual floods which changed the locations of many boundaries. Through the necessity for frequently relocating boundaries, they used triangles and other geometrical figures for locating points and lines along the changing banks of the Nile. Thus they developed a simple practice of land surveying.

Their temples and pyramids give additional evidence of the skill of the Egyptians in employing geometrical facts. The Babylonians also knew something of land measures, and their monuments show many geometrical designs. The Greeks learned of the methods of measurement and calculation which the Egyptians used for their practical purposes, and they made much progress in developing the methods. To the Greeks we are indebted for the name geometry, or "earth measure." Whereas the Egyptians had been interested in geometry primarily for its practical uses, the Greeks loved to solve problems, whether they were practical or not. The chief practical use of geometric facts by the Greeks was with the design of beautiful objects and structures, many of which feature the use of dynamical symmetry.

Euclid, a Greek who taught geometry in Egypt about 300 B. C., organized all of the geometrical knowledge of his time, and presented it in a logical arrangement in his *Elements*. The logical plan of Euclid is founded on a relatively small number of fundamental postulates, axioms, and definitions, derived through sense perception and intuition. Euclid's *Elements* was probably more widely used as a textbook than any other book ever published, and even the modern textbooks in geometry are still greatly influenced by it.

We study geometry for its development of logical principles, for the exact truths which it contains, and for its many practical relations to life. The help that a study of geometry gives in developing clear and logical habits of thinking is generally recognized, and has established a study of geometry as one of the most valuable aids in forming such habits of thinking in the minds of young students. The practical applications of geometrical figures and properties which are used in developments make a knowledge of geometry essential to engineers, astronomers, physicists, and others who design and build machinery, bridges, and other structures, who navigate or pilot ships or airplanes, who study the behavior of heavenly bodies, or who are concerned with any of a multitude of other important applications of geometry in modern science.

TERMS AND DEFINITIONS

A **theorem** is a statement to be proved.

A **corollary** is a truth that follows from another with little or no proof.

A **demonstration** is a course of reasoning used in proving a theorem or solving a problem.

A **construction** is the representation of a required figure by means of points and lines.

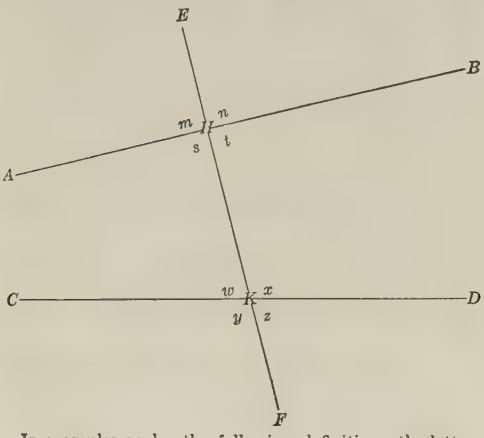
A **point** has neither length, breadth, nor thickness. It has position only and is designated by a capital letter. Thus, the point *K*.

A **line** has one dimension only—length. The finest wire or lead pencil mark, therefore, is not a geometrical line, as both have width and thickness. A line is usually indicated by two capital letters. Thus, the line *AB*.

A **segment** of a line is a part, or section, of a line: *KH* is a segment of the line *FE*.

A **straight line** that does not change its direction throughout its entire length, and is considered as extending without limit in either direction.

POINTS, LINES, AND ANGLES



In examples under the following definitions, the letters refer to corresponding letters in the above figure.

A **broken line** is a line made up wholly of line segments that differ in direction.

A **curved line,** or **curve,** is a line no part of which is straight.

An **angle** is the figure formed by portions of two straight lines which meet at a point. The abbreviation or symbol for the word angle is $\angle$.

An angle may also be defined as the amount of revolution about a point of the portion of a line extending in one direction from the point.

The **sides** of an angle are the portions of the lines which form the angle.

Among the units used for measuring angles are: the revolution, the right angle, the degree, and the radian. A **degree** is equal to 1/360 of one complete revolution of a portion of a line about a point; this is otherwise expressed as 360 degrees = 360° = 1 revolution. A **right angle** is equal to one fourth of a complete revolution, or to 90 degrees. The $\angle AHE$ is a right angle. A **radian** is an angle at the center of a circle that subtends an arc whose length is equal to the radius; in terms of degrees 1 radian = $180/\pi$ degrees. An angle is indicated by three capital letters, reading from one side to the other with the vertex letter in the middle. Where there is no doubt as to which angle is meant, the vertex letter alone may be used. Thus, $\angle FKD = \angle z$. The symbol $\angle K$ cannot be used here to name any single angle, as there are four angles around the point *K*.

A **straight angle** is an angle whose sides lie in the same straight line in opposite directions from a point. A straight angle is equal to two right angles, or to half of a complete revolution, or to 180°. The $\angle AHB$ is a straight angle.

An **acute angle** is an angle that is less than a right angle. The $\angle CKE$ is an acute angle.

An **obtuse angle** is an angle that is greater than a right angle but less than a straight angle. The $\angle CKF$ is an obtuse angle.

Complementary angles are two angles whose sum is a right angle.

Supplementary angles are two angles whose sum is a straight angle or 180°. Thus, $\angle FKD$ and $\angle DKE$ are supplementary.

Adjacent angles have a common side and a common vertex. Thus, $\angle CKE$ and $\angle EKD$ are adjacent angles.

Opposite angles, or **vertical angles,** are the non-adjacent angles formed by two intersecting straight lines. Thus, $\angle AHE$ and $\angle BHF$ are vertical angles.

A **transversal** is a line that intersects two or more lines. The line *EF* is a transversal.

The following terms are used to designate angle pairs, as illustrated in the figure:

Corresponding angles, $\angle n$ and $\angle x$;

Alternate-interior angles, $\angle w$ and $\angle t$;

Alternate-exterior angles, $\angle m$ and $\angle z$.

A **perpendicular** is a straight line that forms a right angle with another line. The point of intersection is the *foot* of the perpendicular. A perpendicular is the shortest distance from a given external point to a given line. Thus, *EH* is the shortest distance from the point *E* to the line *AB*.

A **bisector** of an angle is a straight line that divides the angle into two equal angles.

Parallel lines are lines that are equally distant from each other throughout their entire lengths.

A **triangle** is a plane figure formed by three straight lines which intersect by twos in three points. These points of intersection are the **vertices** of the triangle, and the line segments connecting the vertices in pairs are the **sides.** The sum of the interior angles of a triangle is equal to two right angles, or 180°. The symbol $\triangle$ is sometimes used for the word triangle.

A **polygon** is a closed broken line all of whose line segments lie in the same plane. A *triangle* is a polygon of three sides, a *quadrilateral* has four sides, a *pentagon* has five sides, a *hexagon* has six sides, etc.

A **regular polygon** is a polygon which has all its sides equal and all its angles equal.

A **circle** is a closed curved line all of whose points lie in a plane and are equally distant from a point within called the **center.** The perimeter, or length, of a circle is called the **circumference.**

A **radius** of a circle is a straight line segment drawn from the center to the circle. All radii of the same circle are equal.

Any portion of the line forming a circle is called an **arc.**

A **sector** of a circle is the figure formed by two radii and their intercepted arc.

A **chord** of a circle is a straight line joining the extremities of an arc, or, in other words, joining any two points of a circle.

A **segment** of a circle is the figure formed by an arc of the circle and its chord.

A **secant** of a circle is a straight line of indefinite length that cuts the circle in two of its points.

A **tangent** to a circle is a straight line, lying in the plane of the circle, which touches the circle at only one point. A tangent to a circle is perpendicular to the radius drawn to the point of contact.

Congruent. Two figures are said to be congruent if all of their corresponding parts are equal, or, if they could be made to coincide throughout if one were superimposed on the other.

A polygon is said to be **circumscribed** about a circle when each of its sides is tangent to the circle. Under the same circumstances the circle is said to be **inscribed** in the polygon.

A polygon is said to be **inscribed** in a circle when each of its sides is a chord of the circle. Under the same circumstances, the circle is said to be **circumscribed** about the polygon.

An **axiom** is a general statement admitted to be true, without proof.

A **postulate** is a geometrical statement admitted to be true, without proof.

A **proposition** is a statement concerning geometrical relationships.

The following are some of the most important axioms and postulates:

Axioms. 1. Quantities equal to the same quantity or to equal quantities are equal to each other. Thus a quantity may be substituted for its equal at any time in any expression.

2. If equals are added to equals, the sums are equal.

3. If equals are subtracted from equals, the remainders are equal.

4. If equals are multiplied by equals, the products are equal.

5. If equals are divided by equals, the quotients are equal. The divisor must not be zero.

6. Like powers or like positive roots of equals are equal.

7. The whole is greater than any of its parts and is equal to the sum of all its parts.

8. If unequals are operated on by positive equals in the same way, the results are unequal in the same order. This axiom states for unequals ideas similar to those given for equals in axioms 2, 3, 4, 5.

9. If unequals are subtracted from equals, the remainders are unequal in the reverse order.

10. If the first of three quantities is greater than the second, and the second is greater than the third, then the first is greater than the third.

Postulates. 1. One straight line and only one can be drawn through both of two given distinct points.

2. Any figure may be moved from one place to another without changing its size or shape.

3. A straight line segment may be produced to any desired length.

4. From a given point one and only one perpendicular can be drawn to a given line.

5. The perpendicular from a point to a line is the shortest distance from the point to the line.

6. All right angles are equal.

7. In a plane one and only one circle may be drawn with a given point of the plane as center and a given radius.

METHODS OF PROOF

There are two general methods of proving theorems, the direct, or synthetic, and the indirect method. Either method may use algebraic or geometric facts in the proof. A theorem may be proved indirectly by analysis or by means of exclusion and reduction to an absurdity.

Direct Proof. A direct proof uses the method of superposition, or starts with some known fact and combines known truths with it, step by step, until the desired conclusion is reached. Illustration:

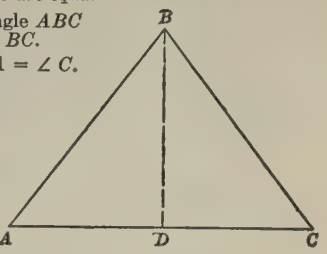
If two sides of a triangle are equal, then the angles opposite these sides are equal.

Given the triangle ABC with AB equal to BC.

To prove $\angle A = \angle C$.

Proof.—Draw BD so as to bisect the $\angle ABC$.

Then in the triangles ABD and DBC,



$AB = CB$, given
$BD = BD$, identical
and $\angle ABD = \angle DBC$. construction
(BD is the bisector of the $\angle ABC$.)

$\therefore$ $\triangle ABD$ is congruent to $\triangle DBC$.

(If two sides and the included angle of one triangle are equal respectively to two sides and the included angle of the other, the triangles are congruent.)

$\therefore$ $\angle A = \angle C$.

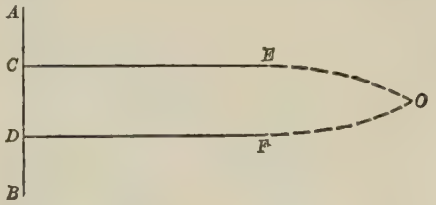
(Corresponding parts of congruent figures are equal.)

Indirect Methods of Proof. Three possibilities of relation may occur with two magnitudes. The first may be less than, equal to, or greater than, the second. If two of these relations are false, then of necessity the third is true. This is the method of exclusion, or elimination.

The method of analysis consists in investigating the immediate condition under which the conclusion would be true. This step suggests new conditions, and each new condition is examined until one known to be true is found. The proof is then derived analytically and rearranged by retracing the steps taken.

The method known as *reductio ad absurdum*, or "reduction to an absurdity," consists in assuming the falsity of the proposition and showing that this assumption leads logically to an absurdity. The following is an illustration of the last method.

Two lines in the same plane perpendicular to the same line are parallel.



Given the two straight lines CE and DF, both perpendicular to the line AB.

To prove that the lines CE and DF are parallel.

Proof.—If these lines are not parallel, then, being produced, they will meet on one side or the other of AB. Let them be produced and meet in O. Then there will be two perpendiculars, OC and OD, let fall from the same point on the same straight line, which is impossible.

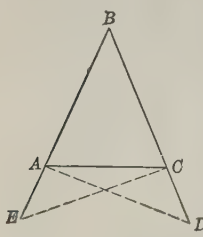
$\therefore$ CE and DF are parallel.

SOME FAMOUS THEOREMS

A number of geometrical theorems became famous, even in ancient times, because of some special difficulty, some neatness in demonstration, or some historical interest attaching to them. Two of these theorems are here given:

Pons Asinorum. *In an isosceles triangle, the angles opposite the equal sides are equal.*

This theorem is attributed to Thales, but the proof usually studied is due to Euclid. Roger Bacon, writing near the close of the 13th century, says that few students at Oxford cared to go beyond the first few theorems of Euclid and on this account the fifth proposition was called *elefuga*, or "flight of the wretched." This proposition is known also as the *pons asinorum*, or "bridge of fools." The average beginners doubtless found it difficult on account of the many lines and angles, to which they were not as yet accustomed.

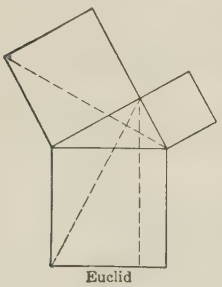


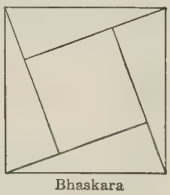
The theorem is proved as follows: The sides of the original triangle ABC are produced to D and E so that $BD = BE$. Triangle BCE is congruent to triangle BAD because two sides and the included angle of the first triangle are equal to two sides and the included angle of the second triangle, and, by use of the same theorem, we see that triangles ACE and ACD are congruent, since $AE = CD$ by construction, and $EC = AD$, corresponding sides, and $\angle BEC = \angle BDA$, corresponding angles, of the congruent triangles BCE and BAD. Hence $\angle ACE = \angle CAD$ and $\angle BAD = \angle BCE$, and by subtraction of equals from equals we find $\angle BAC = \angle BCA$.

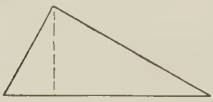
The Pythagorean Theorem. In many respects this theorem is the most famous, and perhaps the most useful, single truth of plane geometry. It is practically certain that the truth here stated was known to the Egyptians and Hindus long before the time of Pythagoras, who is credited with having formulated the first geometrical proof of the theorem.

In any right-angled triangle the square on the hypotenuse is equivalent to the sum of the squares on the other two sides.

Many ways of proving this theorem have been devised. Of the following figures, that attributed to Euclid was formerly the most frequently used, but the unmarked triangle is in more common use in modern textbooks.







The proof according to Euclid is based on the fact that triangles having the same base and the same altitude are equal and that, since these triangles are halves of rectangles having the same base and the same altitude, the rectangles also are equal. With these considerations, we are able to prove that, in the figure given, the left-hand rectangle of the large square is equal to the square above it. Similarly, we can prove that the area of the right-hand rectangle in the large square is equal to the area of the small square. Hence, the area of the large square is equal to the sum of the areas of the smaller squares.

The unmarked figure makes use of the theorem: *If in a right triangle a perpendicular is drawn from the vertex of the right angle to the hypotenuse, each leg of the triangle is the mean proportional between the hypotenuse and its adjacent segment.*

Thus, if, in the given figure, a = the shorter leg, b = the longer leg, and c = the hypotenuse of the triangle and if x = the shorter, and y = the longer, segment of the hypotenuse,

then $c : a = a : x$ (1)
and $c : b = b : y$ (2)
and $c = x + y$. (3)
Hence from (1), $cx = a^2$. (4)
From (2), $cy = b^2$. (5)
Adding (4) and (5), $c(x + y) = a^2 + b^2$. (6)
Substituting (3) in (6), $c^2 = a^2 + b^2$. (7)

The proof according to Bhaskara is based on the fact that a large square may be divided into four equal right triangles and a square whose side is equal to the difference between the legs of one of the right triangles.

If c = the side of the large square, a = the shorter leg of the triangles, and b = the longer leg, then c^2 = the area of the large square; $\frac{ab}{2}$ = the area of one of the right triangles; $(b-a)^2$ = the area of the small square.

Therefore, $c^2 = 4\left(\frac{ab}{2}\right) + (b - a)^2$,

from which $c^2 = a^2 + b^2$.

Problem. From the top of a building wall 60 feet high, a rope is stretched to the bottom of a fence 50 feet distant from the base of the wall. What is the length of the rope between the points of attachment?

Solution.—The rope forms the hypotenuse of a right triangle; the height of the wall and the distance from the base of the wall are the legs.

Let L = the length of the rope.
Then $L^2 = 60^2 + 50^2 = 3600 + 2500 = 6100$.
Therefore $L = \sqrt{6100}$, or 78.1, feet.

SIMILAR FIGURES

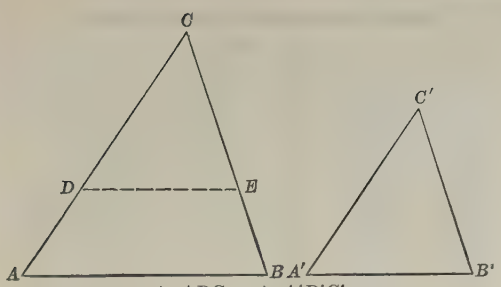
Similar figures are figures which are alike in shape or form, differing only in size. A map is similar in outline to the area which it represents. Photography is based on the idea of similarity. The plans of the carpenter, the architect, or the engineer are reproductions on a small scale of the outlines of the structure each intends to build. The relative size of any part of such a drawing may be determined by a comparison of measurements, since all parts are drawn to the same scale. This condition of similarity exists only when every possible pair of dimensions in one figure has a ratio equal to the ratio of corresponding dimensions in the other figure. Thus, all circles are similar; likewise all squares, all spheres, and all cubes. Rectangles are similar when they have the same ratio of width and length.

SIMILAR TRIANGLES

Since all plane figures that are composed of line segments may be divided into triangles, the laws of similarity may best be mastered by a study of the following summary of the geometrical theorems on similar triangles.

The fact that two figures are similar, and therefore that this equality of ratios of corresponding sides exists between them, is denoted in geometry by the symbol $\sim$. Thus, the notation $\triangle ABC \sim \triangle A'B'C'$ is read, "The triangle ABC is similar to the triangle A prime, B prime, C prime."

1. *Two triangles are similar if two angles of one are equal respectively to two angles of the other;* that is, in



$\triangle ABC \sim \triangle A'B'C'$.

the above figures, if $\angle A = \angle A'$ and $\angle B = \angle B'$, the triangles are similar.

2. *Two triangles are similar if the ratio of two sides of one is equal to the ratio of two sides of the other and the angles included between these sides are equal;* that is, if $\frac{AC}{CB} = \frac{A'C'}{C'B'}$ and $\angle C = \angle C'$, the triangles are similar.

3. *Two triangles are similar if the ratios of their corresponding sides are equal;* that is, if $\frac{AC}{A'C'} = \frac{CB}{C'B'} = \frac{AB}{A'B'}$, the triangles are similar.

Other theorems relating to similar plane figures or to similar solids are:

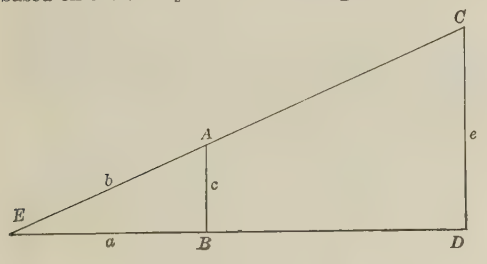
4. *The perimeters of two similar polygons have the same ratio as any corresponding parts of the polygons in the same dimension.*

5. *The areas of two similar polygons are to each other as the squares of any corresponding lines of the polygons.*

6. *The volumes of two similar solids are to each other as the cubes of any corresponding lines of the solids.*

DISTANCE MEASURING DEVICES

How far is it from a given point to a certain tree or other object? For calculating the answers to such questions as this, many interesting devices have been perfected, varying from the elaborate range finders of the coast defense artillery to the string and calibrated wooden stick of the boy scout. The method of operation of these instruments is based on the theory of similar triangles as follows:



The $\triangle EAB$ is similar to the $\triangle ECD$ because $\angle E$ is identical in both triangles and the $\angle ABE$ and $\angle CDE$, by construction, are both right angles, thus answering the condition: *Two triangles are similar if two angles of one are equal respectively to two angles of the other.* Therefore the following equality results: $\frac{AB}{CD} = \frac{EB}{ED}$. This fractional equation may be solved in four ways so as to find any one of the four lines in terms of the other three. Thus:

$$(1)\ AB = \frac{CD \times EB}{ED},\ (2)\ CD = \frac{AB \times ED}{EB},$$

$$(3)\ EB = \frac{AB \times ED}{CD},\ (4)\ ED = \frac{CD \times EB}{AB}.$$

HEIGHT BY SHADOWS

The sun's rays are considered to be parallel. Therefore the line connecting the top of any object with the corresponding point of its shadow is parallel to every other line similarly formed. Since parallel lines make equal angles with a horizontal plane, the shadows cast by vertical objects may be considered as corresponding parts of similar triangles and the ratios of their corresponding sides as equal.

Problem. A yardstick standing vertically casts a shadow 30 in. long. What is the height of a tree which at the same time casts a shadow 35 ft. long?

Solution (1). By the formula (2) above for similar triangles, $CD = \frac{AB \times ED}{EB}$, letting ED and EB represent the lengths of shadows. Substituting,

$$CD = \frac{3 \times 35}{2.5} = \frac{105}{2.5} = 42 \text{ ft.}$$

Solution (2).

$$\frac{\text{height of yardstick}}{\text{shadow of yardstick}} = \frac{\text{height of tree}}{\text{shadow of tree}}.$$

$$\frac{3 \text{ ft.}}{2.5 \text{ ft.}} = \frac{\text{height of tree}}{35 \text{ ft.}}.$$

Height of tree $\times$ 2.5 = 105 ft.

Height of tree = 42 ft.

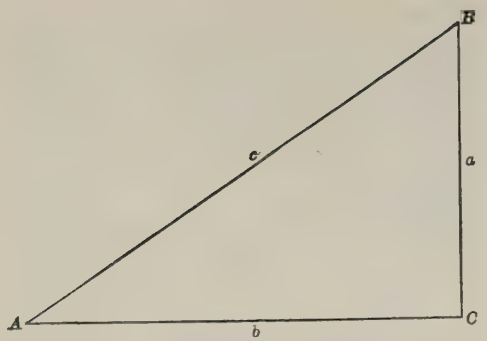
Problems such as the preceding, in which several of the lines may be measured, are easily solved by making use of the geometrical relationships between the sides of similar right triangles. However, it frequently happens that the length of only one side of a right triangle is known or can be measured. In such cases, if the size of one of the acute angles can also be measured, the dimensions of all of the sides and angles may then be calculated by means of trigonometry.

TRIGONOMETRY

Trigonometry is the branch of mathematics that deals specifically with relations between the sides and angles of triangles and with quantities closely related to them. It is based chiefly on theorems concerning similar triangles and on the Pythagorean theorem. The science has wide application in astronomy, physics, engineering, and other fields where magnitudes may be calculated more readily by means of the construction of triangles some elements of which can be easily measured.

The need for this type of calculation arises especially in the determination of distances that do not readily admit of the actual physical processes of measuring, such as the distance between the tops of two buildings or the distance of a ship from a point on the shore. The following paragraphs explain the elementary ratios used in trigonometry and exemplify their application in the solution of a few simple problems.

Trigonometrical Ratios. The last preceding figure shows the similar right-angled triangles EAB and ECD. Since these triangles are similar, their corresponding sides are in proportion and the ratio of AB to EA, for example, is equal to the ratio of CD to EC. In any triangle similar to these, the ratio of the sides corresponding to AB and AE remains the same and will not be affected by the *size* of the triangle. This ratio is therefore a constant for every angle of the same size. If the $\angle E$ changes, however, while the $\angle$ corresponding to B remains right, the ratio also will change. This fact enables us to use the ratio of the sides in such a triangle as a means of determining the magnitude of an angle. To facilitate such a process, distinctive names have been assigned to the six ratios between the different sides of a right-angled triangle. These ratios, by means of which most trigonometrical results are obtained, are called *trigonometric ratios*, or *trigonometric functions of the angle.*



With reference to the right-angled triangle ABC, in which C is the right angle and c is consequently the hypotenuse, the names and definitions of three of the fundamental trigonometric ratios may be given as follows:

Sine of $\angle A = \frac{a}{c} = \frac{\text{opposite side}}{\text{hypotenuse}}$.

Cosine of $\angle A = \frac{b}{c} = \frac{\text{adjacent side}}{\text{hypotenuse}}$.

Tangent of $\angle A = \frac{a}{b} = \frac{\text{opposite side}}{\text{adjacent side}}$.

These three ratios are those most commonly employed. They are usually abbreviated **sin** A, **cos** A, and **tan** A, respectively. The reciprocals of these ratios are also trigonometric ratios and are identified by names. The definition of each of these and the identity of each with its reciprocal function, are given below.

Cosecant of

$$\angle A = \csc A = \frac{c}{a} = \frac{\text{hypotenuse}}{\text{opposite side}} = \frac{1}{\sin A}.$$

Secant of

$$\angle A = \sec A = \frac{c}{b} = \frac{\text{hypotenuse}}{\text{adjacent side}} = \frac{1}{\cos A}.$$

Cotangent of

$$\angle A = \cot A = \frac{b}{a} = \frac{\text{adjacent side}}{\text{opposite side}} = \frac{1}{\tan A}.$$

By definition,

$\sin A = \frac{a}{c}$, therefore $a = c \sin A$, and $c = \frac{a}{\sin A}$;

$\cos A = \frac{b}{c}$, therefore $b = c \cos A$, and $c = \frac{b}{\cos A}$;

$\tan A = \frac{a}{b}$, therefore $a = b \tan A$, and $b = \frac{a}{\tan A}$.

Just as $\sin A = \frac{\text{side opposite } A}{\text{hypotenuse}} = \frac{a}{c}$, so the sine of $\angle B$, or $\sin B = \frac{\text{side opposite } B}{\text{hypotenuse}} = \frac{b}{c}$. As stated above, the ratio $\frac{b}{c}$ also equals $\cos A$. Therefore $\sin A = \cos B$.

Since $\angle C$ is a right angle and the sum of all of the angles in a triangle equals two right angles, $\angle A + \angle B$ must equal 90°. It follows, therefore, that the sine of any angle is equal to the cosine of its complementary angle (complement's sine). Similarly, the tangent and secant of any angle are equal to the cotangent and cosecant, respectively, of the complementary angle.

These relationships explain why, in using the following table of the numerical values of trigonometrical functions, the values for any angle from 45° to 90° may be obtained by reading from the foot of the table to the top, using the column of degrees at the right. More complete tables should be obtained by anyone who has to solve many problems which involve trigonometric functions.

TRIGONOMETRIC FUNCTIONS

Angle	sin	cos	tan	cot	
0°	0.0000	1.0000	0.0000	∞	**90°**
1°	.0175	.9998	.0175	57.2900	89°
2°	.0349	.9994	.0349	28.6363	88°
3°	.0523	.9986	.0524	19.0811	87°
4°	.0698	.9976	.0699	14.3007	86°
5°	.0872	.9962	.0875	11.4301	**85°**
6°	.1045	.9945	.1051	9.5144	84°
7°	.1219	.9925	.1228	8.1443	83°
8°	.1392	.9903	.1405	7.1154	82°
9°	.1564	.9877	.1584	6.3138	81°
10°	.1736	.9848	.1763	5.6713	**80°**
11°	.1908	.9816	.1944	5.1446	79°
12°	.2079	.9781	.2126	4.7046	78°
13°	.2250	.9744	.2309	4.3315	77°
14°	.2419	.9703	.2493	4.0108	76°
15°	.2588	.9659	.2679	3.7321	**75°**
16°	.2756	.9613	.2867	3.4874	74°
17°	.2924	.9563	.3057	3.2709	73°
18°	.3090	.9511	.3249	3.0777	72°
19°	.3256	.9455	.3443	2.9042	71°
20°	.3420	.9397	.3640	2.7475	**70°**
21°	.3584	.9336	.3839	2.6051	69°
22°	.3746	.9272	.4040	2.4751	68°
23°	.3907	.9205	.4245	2.3559	67°
24°	.4067	.9135	.4452	2.2460	66°
25°	.4226	.9063	.4663	2.1445	**65°**
26°	.4384	.8988	.4877	2.0503	64°
27°	.4540	.8910	.5095	1.9626	63°
28°	.4695	.8829	.5317	1.8807	62°
29°	.4848	.8746	.5543	1.8040	61°
30°	.5000	.8660	.5774	1.7321	**60°**
31°	.5150	.8572	.6009	1.6643	59°
32°	.5299	.8480	.6249	1.6003	58°
33°	.5446	.8387	.6494	1.5399	57°
34°	.5592	.8290	.6745	1.4826	56°
35°	.5736	.8192	.7002	1.4281	**55°**
36°	.5878	.8090	.7265	1.3764	54°
37°	.6018	.7986	.7536	1.3270	53°
38°	.6157	.7880	.7813	1.2799	52°
39°	.6293	.7771	.8098	1.2349	51°
40°	.6428	.7660	.8391	1.1918	**50°**
41°	.6561	.7547	.8693	1.1504	49°
42°	.6691	.7431	.9004	1.1106	48°
43°	.6820	.7314	.9325	1.0724	47°
44°	.6947	.7193	.9657	1.0355	46°
45°	.7071	.7071	1.0000	1.0000	**45°**
	cos	sin	cot	tan	Angle

The letters designating sides and angles in the following problems correspond to those used in the figure given above, in which BC, or a, is the altitude, or height; AB, or c, is the hypotenuse; and AC, or b, is the base. The student is advised to make his own sketch for every problem.

Problem. The line of sight from the eyes of an observer standing on level ground 250 feet from the base of a flagpole to the top of the pole forms an angle of 20° with the horizontal. What is the height of the pole if the observer's eyes are 5 feet above the ground?

Solution.—Height above observer's eyes =
$a = b \tan A = 250 \tan 20°$
$= 250 \times .3640 = 91$ ft.
True height $= 91 + 5 = 96$ ft.

Problem. From an airplane directly above a town, the angle of depression of another town 9 miles distant from the first is 6°. How high was the plane at the moment of observation?

Solution. The angle of depression of the town as seen from the airplane is the same as the angle of elevation of the airplane as seen from the town. Therefore, lines joining the two towns and the plane form a right-angled triangle in which $b = 9$ miles and $\angle A = 6°$. The height, $a = b \tan A = 9 \tan 6°$ $= 9 \times .1051 = .9459$ miles, or 4994 feet.

TEST QUESTIONS

Introductory Comments. The test questions which follow have been assembled in order that a student, after careful study of the text in this section, may check his progress in developing a facility for solving problems in elementary mathematics. The questions should reflect modern practices in teaching, and a reader who is familiar with modern textbooks in elementary mathematics, or who has gained an understanding of the mathematical principles and processes which have been presented in this section, should be able to answer all test questions and solve all problems. References are given to the pages on which the material covered by the questions may be found.

Some of the questions and problems have also been selected to help the student who may be preparing for an entrance or placement examination. Consequently the problems in arithmetic include some that were given in Regents' Examinations in New York State, and the questions in algebra include types such as are given by the College Entrance Board. Questions that have been used at the University of Cincinnati as an aid in the selection of students who are to receive scholarships are also included.

HISTORY OF MATHEMATICS

State briefly the contributions which the Egyptians and Babylonians made to early developments in mathematics 1133

Name four outstanding Greek mathematicians, and indicate at least one contribution which each made to the science of mathematics 1133

What important improvement in mathematical notation was introduced by the Hindus? 1134

Mention and explain three famous problems, attempts to solve which long engaged the efforts of ancient mathematicians 1134

Name five mathematicians who made valuable developments during the Renaissance in Europe. Who is credited with inventing logarithms? analytical geometry? calculus? . . 1134

What important contribution to mathematics, and other sciences, was made by Einstein, and what are some of the developments that have resulted from his work? 1134

ARITHMETIC AND MENSURATION

Definitions

What is a unit? a digit? Name the digits. Explain the difference between a number and a figure 1135

What is notation? What place-name has the first figure at the left of tens? at the left of thousands? 1135

Define and illustrate the following: abstract number, concrete number, factor, odd number, even number, prime number, composite number, perfect number 1135

What is a prime factor? How does a prime factor differ from a prime number? 1135

Distinguish between like and unlike numbers. What is meant by the term addends? . . 1135

Define subtraction. Explain the term subtrahend and remainder 1136

Define multiplication, multiplicand, and multiplier 1137

Explain a short method of multiplying numbers by 100; by 99; by 25 1137

What is division? When is division said to be exact? Distinguish between long and short division 1137, 1138

What is the G.C.D. of two or more numbers? . 1138

What is the L.C.M. of two or more numbers? . 1139

Define common fraction. How does a fraction differ from a unit? How is a common fraction written? What is a proper fraction? . 1139

How may one tell by inspection which fraction has the greater value, $\frac{5}{18}$ or $\frac{5}{17}$? . . . 1140

Define decimal fraction. By what other name is a decimal fraction commonly known? What is a mixed decimal? Illustrate . . . 1142

In the multiplication of decimals, how may the position of the decimal point in the product be determined? 1143

Define per cent, rate, base, amount, and difference as used in percentage 1144

Show three ways of expressing 9 per cent . . 1144

Six dollars is 30 per cent of how many dollars? . 1144

Define interest, principal, amount, rate, simple interest, compound interest 1145

Explain the Banker's sixty-day method for computing interest 1146

What is discount? commercial discount? bank discount? cash discount? 1147

Explain what is meant by the present worth of a debt 1147

The profit or loss may be figured as a percentage of what sums? If the cost and the selling price of an article are given, how may the gain or loss be determined? . . . 1148

Name two general kinds of insurance and distinguish between them. Define policy, face of policy, premium 1149

Distinguish between a direct and an indirect tax. Define poll tax, property tax, income tax, assessed valuation 1149

Distinguish between the market value and the par value of stock. When is stock at a premium? at par? below par? 1150

Define dividend, preferred stock, brokerage. Mention three differences between a share of stock and a bond 1150

Tell how to do each of the following:

(*a*) To express a mixed number as an improper fraction 1140

(*b*) To obtain the product of a mixed number and an integer 1141

(*c*) To divide a fraction by a fraction . . 1142

(*d*) To divide a mixed number by a mixed number 1142

Define the following figures, and illustrate by drawings: rhombus, rhomboid, trapezoid, trapezium, prism, parallelepiped, pyramid, cone, frustum of a cone, and cylinder . 1152-55

If a particle is dropped from rest in a vacuum, what formula expresses the approximate value of the following:

(*a*) Distance (s) in feet the particle will fall in terms of time (t) in seconds from the instant the particle was dropped? . 1156

(*b*) Speed (v) in feet per second in terms of the time (t)? 1156

(*Note*: The acceleration (g) due to gravity varies with the latitude and elevation above sea level, and is approximately 32.16 feet per second per second, commonly written 32.16 ft./sec.^{2})

What is the formula from which to find the approximate height (h) in feet to which a particle will rise when given an initial upward velocity (v) in feet per second? 1156

What is the formula for computing the horsepower of a reciprocating engine? 1157

Name three statistical charts or graphs and give a brief explanation of the use of each 1158–60

Mental Tests

Which of the numbers 24, 31, 48, 56, and 61 are composite numbers? (*Ans.* 24, 48, 56.) 1135

What are the prime factors of 21? of 132? (*Ans.* of 21, 3 and 7; of 132, 2, 3, 11.) . . 1135

Find the cost of a 16-word telegram if the first 10 words cost 50 cents, and each additional word costs 4 cents.
(*Ans.* 74 cents.) 1135, 1137

If Grocer *A* sells coffee for $1.12 per pound and Grocer *B* for $1.18½ per pound, how much does a purchaser save by buying 10 pounds from Grocer *A*?
(*Ans.* 65 cents.) 1136, 1137

If a bank of furnaces requires 6¼ tons of coal per hour, how many tons will be used in an 8-hour shift?
(*Ans.* 50 tons.) 1141

If a car uses a gallon of gasoline every 15 miles, what will be the cost, at 30 cents a gallon, of the gasoline necessary to run the car 75 miles?
(*Ans.* $1.50.) 1137

If an automobile runs 11 miles in 15 minutes, what is its rate per hour?
(*Ans.* 44 miles per hour.) 1137

A man weighs 120 pounds plus one fourth of his weight. How much does he weigh?
(*Ans.* 160 pounds.) 1137

A certain truck is built to carry 6000 #. If the driver puts on an overload of 20%, what is the weight of the entire load?
(*Ans.* 7200 pounds.)

The price of a vacuum sweeper was raised from $60 to $72. What was the per cent of increase?
(*Ans.* 20%.)

John received $320 for doing a piece of work and Jim received seven-eighths as much as John. How much did Jim receive?
(*Ans.* $280.)

What is ½ of 36? ½ of 96? ⅛ of 75? ¼ of 64?
(*Ans.* 18, 8, 15, 16.)

What is ⅔ of 18? ¾ of 40? ⅝ of 48? ⅞ of 56? ⅜ of 200? ⅔ of ¾? ⅜ of ⅝?
(*Ans.* 12, 30, 40, 49, 120, ½, 1/16.)

Fundamental Operations

Add the following upward. Check by adding downward.

748	422	162	645	264
625	546	645	546	792
874	332	504	118	192
297	867	270	204	620
438	926	822	431	800

(*Ans.* 2982, 3093, 2403, 1944, 2668.) . . . 1136

Subtract the lower number from the upper one. Prove by adding remainder and subtrahend

5308	76020	10832	42342	10200
2427	57326	10756	4238	9099

(*Ans.* 2881, 18694, 76, 38104, 1101.) 1136

(*A*) The numbers below correspond to checks drawn by three different people (identified as *a*, *b*, *c*.) during the month of November. Find the total withdrawals of each one for the month.

(*a*)	(*b*)	(*c*)
$38.22	$122.40	$49.50
4.18	3.50	1.03
1.29	4.75	7.22
49.72	10.28	140.50
161.90	11.41	75.00
8.40	2.20	58.40
3.31	1.18	175.22
87.50	50.22	40.00
1.62	4.91	
4.30	2.28	
	9.75	

[*Ans.* (*a*) $360.44, (*b*) $222.88, (*c*) $546.87.] . 1136

(*B*) Each of the accounts in (*A*) had the following credits, the first number representing the balance at the beginning of the month, the second number the deposits during the month. Add these to find the total credits to the end of November.

	(*a*)	(*b*)	(*c*)
Balance	$531.28	$368.91	$1231.51
Deposit	472.35	315.73	688.72

Total credits =
[*Ans.* (*a*) $1003.63, (*b*) $684.64, (*c*) $1920.23.]
. 1136

(*C*) Subtract the total of the withdrawals in each exercise in (*A*) from the total credits for the corresponding one in (*B*) to determine the new balance to carry over to December.

	(*a*)	(*b*)	(*c*)
Total credits =	$1003.63	$684.64	$1920.23
Total checks =	360.44	222.88	546.87

Balance =
[*Ans.* (*a*) $643.19, (*b*) $461.76, (*c*) $1373.36.]
. 1136

Multiply the sum of 875 and 256 by twice their difference.
(*Ans.* 1,400,178.) 1136–37

Multiply 1628 by 32; add 558 to the product; from this sum subtract 778; divide the remainder by 36. Check your work.
(*Ans.* 1441.) 1135–37

If stockings cost $1.68 a pair, what will 6 pairs cost?
(*Ans.* $10.08.) 1137

If 4 pounds of tomatoes sell for 44 cents, how much will 6 pounds cost?
(*Ans.* 66 cents.) 1136, 1137

Use long division to find the following indicated quotients:

$31\sqrt{713}$; $53\sqrt{2226}$; $19\sqrt{1349}$; $41\sqrt{574}$.

(*Ans.* 23; 42; 71; 14.) 1138

If oranges are selling for 60 cents a dozen, how much will 4 oranges cost?
(*Ans.* 20 cents.) 1137

It cost $45,900 to buy desks to furnish a new school building. If 1224 desks were bought, how much did each desk cost?
(*Ans.* $37.50.) 1137

An aviator flew an airplane to a height of 54,840 ft. How many feet over 10 miles did he go?
(*Ans.* 2040 ft.) 1136, 1137, 1166

A particle was dropped from rest from a point *h* feet above the ground, and struck the ground in 4 seconds. Find the approximate value of *h*, and of the speed *v* with which the particle struck the ground.
(*Ans.* 257.28 ft.; 128.64 ft./sec.) . . 1138, 1156

A particle was thrown vertically upward from the ground with an initial speed of 80 ft./sec. Find an approximate value of the height to which the particle rose.
(*Ans.* 99.5 ft.) 1138, 1156

Find the G.C.D., (*a*) of 72, 216, and 420; and (*b*) of 925 and 1475.
[*Ans.* (*a*) 12; (*b*) 25.] 1138

Find the L.C.M. of 24, 45, 60, and 120.
(*Ans.* 360.) 1139

What number is the difference between the L.C.M. and the G.C.D. of 28, 35, and 70?
(*Ans.* 133.) 1136, 1138

Common Fractions

Express the following fractions in their lowest terms: 5/12, 8/24, 22/55, 4/16, 28/70, 19/57, 7/56, 5/45.
(*Ans.* ½, ⅓, ⅖, ¼, ⅖, ⅓, ⅛, ⅑.) 1139

Express 5⅞ as an improper fraction.
(*Ans.* 47/8.) 1140

Express ¾, ⅝, ⅔, and 7/12 as equivalent fractions with the L.C.D.
(*Ans.* 27/36; 33/36; 24/36; 21/36.) 1140

Add the following fractions: (*a*) $\frac{1}{4} + \frac{3}{8} + \frac{7}{10}$; (*b*) $\frac{3}{5} + \frac{5}{6} + \frac{5}{12}$; (*c*) $\frac{5}{6} + \frac{9}{10} + \frac{3}{5}$; (*d*) $\frac{7}{18} + \frac{5}{9} + \frac{5}{6}$.
[*Ans.* (*a*) $\frac{31}{40}$; (*b*) $2\frac{3}{12}$; (*c*) $\frac{46}{30}$; (*d*) $\frac{33}{18}$.] 1140

Find the sum of each of the following pairs of mixed numbers: (*a*) $4\frac{3}{8} + 2\frac{1}{8}$; (*b*) $8\frac{1}{12} + 4\frac{7}{12}$; (*c*) $6\frac{3}{8} + 8\frac{1}{8}$; (*d*) $15\frac{5}{8} + 14\frac{1}{8}$.
[*Ans.* (*a*) $6\frac{1}{2}$; (*b*) $12\frac{2}{3}$; (*c*) $14\frac{11}{15}$; (*d*) $30\frac{1}{4}$.] . . 1140

Find the result of each of the following indicated subtractions: (*a*) $\frac{5}{9} - \frac{1}{9}$; (*b*) $\frac{5}{6} - \frac{1}{2}$; (*c*) $\frac{9}{10} - \frac{3}{5}$; (*d*) $1\frac{1}{9} - \frac{5}{9}$.
[*Ans.* (*a*) $\frac{1}{3}$; (*b*) $\frac{1}{3}$; (*c*) $\frac{1}{2}$; (*d*) 1.] 1141

Find the result of each of the following indicated subtractions: (*a*) $7\frac{5}{8} - 2\frac{3}{8}$; (*b*) $6 - 2\frac{3}{4}$; (*c*) $5\frac{3}{8} - 2\frac{3}{4}$; (*d*) $30\frac{3}{8} - 12\frac{5}{7}$.
[*Ans.* (*a*) $5\frac{1}{4}$; (*b*) $3\frac{1}{4}$; (*c*) $2\frac{5}{8}$; (*d*) $17\frac{31}{56}$.] . . . 1141

In each of the following multiply the first number by the second, as indicated: (*a*) 24 x $2\frac{1}{12}$; (*b*) 8 x $5\frac{1}{8}$; (*c*) 10 x $5\frac{1}{7}$; (*d*) 18 x $6\frac{1}{27}$.
[*Ans.* (*a*) 50; (*b*) 40⅜; (*c*) $51\frac{3}{7}$; (*d*) $108\frac{2}{3}$.] . 1141

From $3\frac{3}{8}$ subtract the product of $2\frac{5}{8}$ and $\frac{3}{4}$.
(*Ans.* $1\frac{23}{40}$.) 1141

In each of the following find the product of the two given mixed numbers: (*a*) 13⅓ x $3\frac{5}{11}$; (*b*) $12\frac{3}{4}$ x $2\frac{2}{3}$; (*c*) $7\frac{1}{2}$ x $5\frac{1}{6}$.
[*Ans.* (*a*) $46\frac{2}{33}$; (*b*) $30\frac{2}{3}$; (*c*) 39.] 1141

Find the result of each of the following indicated divisions: (*a*) $7\frac{5}{8} \div 46$; (*b*) $9 \div 1\frac{3}{25}$; (*c*) $9\frac{3}{8} \div 6\frac{1}{2}$.
[*Ans.* (*a*) $\frac{1}{6}$; (*b*) $12\frac{1}{2}$; (*c*) $1\frac{1}{2}$.] 1142

John took his wife and two children on an airplane trip on Monday when he had to pay full price for his ticket but only half-fare for each of the others. If he paid $311.20 for one full ticket and three half-fare tickets, what was the price of a full ticket?
(*Ans.* $124.48.) 1142

Decimal Fractions

Express .069 and .0375 as common fractions in their lowest terms.
(*Ans.* $\frac{69}{1000}$, $\frac{3}{80}$.) 1142

Express $\frac{7}{8}$, $\frac{5}{8}$, and $\frac{9}{16}$ as decimals and add.
(*Ans.* 1.8625.) 1143

Perform the indicated addition: 2.316 + .352 + 312.8 + 438.21.
(*Ans.* 753.678.) 1143

Add: 3.272, .421, 227.41, 516.328.
(*Ans.* 747.431.) 1143

What is the difference between 150 and 16.25; and between 438.21 and 312.8?
(*Ans.* 133.75; 125.41.) 1143

Multiply: 324 by .6; 716 by .123; 6243 by 0.002.
(*Ans.* 194.4; 88.068; 12.486.) 1143

Multiply: 43.6 by .342; 3.1416 by .023; .3675 by .0027.
(*Ans.* 14.9112; .0722568; .00099225.) . . . 1143

Find the quotient in each of the following: 82.944 ÷ 36; .00115 ÷ .05; 2.4 ÷ .0025.
(*Ans.* 2.304; .023; 960.) 1143

Divide .09 by 1.385, and carry the quotient to 4 decimal places.
(*Ans.* .0649.) 1143

With each of the following quotients express the result with 3 decimal place accuracy: 127.52 ÷ 126; 149.84 ÷ 154.
(*Ans.* 1.012; .973.) 1143

Percentage and Related Subjects

Write 25 per cent as a common fraction in its lowest terms.
(*Ans.* ¼.) 1144

Write as common fractions: 12½%; 16⅔%; 20%.
(*Ans.* ⅛; ⅙; ⅕.) 1144

Change the following to per cent: ⅛; ⅜; ¾; ⅞.
(*Ans.* 33⅓%; 40%; 75%; 87½%.) 1144

Give the result in each of the following: 12½% of 72; 8% of 1500; 150% of 200; 40% of 1600.
(*Ans.* 9; 120; 300; 64.) 1144

What per cent of $3400 is $85?
(*Ans.* 2½%.) 1144

A man collected $480 for a client and charged 6% for his services. How much did he charge?
(*Ans.* $28.80.) 1144

A farmer raised 250 bushels of oats and sold all but 65 bushels. What per cent of his crop did he sell?
(*Ans.* 74%.) 1144

An item that cost $48 was sold for 20% less than it cost. What was the selling price?
(*Ans.* $38.40.) 1145

An article which cost $160 was sold for 12½% more than it cost. What was the gain?
(*Ans.* $20.) 1145

What is the difference between 37 per cent of $5000 and .37 per cent of the same sum?
(*Ans.* $1831.50.) 1143, 1145

If by selling land at $90 an acre a farmer lost 25 per cent on the cost, find the price per acre for him to gain 40 per cent on the cost price.
(*Ans.* $168.) 1145

A machine that cost $4500 was sold for $6300. What was the gain per cent on the cost?
(*Ans.* 40 per cent.) 1144

What percentage of 30,000 pounds is 50 pounds?
(*Ans.* 16⅔ per cent.) 1144

If a family spent 20% of their yearly income for rent, 25% of it for food, 33⅓% of it for other expenses, and saved $780, how much was their entire yearly income?
(*Ans.* $3600.) 1141, 1144

How much will be due a wholesale dry goods merchant on a bill for $872 after discounts of 12½% and 10% have been deducted?
(*Ans.* $686.70.) 1144

A dealer sold an automobile and took a note for $1500, without interest, and then he had the note discounted at a bank at 6% sixty days before maturity. How much did he receive from the bank?
(*Ans.* $1485.) 1144

John bought a house for $13,500, spent $2,500 in repairs and, during a period when real estate prices were high, sold the house to Jim for $23,200. What was John's per cent gain?
(*Ans.* 45%.) 1144

A few years after Jim bought the house, as given in the preceding problem, there was a business recession and Jim was forced to sell. If Jim lost 15% of what the house cost him, how much did he receive for it?
(*Ans.* $19,720.) 1145

A clerk made a mistake in the price of an item of clothing and sold it for 10% less than it had cost. If he sold the item for $171, how much had it cost?
(*Ans.* $190.) 1145

An agent sold 500 items at $10 each and remitted $4900. What rate of commission did he charge?
(*Ans.* 2%.) 1144

A real estate broker sold a house for $32,400 and charged 5% commission. How much did he receive?
(*Ans.* $1620.) 1144

An auctioneer sold a miscellaneous collection of furniture and pictures at auction. If the amount of the sales was $568.40, and the auctioneer charged 25% for his services, how much did the owner receive from the sale?
(*Ans.* $426.30.) 1144

What will be the cost of insuring a house for $6000 if the rate of insurance is 88 cents for $100?
(*Ans.* $52.80.) 1149
What tax is payable on property assessed at $8200 if the rate is 27.6 mills on the dollar?
(*Ans.* $226.32.) 1149
A stock company whose shares have a par value of $100 declares a quarterly dividend of 1.25%. How much does John, who owns 450 shares, receive?
(*Ans.* $562.50.) 1150
At 5% simple interest, find the amount due on a note for $1788 for 1 year, 9 months, and 6 days.
(*Ans.* $1945.94.) 1146
If a man owns 29 bonds of $500 each, bearing interest at 3½%, compounded semiannually, how much does he receive at each semiannual interest period?
(*Ans.* $253.75.) 1146
The assessed valuation of a district was $25,000,000, and the total tax was $337,500. If John's property was assessed at $24,000, what was his tax?
(*Ans.* $324.) 1149
A man buys 6 per cent stock at 150; what rate per cent on the investment does this stock yield?
(*Ans.* 4%.) 1144, 1150
Find the compound amount of $240 at 4% for 8 years. (Use table.)
(*Ans.* $328.46.) 1146
A merchant sold a piano for $960, thereby making a profit of 40 per cent. Do not solve in figures but tell in good clear English sentences what you would do to find the cost of the piano and the merchant's gain, explaining the reason for each step of the process. . 1148

Area and Volume

A surveyor measured a triangular plot of land and found that the sides were 98.3 ft., 84.2 ft., and 20.7 ft. long, respectively. Find the area.
(*Ans.* 686.9 sq. ft.) 1163
A room has a hardwood floor 12 ft. by 15 ft. partly covered by a rug 9 ft. by 12 ft.; at 6 cents a square foot, find the cost of varnishing the part of the floor not covered by the rug.
(*Ans.* $4.32.) 1137, 1160
At $1.65 a cubic yard, how much will it cost to excavate a cellar 48 ft. by 30 ft. and 7½ ft. deep?
(*Ans.* $660.) 1137, 1166
Find the cost, at 60 cents a square foot, of paving a space in the form of a trapezoid the parallel sides of which are 18 ft. and 21 ft. long and 10 ft. apart.
(*Ans.* $117.) 1137, 1152
The altitude of a pyramid having a square base is 80 ft.; the length of each side of the base is 120 ft. Find: (*a*) the slant height; (*b*) the total surface area (faces and base); and (*c*) the volume.
[*Ans.* (*a*) 100 ft.; (*b*) 38,400 sq. ft.; (*c*) 384,000 cu. ft.] 1137, 1154
To estimate the amount of earth to be removed for a railroad cut, surveyors found the areas of three equally spaced, parallel, plane sections, of the earth to be removed, to be as follows: area of one end section 270 sq. ft., area of middle section, 900 sq. ft., area of other end section 180 sq. ft. The distance from the middle section to each end section was 60 ft. Use the prismoidal formula and compute the approximate volume of the earth to be removed to form the cut.
(*Ans.* 81,000,000 cu. ft.) 1137, 1156
Find the area of a table top, circular in form, with a diameter of 7 ft.
(*Ans.* 38½ sq. ft., with $\pi = \frac{22}{7}$; 38.4846 sq. ft., with $\pi = 3.1416$.) 1153
A ton of coal requires 36 cu. ft. of space. A coal bin is 9 ft. long and 8 ft. wide; how deep must the bin be to hold 10 tons of coal?
(*Ans.* 5 ft.) 1162
If the price of coal is $15.75 per ton, and one ton occupies 36 cu. ft., how much will the coal cost that will fill a bin 12 ft. long, 8 ft. wide, and 6 ft. deep?
(*Ans.* $252.) 1154, 1162
Find the solid contents of a right circular cone 12 inches high that has a base 12 in. in diameter.
(*Ans.* 452.4 cu. in.) 1155
What is the capacity in gallons of a right circular cylindrical cistern 5 ft. in diameter and 8 ft. from top to bottom?
(*Ans.* 1175 gallons, approximately.) . . . 1155

ALGEBRA

Give the origin of the word algebra and explain briefly the relation of the science of algebra to arithmetic 1171
Define algebraic expression, coefficient, term, binomial, formula, power, exponent, root, negative term, similar terms 1171
Illustrate by examples the difference between positive and negative quantities 1171
Explain how each term of a polynomial in a parenthesis is affected when the parenthesis is removed, if the parenthesis is, (*a*) preceded by a minus sign, and (*b*) multiplied by a quantity 1172
State the rule for subtraction in algebra; the law of signs for multiplication; the law of exponents and of coefficients for division. What is meant by the term cross products? 1172–73
Write the formulas for the square of the sum of two terms; the square of the difference of two terms; the product of the sum and the difference of two terms 1173
What is meant by factoring? Is $a + b$ a factor of $a^5 + b^5$? of $a^5 - b^5$? of $a^4 + b^4$? of $a^4 - b^4$? Is $a - b$ a factor of $a^7 - b^7$? of $a^7 + b^7$? 1174
Find the H.C.F. and the L.C.M. of $4x^2 - 9$ and $2x^2 + x - 6$.
(*Ans.* $2x - 3$; $4x^3 + 8x^2 - 9x - 18$.) 1174, 1175
Explain the process of adding fractions in algebra. How will the sign of a fraction be affected by changing the sign of the denominator? 1174
Find the result of the following:

$$\frac{x+4}{x-3} + \frac{x-4}{x+3}.$$

$\left(Ans. \frac{2(x^2+12).}{x^2-9}\right)$ 1175
Explain the process of clearing an equation of fractions. Clear the following equation of fractions:

$$\frac{1}{a} + \frac{1}{b} = \frac{1}{ab}.$$

(*Ans.* $a + b = 1$.) 1176
Is $x^2 - 2x + 1 = 0$ an identity or a conditional equation? Define the root of an equation, numerical equation, literal equation. What is meant by transposition? 1176
Define quadratic equation, pure (or incomplete) quadratic equation, complete quadratic equation. Indicate two methods of solving a quadratic equation 1177
Solve the equations, (*a*) $4x^2 - 25 = 0$, and (*b*) $2x^2 - x = 6$.
[*Ans.* (*a*) $\pm \frac{5}{2}$; (*b*) $-\frac{3}{2}$, and 2.] 1177
What are simultaneous equations? Mention two methods by which simultaneous equations may be solved 1177, 1178

Find the simultaneous solution of the following pair of equations: $3x - y = 6$ and $2x + 3y = 4$.
(*Ans.* $x = 2$, $y = 0$.) 1177–78

Define series, terms of a series, arithmetical progression, common difference, geometrical progression, common ratio, geometrical means 1179

Find the sum of the odd integers from 1 to 99.
(*Ans.* 2500.) 1179

Two automobiles leave the same place and travel over the same route without stopping. The first travels 15 miles the first hour, $15\frac{1}{2}$ miles the second hour, 16 miles the third hour, and so on. The second leaves 5 hours and 12 minutes after the first and travels at the uniform rate of 30 miles an hour. In how many hours after the first starts are the two automobiles together, and how far has each traveled?

Pages 1179, 1176 (*Formula for the sum of the terms in an A. P.* and *Fractional equations*). By letting x represent the number of hours during which the first automobile travels before being overtaken, we obtain expressions for the distance each has traveled. These, when equated, give the following relation: $\frac{x}{2}\left(30 + \frac{1}{2}\overline{x-1}\right) = 30\left(x - \frac{26}{5}\right)$.

From this equation, x is found to be 13 or 48. Of these results, 13 is the one pertinent to this problem, and 48 is the answer to a related problem asking when the two automobiles will again be together, provided that both continue to travel at the rates described. The required distance is $\left(13 - 5\frac{1}{5}\right)$ 30, or 234, miles.

If money invested at a certain rate of interest doubles in each period of nine years, what will \$950 invested now amount to in 54 years?
(*Ans.* \$60,800.) 1179

Define permutations, combinations 1180

A library shelf contains an encyclopedia of 8 volumes. In how many ways may these volumes be wrongly arranged?
(*Ans.* 40,319.) 1180

Find, and simplify, the fourth term in the binomial expansion of $(a - 3b^2)^8$.
(*Ans.* $-448a^5b^6$.) 1178

Define radical, radicand, surd, mixed surd, similar surds. When is a radical said to be rational? irrational? 1181

Express each of the following radicals in its simplest form: $\sqrt{18x^2y^3}$; $\sqrt[3]{27a^5b^2c^3}$.
$\left(Ans.\ 3xy\sqrt{2y};\ 3a^2c\sqrt[3]{b^2}.\right)$ 1181

Free the following expression from negative and fractional exponents, and from radicals:
$\left(Ans.\ \frac{25x^{21}}{y^8}.\right)$ 1171, 1172 (*Exponent* and *Signs of aggregation*).

Rationalize the denominator of $\frac{1}{\sqrt{a}+\sqrt{b}}$.
$\left(Ans.\ \frac{\sqrt{a}-\sqrt{b}}{a-b}\right)$ 1182

Define logarithm, mantissa, characteristic, antilogarithm. By reference to the table on page 1185, find the logarithm of 7183 and the antilogarithm of $8.7639 - 10$ or $\bar{2}.7639$.
(*Ans.* 3.8563; .05806.) 1182, 1183

By means of logarithms, find the value of $\sqrt[.3]{782^2}$.
(*Ans.* 84.88.) 1184, 1185

A workman, wishing to explode a blast of powder, set the fuse to cause the explosion to take place in 30 seconds. He ran back at the rate of 8 yards per second. How far had he run when he heard the explosion, if sound travels at the rate of 1080 feet per second?

Pages 1156, 1176 (*Formulas* and *Simple equations*). By letting x represent the distance covered by the workman, the following equation may be deduced:
$x = \frac{1080}{3}\left(\frac{x}{8} - 30\right)$, from which the required distance is found to be 245 $\frac{5}{11}$ yards.

If I lend a certain sum of money for a certain time at 6 per cent (simple interest), the interest exceeds the loan by \$160; but if I lend it at 4 per cent for one-half that time, the loan exceeds the interest by \$480. What is the sum?

Pages 1145, 1177 (*Simple interest* and *Elimination by addition*). By letting x represent the sum and t the time, we obtain the equations $.06\,tx - x = 160$ and $x - \frac{.04tx}{2} = 480$, from which t may be eliminated by addition and the required sum found to be \$800.

Scholarship Examination

1. Factor completely: (*a*) $6x^3 - 5x^2y - 6xy^2$; (*b*) $4a^2 - 9b^2 + 12b - 4$; (*c*) $64a^6 - 27b^3$; (*d*) $81am - a^5m$.
[*Ans.* (*a*) $x\,(3x + 2y)\,(2x - 3y)$; (*b*) $(2a + 3b - 2)\,(2a - 3b + 2)$; (*c*) $(4a^2 - 3b)\,(16a^4 + 12a^2b + 9b^2)$; (*d*) $am\,(3 - a)\,(3 + a)\,(9 + a^2)$.] 1174

2. Simplify:
(*a*) $\frac{a}{a-2} - \frac{a-2}{a+2} + \frac{3}{4-a^2}$; (*b*) $\frac{1}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}}$.
[*Ans.* (*a*) $\frac{6a-7}{(a-2)\,(a+2)}$; (*b*) $\frac{abc}{ab+bc+ac}$] 1175, 1176

3. (*a*) If $l = a + (n - 1)\,d$, find the value of n when $l = 2$, $a = \frac{3}{5}$, $d = \frac{1}{5}$. (*b*) Find the sum of all the odd numbers between 0 and 200.
[*Ans.* (*a*) $n = 9$; (*b*) 10,000.] 1179

4. The horse power required to fly an airplane is the product of the drag and the velocity divided by 375. If HP is horsepower, D is drag, and V is velocity, write the formula representing this relationship.
$\left(Ans.\ HP = \frac{D \cdot V}{375}.\right)$ 1176

5. Solve the following equation for x and check your answer:
$\frac{2x-1}{2x-3} - \frac{3x+1}{x+2} + 1 = 0$.
(*Ans.* $\frac{1}{2}$, 5.) 1176, 1177

6. Rationalize the denominator and simplify:
$$\frac{2\sqrt{3}-\sqrt{2}}{\sqrt{3}+2\sqrt{2}}$$
(*Ans.* $\sqrt{6} - 2$.) 1182

7. A party shared the expenses of an automobile trip which cost 40 dollars. If there had been 3 more people in the party, each would have paid 3 dollars less. How many people were in the party and how much did each pay?
(*Ans.* 5; \$8.) 1176, 1177

8. If one drainpipe can empty a tank in 8 hours and another drainpipe can empty the tank in 5 hours, how many hours will be required if the two pipes are working together?
(*Ans.* $3\frac{1}{13}$ hr.) 1176

9. Solve the following pair of simultaneous equations for x and y:
$4x + 3y = 25$, $2x - y = 15$.
(*Ans.* $x = 7$, $y = -1$.) 1177–78

10. Write and simplify the first four terms of the expansion by the Binomial Theorem:
$\left(\frac{a}{2} - 2b\right)^8$.
$\left(Ans.\ \frac{a^8}{256} - \frac{a^7b}{8} + \frac{7a^6b^2}{4} - 14a^5b^3 + \ldots.\right)$ 1178

GEOMETRY AND TRIGONOMETRY

Define the following terms: angle, radian, complementary angles, parallel lines, circle, arc, sector, secant, and tangent. When are figures said to be congruent? . . . 1186, 1187

What is meant by the *pons asinorum*? Prove the theorem 1187

Explain and give an example of a proof known as *reductio ad absurdum* 1187

What is the Pythagorean theorem and why is it so called? Mention two different proofs that have been given for this theorem . . 1188

A tree 90 feet high is broken off 40 feet from the ground. How far from the foot of the tree will the top strike if the two sections are not severed at the point of fracture? (*Ans.* 30 feet) 1189

A 4-foot pole standing vertically casts a shadow 60 inches long. What is the height of a tree which at the same time casts a shadow 45 feet long? (*Ans.* 36 feet) . . . 1189

Define trigonometry. What are trigonometrical ratios? State a purpose for which they are used. Define the sine, the cosine, and the tangent of an angle. 1189, 1190

An observer knew that the horizontal distance from himself to a flagpole was 300 feet. From his position the angle of elevation to the top of the pole was 15°, and the angle of depression to the bottom of the pole was 5°. How high was the pole? What was the elevation of the observer above the base of the pole? (*Ans.* 106.62 feet; 26.25 feet) . . . 1190

Scholarship Examination—Plane Geometry

1. The three sides of a triangle are 9 inches, 11 inches, and 12 inches long. A line segment is drawn from the mid-point of the 9-inch side to the mid-point of the 12-inch side. How long is the line segment?
(*Ans.* 5½ in.) 1188

2. The base and altitude of a triangle are, respectively, 15 inches and 6 inches in length. What is the area of a similar triangle the base of which is 7.5 inches?
(*Ans.* 11¼ sq. in.) 1188

3. If the circumference of a circle is increased by 12 inches, by how much is the radius increased? Leave answer in terms of π.
(*Ans.* $6/\pi$ in.) 1153

4. The front wheels of a wagon are 2 feet in diameter and the back wheels are 3 feet in diameter. How far has the wagon gone when the front wheels have made 10 more revolutions than the back wheels?
(*Ans.* 60π ft.) 1153

5. Compute the area of an equilateral triangle inscribed in a circle whose diameter is 10 feet.

(*Ans.* $\frac{75\sqrt{3}}{4}$, or 32.47, approx.) 1151

6. If two adjacent sides and the included angle of a parallelogram are 10 inches, 18 inches, and 60° respectively, find the area of the parallelogram.

(*Ans.* $90\sqrt{3}$, or 155.9, approx.) 1152

7. If the wheel on a truck is 28 inches in diameter, how many revolutions per minute will the wheel make if the truck is traveling at the rate of 30 miles per hour? One mile equals 5280 feet.

(*Ans.* $\frac{7920}{7\pi}$, or 360.1, approx.) 1153

8. A plot of ground in the shape of a rectangle 350 feet long by 200 feet wide plus semicircular ends is to be covered with sod. If the sod costs 50 cents per square yard, what will be the total cost for the field?
(*Ans.* $5634.22.) 1152, 1153

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Economics and Useful Arts

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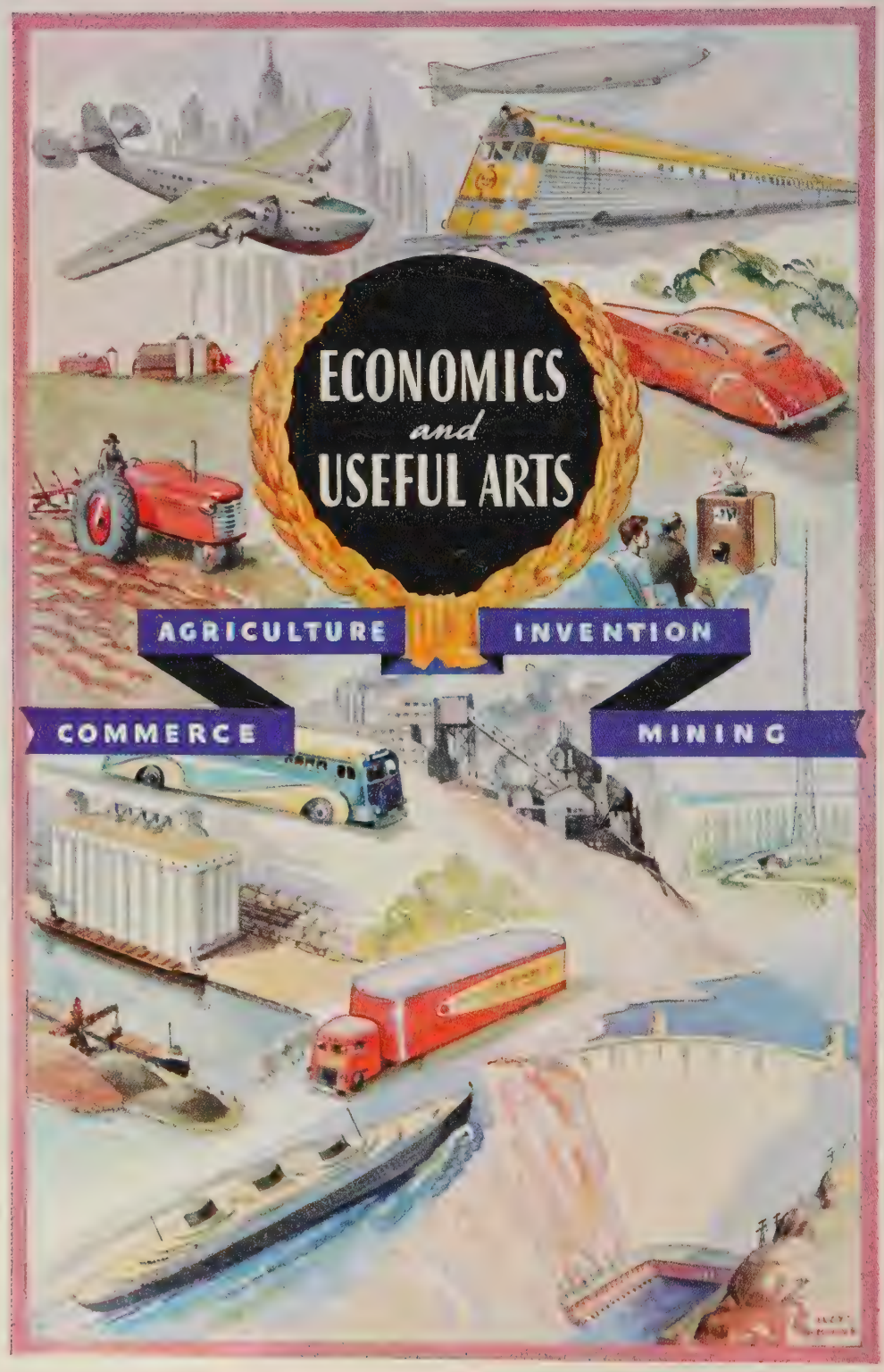

ECONOMICS
and
USEFUL ARTS
AGRICULTURE
INVENTION
COMMERCE
MINING

ECONOMICS AND USEFUL ARTS

INTRODUCTORY

ECONOMICS is the study of the means by which people obtain their livelihood and satisfy their wants. Many thinkers maintain that the economic system under which a people lives largely determines the form of all its institutions, including its morality, family life, religion, and art. Whether or not this view is entirely correct, there can be no doubt that, along with political government, economic conditions constitute a factor of supreme importance in the life of man.

The economic system touches the life of every man, woman, and child, primarily through their jobs or other sources of income or support and through the prices which must be paid in securing what they want. When jobs fail or prices fluctuate unduly, the average person senses that something is wrong. On giving it proper attention, he begins to perceive that he is part of a vast system of world-wide sweep. If he is to be an intelligent citizen and understand the forces which have such a large part in determining his well-being, it is essential that he study the economic system under which he lives.

The Economic System. In the normal course of events, every one of us, unless he is altogether dependent on others, contributes something to the common store of goods and services. In return, he receives, through the agency of money, the right to a certain share of that common store.

The present economic system of production, distribution, and consumption has been built and rebuilt by many generations, the results differing according to each generation's degree of intelligence, skill, and invention, its command over nature, and its social relationships. The system rests on such institutions as property and contract, the division of labor, competition, and combination. Behind all the factors of an economic system are the laws of human nature. These laws, working through the instincts to acquire, to possess, and to provide for family and dependents, operate to convert the vast resources and powers of the earth into human service.

Under the impact of two world wars, the economic system has been subjected to tremendous strains and shocks of abnormal periods. We have seen inflation and deflation at their greatest extremes, high prices, scarcity of raw materials, rationing and governmental price fixing, excess profits tax, and other programs and policies necessitated by world conflict. The divergent interests of workers and employers, labor and capital, have frequently set class against class, while the intensive research in products and methods has given us great improvements in machines and time saving devices, all of which have displaced great numbers of workers from one form of employment into other forms, causing a change in the personal life of the individual affecting his housing, type of employment, wage, and social position.

The economic system of a democratic country must assume that the right of private property is an inalienable right. With this right of ownership and possession for use, man becomes a dignified human being and possesses initiative and an incentive to achieve a better education, and a better position so that he may provide more adequately for himself and his family. This freedom of choice and freedom of work are important human factors of advantage which the capitalistic system has over any other prevailing economic systems in the world today. America has the highest standard of living in the world, with a greater share of world wealth more generally distributed among all its people than any other country.

Of the two world economic systems today, Capitalism and Communism, a choice is being made by millions of people. In Russia, production has been placed on a basis of use rather than profit and the strong centralized government allocates production, regulates prices, and assigns positions. This system is known as "controlled economy" which goes into the life of the individual who has his entire future education, work, and leisure time planned for him.

In the United States of America, it is recognized that the government, as a servant of all the people, must provide for laws and regulations so that all persons, regardless of race, creed, or color, may have the opportunity of training and work so that they in return may provide for themselves and their families. The purpose of a government in our economic system is simply to outline the rights and responsibilities of each group, so that no one transgresses upon the rights of others.

The Division of Labor. This is the key to the understanding of the whole economic order. If every man or every family produced only for himself or itself, there would be no exchange, no markets, no money, no means of transportation; in fact, no economic system. Some such situation actually existed in the more primitive ages of the world where each household was almost self-sufficient. With the advance of civilization, however, came the division of labor.

Men have discovered that it is far more profitable to co-operate with one another, each finding and keeping to his own special task. Adam Smith, the "father of political economy," remarked that if a man set out to make pins by his unaided labor he could scarcely produce a single pin a day, whereas, when even a few combine in the business of pin-making, each is enabled, through the division of labor, to produce many thousands per day.

Ours is an age of specialization. To provide the breakfast of even the humblest family in a modern country, all parts of the earth are drawn upon. To serve our needs we have thus built up the vast network of modern trade and commerce now in existence.

Linking the World. The greatest benefits of the division of labor are reaped when cities and districts and countries exchange with one another those products which they can produce most advantageously. Such advantages in the production of certain commodities may arise in a particular place by reason of its climate, soil, natural resources, and the capacities of its inhabitants. The United States, with its wide range of soil and climate, is more self-sufficient than most countries. But it needs the rubber and tin of the East Indies, the silk of Japan, the nickel of Canada, the tea of China, the coffee of Brazil, and a thousand other products which commerce brings to our shores.

In a similar way, different parts of the same country specialize and create domestic trade. Indiana specializes in corn; South Dakota, in wheat; California, in oranges. Each produces the crops which it can raise to the greater advantage. Likewise, the city depends on the country, but so also does the

country depend on the city. This all-round dependence of part on part is made possible by great systems of transportation and communication.

By aid of the means of communication, we have today markets that are nation-wide and even world-wide for the main articles of commerce—wheat, cotton, wool, rubber, and so forth. By aid of the system of transportation, the resources of the world are exploited and brought wherever there is a demand for them. Nowhere have these agencies been more highly developed than in the United States, and nowhere have they been such important factors in the building up of a national life. In the pages that follow, special attention is paid to the history of *Communication* and *Transportation.*

Capital and Labor. We often speak of capital as a form of wealth. It has another aspect, which appears when we contrast capital with labor. Here lies one of the greatest problems of modern society. Since the Industrial Revolution, the mechanism of production has grown so elaborate and so costly that the worker can no longer own the instruments with which he works. He must work for an employer and often the employer is a large corporation. So a conflict of interests arises.

As producers, capital and labor are of necessity partners, for capital is useless without labor and labor is powerless without capital. But, as claimants to the product of this partnership, the owners of capital and the givers of labor have unreconciled interests. This conflict of interests is not strictly a warfare, as it is sometimes called, since capital and labor *must* combine to produce. Some degree of struggle and conflict is at the same time inevitable at every stage of social evolution. But this struggle has grave social and economic consequences, which have led governments to step in with regulations of far-reaching importance both to employers and to employees. This vital issue is treated in the section on *Labor Relations.*

From Producer to Consumer. When production takes place on a large scale, the consumer is no longer in direct and personal relation to the producer. Hence arises the need for agencies to bring the two together. Modern business makes necessary a system of commission houses, jobbers, wholesalers, and retailers. They all have their parts to perform in the division of labor, and, as such, they serve useful economic functions. The practical aspect of this subject is taken up in the sections on *Advertising* and *Salesmanship.*

Money as the Medium of Exchange. All this interchange requires a scale of value and a money system. Barter, or the direct exchange of goods for goods, is a cumbersome and difficult process. A standard of value, universally recognized and accepted, is therefore essential, and most modern countries have found it in gold, though China uses silver instead. The American dollar means an amount of gold of certified weight and fineness. So do the pound sterling, the mark, the franc, and other national units, although at times their conversion into gold has been suspended.

On the basis of gold, a wonderful system of credit is built. Banks and other financial institutions issue notes and certificates that are generally "as good as gold" because of the guarantee behind them. These notes do away with the inconvenience involved in carrying around the precious metal. All economic wealth has come to be reckoned and measured in these units of value. In fact, wealth has come to mean, not the owning of so much land and so many cattle and so many houses, as in the old days, but the owning of so much "capital," so many of the standard units of value.

For example, no individual owns today a particular stretch of railroad or a particular locomotive that runs along it, but he may own so many shares, representing so many units of value, in the railroad company. It is this development of the ownership of capital which has made possible the growth of the institutions described in this department under *Insurance, Investments,* and *Money and Banking.* In the section on *Business Crises,* another very significant aspect of the subject is treated.

The Useful Arts. We now turn to the second great branch of our subject. Today the consumer never sees the source of the great multitude of objects of which he makes direct or indirect use. He does not know whence they come. He does not know how or by whom they are made. The work of the world is usually a closed book to us, because each of us is engaged on such a tiny and subdivided fraction of the whole. We live in a world whose activity mostly passes us by, whose marvel is largely unappreciated by us. In order to convey some idea of the complexity of our economic system, this department is supplemented by an account of the arts and technique of production.

The Stages of Production. We begin with the land, for on it or out of it (including, as economists do, the oceans and inland waters as part of the "land") are produced all the raw materials which the labor and organization of men turn into the means of satisfying their numerous wants. Thus we have first in order the extractive industries, which are described under the titles *Agriculture, Animal Industry, Fisheries,* and *Mining and Mineral Production.*

Most raw materials—wheat, cotton, wool, silk, iron, copper, lumber, and a host of others—go through many and elaborate processes before they are ready for their final use. They must be conveyed by land and water, they must pass through many hands, they must be treated by complicated machinery. Production calls for the work of the inventor and of the engineer no less than that of the farmer and of the miner. Hence the division on *Inventions* and on *Engineering and Building.*

Then comes the last stage, that of manufacturing. In the plant of the manufacturer, the work of the farmer, the miner, the inventor, and the engineer is brought together. Out of the factory the results of their labor pass at last as finished goods, and the whole roundabout process of production is complete. The more important aspects of this last step are treated under *Manufacturing* and *How Things are Made.*

The Age of Industry. One man today can do the work which hundreds or even thousands were needed to perform in the pre-industrial age. Power has been harnessed and applied in countless ways. Steam and electricity and oil and gasoline serve the desires of man. The blast furnace, the power loom, the self-binding reaper, the linotype machine—to mention at random a few of our innumerable inventions—make possible an efficiency of production which surpasses the wildest dreams of the past. The standard of living of ever-greater populations has risen vastly. The ordinary man has at his command commodities that in earlier times were the rare luxuries of kings. Thus has industry, aided by invention, revolutionized the world. The Industrial Revolution is well named because, of all the great changes society has known, none has been at once so rapid and so extensive as this development. A period of much less than a hundred years saw the transformation of the everyday life of our Western civilization, saw a remarkable change in the habits and thoughts and modes of work of many millions, saw a new power over nature created, and saw the very face of the country completely altered.

To understand these things is to understand our own age and civilization. Through a study of economics and the arts of production, we may attain this understanding and learn in a new way the meaning of the world and the society in which we live. To serve this purpose, through a compact and accurate presentation of the whole system, the material in this department has been prepared.

COMMERCE

COMMERCE consists of all those processes of trade involved in the general distribution of commodities from the producer to the consumer. However, the term generally implies an exchange of large volumes of merchandise between different places or communities rather than the trade carried on between individuals. Traffic passing from one nation to another is *foreign*, or *international*, commerce; that moving between localities included within national boundaries is *internal*, or *domestic*, commerce. In the United States, commercial shipments of merchandise from one state to another are said to enter into *interstate* commerce.

Origins. The desire of man to satisfy his wants as easily as possible supplies the primary reason for commercial transactions. However, there can be comparatively little exchange between countries or districts inhabited by people who produce the same type of commodities; for then, neither locality has anything required by the other. Commerce, therefore, depends upon existing differences in temperature and climate, in natural resources, in industrial development, or in racial and cultural characteristics.

Transportation and Commerce. Wherever such differences exist, the inhabitants of one district will generally have a surplus of certain commodities which they are anxious to exchange for the surplus from other places. But, before the exchange can be accomplished, the goods must be transported to the locality where they are needed. For this reason commerce and transportation are mutually dependent to such an extent that the condition of one is almost invariably indicated by a corresponding degree of development in the other.

Because of this intimate relationship, the history of commerce may be divided into three fairly distinct periods: First, that in which transportation was accomplished by man or by beasts of burden on land, and by coasting vessels on the water. Second, that in which mariners, by the aid of the compass, were able to guide their sailing vessels upon the open seas. Third, that in which transportation by land and by sea depended chiefly upon the power of steam. The first period, of possibly 5000 years' duration, extended from the beginning of commerce well into the 15th century, in spite of the fact that the compass was known in parts of Europe as early as 1200; the second period, of about 400 years' duration, may be said to have terminated in 1838, when the first line of commercial steamships began operation. The third period is that of the past century.

ANCIENT COMMERCE

The city of Babylon, possibly as early as 3000 B. C., was a market place to which precious metals, grain, wool, and other materials were brought from all directions. Later, records show that, by 1600 B. C., well developed trade routes existed, over which the Arabs conducted caravans transporting silks, spices, wine, gold, and other commodities from the Red Sea district, from Phœnicia, and even from Asia, to Egypt, where they were exchanged chiefly for grain and linen. Excavations in Egypt have revealed certain vases which seem to have been brought from the island of Crete as early as the year 2000 B. C.

The Phœnicians. The first people devoted chiefly to commerce were the Phœnicians, who inhabited a strip of land about 100 miles long and 10 miles wide on the eastern coast of the Mediterranean. Forced upon the sea as fishermen, these people gradually developed commercial fleets which in time extended their voyages to the Strait of Gibraltar and even north to England. The ships brought back ivory, tin, copper, and precious metals, while caravans sent inland brought spices and frankincense from India. Manufacturing industries were developed, especially in glassware, cloth, and metal products; great cities such as Sidon and Tyre came into existence; colonies—of which Carthage, on the north coast of Africa, was later to become the great rival of Rome—were founded at many advantageous points; and, for perhaps 1000 years, the Phœnicians controlled the commerce of the world.

The Greeks. Eventually, the commercial supremacy of the Phœnicians passed to the Greeks, who excelled both as sailors and as business men. Their homeland, which in area was smaller than the state of Maine, nevertheless offered great incentives to commerce. It was sufficiently fertile to afford a surplus of some products, such as wine, figs, and olive oil, but it did not produce enough grain to feed the population. Mountains on the north protected it fairly well from attack by land; it was centrally located in relation to other countries of the Mediterranean; and its extensive coast line afforded many good harbors.

The conditions of living in a small, well populated country having an insufficient supply of grain were conducive to emigration; ships furnished an easy means of travel. Consequently, for a period of about 500 years, the Greeks followed a consistent policy of founding and of developing settlements in fertile sections of foreign lands, notably on the Black Sea, in Asia Minor, and in southern Italy and Sicily. Malaga, in Spain, and what is now Marseille, in France, were sites of thriving Greek colonies. From these colonies, grain and raw materials were supplied to the mother country, which developed many manufacturing industries, especially the production of bronze, clay, marble, and woolen products.

The Greeks were quick to adopt new devices for facilitating commerce. From contact with the Phœnician traders, they acquired an alphabet, which they greatly improved. From the Lydians of Asia Minor, they learned to mark pieces of silver with an official seal and to use these coins as money.

In spite of the success of the Persians, who broke the Greek power in the East, the Western colonies developed more rapidly than before, while Greece itself, under the leadership of Athens, reached the pinnacle of its power.

Empire of Alexander. The enormous eastern empire held by the Macedonian, Alexander the Great, took away from Athens the control of commerce and led to the development of great commercial cities farther east. Of these, the largest was Alexandria, located near the western corner of the Nile delta. This city surpassed in volume of trade all centers of commerce which had previously existed. The huge lighthouse erected on the island of Pharos to guide mariners safely into the harbor of Alexandria was considered to be one of the seven wonders of the ancient world.

The Romans. The expansion of Roman power outside of Italy is said to have begun in 241 B. C., when Sicily was taken from the Carthaginians. Ninety-five years later, the great commercial cities of Carthage and Corinth were destroyed by Roman soldiers, and Greece and Macedonia were reduced to the position of Roman provinces.

Although Rome ruled the Western world, she never became a commercial city. Captives of war were extensively sold as slaves, and great quantities of foodstuffs, manufactured products, and luxuries were sent to the capital by sea, and over the fine roads that were constructed by Roman engineers, even in the farthest provinces. These products, however, to a large extent, did not represent commercial transactions but were the tributes and taxes imposed upon conquered peoples. What Rome gave in return was almost five centuries of comparative peace and security, during which time commerce developed wherever conditions permitted.

MEDIEVAL COMMERCE

During the "dark ages" that followed the fall of Rome, commerce was almost entirely in the hands of the Mohammedans, with centers at Baghdad, Damascus, Cairo, Alexandria, and the Moorish cities in Spain.

Western and northern Europe became divided under the feudal system into thousands of tiny units, each attempting to be complete within itself, and entirely independent of all external sources of supply. Roads were totally neglected; strangers were regarded with suspicion; robbery was a common practice; and commerce, under such conditions, was quite naturally almost nonexistent.

Growth of Towns. Soon after 1000 A. D. the need for places where an interchange of commodities might be carried on was filled by the widespread development of towns. In these growing communities, manufacturing and trading not only became possible, but were necessary in order to provide something to exchange for the food and raw materials brought in at first from the surrounding country, and, later, from other parts of the world.

Under these conditions some men were enabled to devote all of their time to trading and dealing in commodities. The fear of the townspeople that these traders would take undue advantage of their opportunities, coupled with the prevalent suspicions of all strangers, next led to the establishment of *public markets*, where commercial transactions might be carried on under official supervision. As the markets increased in size and prosperity, traders customarily united for mutual benefit, forming *merchants' guilds*. Somewhat later, the craftsmen also combined, according to their special trades, to form *craftsmen's guilds*. These guilds were at first private organizations, but eventually they were recognized by the town authorities and attained to great power in the local government.

Fairs. An extension of the idea of the town markets led, in all parts of Europe, to the establishment of *fairs* under the protection of various powerful lords. At the fairs, which were usually held annually, special efforts were made to insure honest dealing and the safety of those in attendance. For this reason the large fairs, such as those held in various parts of Champagne, France, were visited by dealers from other French towns and also from Flanders, Italy, Germany, and England. Bankers also were frequently present in order to lend their money. Fairs represented the most important form of commercial activity of the times.

Risks of Medieval Commerce. The extensive commerce of the latter part of the medieval period was carried on at very great risk, because of constant rivalry and open warfare between great commercial cities. There was no central government sufficiently powerful to enforce its laws and to guarantee security. Shipments on land and by inland waterways were subject both to innumerable and excessive tolls and to constant danger from highway robbers. Similarly, coasting vessels always had to be ready for battle with pirates or with ships from rival cities.

Venice and the Hanse. In the north of Europe, during the 13th and the 14th century, the great commercial cities of Lubeck, Hamburg, Cologne, Danzig, and many others united, for mutual protection, into an organization known as the Hanse, or Hanseatic league. This league became extremely powerful and had complete control of commerce with the countries on the Baltic and, to a large extent, with those on the North Sea.

On the Mediterranean the struggle for supremacy was largely between Venice and her chief rivals, Genoa and Pisa. Leadership was secured to Venice by the crafty manner in which the doge, Enrico Dondolo, directed the energies of the Fourth Crusade, first to the capture of Zara, a rival Christian city, and next, in 1203, to the subjugation of Constantinople. Venice then completely dominated the trade with the East, and developed commerce to a degree never before attained. Venetian methods of banking and bookkeeping represented standards that were copied throughout the commercial world.

Between Venice and northern Europe, commerce was carried on in two ways: Traders from central and southern Germany were permitted to bring their metals, furs, coarse textiles, twine, and leather over the Alps by way of the Brenner or the Saint Gotthard pass, to Venice. By sea, the Venetian galleys, with their precious cargoes of spices, dyes, alum, fine textiles, weapons, and paper, traveled to Flanders. Bruges, which was succeeded in the 15th century by Antwerp, was the common center at which the wares of Venice were traded for the fish, furs, coarse textiles, wax, grain, and salt meat brought by the ships of the Hanseatic league, and for the wool, tallow, leather, tin, and lead of England. English exports at this time were almost entirely under the control of the "Merchants of the Staple," a society composed chiefly of foreigners.

MODERN COMMERCE

During the 14th and the 15th century, England, France, and Spain were becoming nations in which many loosely connected feudal divisions were gradually merged under comparatively strong central governments. Then, for the first time, the individual cities of Italy and the weak organization of the Hanse came into conflict with commercial rivals who had less experience but were more powerful and determined than themselves.

Portugal, under the direction of wise rulers, had already attained the leadership in navigation; not because the Portuguese were better sailors than the Venetians, the Genoese, or the mariners of the Hanseatic league, but because they received encouragement and assistance from their government.

New Trade Routes. In the East, the ancient land routes by which the commerce of India and of China had reached Venice were gradually cut off by the spread of Turkish power. As a result, each of the important European nations was actively searching for the "Eastern passage" by which their ships could reach the fabulously rich countries of the Orient.

In 1492, Columbus, a Genoese in command of Spanish vessels, sailed west until he reached the New World, which blocked the direct route to Asia. Cabot, an Italian master of an English ship, reached North America in 1497. Finally, by sailing around Africa, Vasco da Gama, a Portuguese, established trade by sea with India in 1498, and returned home the next year with goods that sold for sixty times the cost of the voyage. In 1522 the expedition which had set out from Spain three years before under command of Magellan completed the first voyage around the world.

The Portuguese obtained the rewards due the winner of the race to the East, for to them Pope Alexander VI assigned all of Africa and of Asia, with the exception of the Philippines. The Americas, except Brazil, were allotted to Spain.

The Struggle for Supremacy. The open seas now became the highway on which the ships of Portugal, Spain, France, and England speeded in order to obtain as much as possible from the newly found sources of wealth. Portuguese ships brought back great quantities of Eastern products which, because of the increased supply, eventually sold at prices low enough to change such important commodities as tea, coffee, and sugar from luxuries to necessities. Lisbon for a time succeeded Antwerp as the most important city of commerce.

Spain. During the century which followed the discovery of America, Spain became the richest and most important country on the earth. From her colonies she received enormous quantities of gold

WORLD'S PROGRESS IN COMMERCE AND PRODUCTION

Year	Population	Total Commerce	Commerce per Capita	Ships, Sail	Ships, Steam	Railways
		Dollars	Dollars	Tons	Tons	Miles
1840	950,000,000	2,789,000,000	2.93	9,012,000	368,000	5,400
1850	1,075,000,000	4,049,000,000	3.76	11,470,000	864,000	24,000
1860	1,205,000,000	7,246,000,000	6.01	14,890,000	1,710,000	67,400
1870	1,310,000,000	10,663,000,000	8.14	12,900,000	3,040,000	139,900
1880	1,439,000,000	14,761,000,000	10.26	14,400,000	5,880,000	224,900
1890	1,488,000,000	17,519,000,000	11.80	9,166,000	8,295,000	390,000
1900	1,543,000,000	20,105,000,000	13.02	6,674,000	13,857,000	500,000
1910	1,616,000,000	33,634,000,000	20.81	4,624,000	22,046,000	637,000
1920	1,730,000,000	61,277,000,000	35.42	4,066,000	32,092,000[3]	710,600
1930	2,000,000,000	69,526,000,000[1]	34.28[1]	.....	69,734,310[4]	706,090
1940	2,170,000,000	27,706,000,000[2]	12.92[2]	.....	69,439,659[5]	756,781[6]
1950	2,400,000,000	58,400,000,000	24.31	.....	75,718,000	783,679

Year	Telegraphs	Cables [8]	Cotton	Coal	Pig Iron	Gold Production
	Miles	Miles	Pounds	Short tons	Long tons	Dollars
1840	.....	.....	1,310,000,000	44,800,000	2,700,000	134,800,000
1850	5,000	25	1,435,000,000	81,400,000	4,700,000	363,900,000
1860	100,000	1,500	2,551,000,000	142,300,000	7,200,000	1,334,000,000
1870	281,000	15,000	2,775,000,000	213,400,000	11,900,000	1,263,000,000
1880	440,000	49,000	3,601,000,000	340,000,000	18,000,000	1,150,800,000
1890	768,000	132,000	5,600,000,000	466,000,000	27,200,000	1,060,100,000
1900	1,180,000	200,000	6,247,000,000	800,000,000	40,400,000	2,100,000,000
1910	1,307,000	291,000	9,013,000,000	1,141,600,000	65,800,000	3,780,700,000
1920	1,592,000	.....	9,405,000,000	1,305,000,000	68,300,000	4,253,800,000
1930	7,119,665	360,613	12,900,000,000	1,196,003,000	80,289,000	3,846,848,000
1940	6,730,500[7]	344,079[2]	14,770,820,000	1,615,972,000[2]	104,000,000	8,562,100,000
1950	5,089,000	344,079[2]	13,750,000,000	1,441,257,000	112,800,000	8,610,000,000

[1]1929. [2]1938. [3]Includes motor ships. [4]Gross Tons, includes motor and sail ships. [5]Includes barges, motor and sail ships, 1939. [6]1937. [7]1939. [8]Nautical miles. [9]For decade ending year named.

and silver, and also many valuable cargoes of hides, drugs, dyes, cocoa, vanilla, and sugar. Manufacturing industries at home were developed on a large scale for the production of silk and woolen textiles, wines, soap, salt, and many other commodities. In addition to manufactured articles, Spain exported figs, raisins, olives, olive oil, iron ore, and large amounts of mercury for use in obtaining gold and silver at the mines of Mexico and Peru.

All of these great advantages were nullified and finally destroyed by a prolonged period of bad government, marked especially by exorbitant taxes of every kind, and by a policy of exploitation rather than assistance in connection with the colonies. So serious were the results that the population declined rapidly, and some great commercial cities retained only one-fourth of their former inhabitants.

Portugal. The commercial greatness of Portugal was open to attack by her rivals, because it lacked the firm foundation of domestic production. The Portuguese were excellent traders, but their country was small and was not developed industrially. Manufactured articles for export were not made at home but had to be purchased from other European countries. Consequently, England and the Netherlands were eventually able to cut off Portugal's supply of export goods, and to fill the Eastern demand themselves. In addition to this fundamental lack of commercial stability, Portugal fell under the harmful rule of Spain during the 60 years between 1581 and 1640. By the time the Spanish yoke was cast off, England had broken Portuguese control in India, and the Netherlands had taken the islands of Ceylon, Sumatra, Java, and the valuable Moluccas, or Spice islands.

The Netherlands. Dutch traders were quick to take advantage of the opportunities offered by the decline of Spain and Portugal. Their ships traveled to India and to the Eastern islands, and were equally active in European trade. Most of the wool exported by Spain was carried to northern countries by Dutch vessels, which also entered the Baltic and returned with cargoes from Russia.

At home, large business companies grew up, the manufacture of silk and of leather was developed, the fishing industry increased until more than 2000 fishing boats were regularly employed, and business of all forms was greatly stimulated. The Netherlands became the financial center, and Amsterdam the most important commercial city, of Europe.

Unfortunately for the country, a strong central government was lacking, corruption became common among high officials, and taxes were greatly increased. The volume of commerce ceased to grow after 1730. In 1798 the Dutch East India Company, which had ruled all of the Eastern possessions and for 180 years had paid average annual dividends of over 18 per cent, came to an end. Its debts of more than 50 million dollars were assumed by the government.

France. Among the five European nations that achieved commercial power during the modern period of 1500 to 1800, France was one of the two which a historian in the 16th century would probably have selected as most likely to reach and to keep first place. Portugal and the Netherlands were obviously handicapped by their lack of area and domestic resources. But France and Spain were the largest and richest countries of western Europe, and both had extensive coast lines. In exploration, France surpassed both the English and the Dutch, while in area of foreign colonies, she was second only to Spain.

France did develop a prosperous trade with the Levant and with Italy and Spain, but this could not become of first importance because faulty political organization raised almost insuperable obstacles to the free flow of commerce.

The greatest checks to commerce within the country were due to the existence of feudal divisions which prevented national unity, to the continuance of the guilds long after these organizations had been displaced in more progressive nations, and to the establishment of an absolute monarchy wherein the correction of existing evils was impossible unless the ruler was unusually strong and wise. High customs duties were collected whenever goods entered the country and also when they crossed from one internal division to another. The quarrels and the strict regulations of the numerous guilds

CANADIAN SHIPPING

Seagoing Vessels Entered and Cleared at Principal Ports, 1949

Ports	Entered		Cleared		Total Shipping			
					Entered		Cleared	
	No.	Tonnage	No.	Tonnage	No.	Tonnage	No.	
Chemainus, B. C.	334	354,601	380	582,231	841	695,189	844	695,548
Halifax, N. S.	936	3,170,720	1,019	3,402,325	1,805	3,956,617	1,822	4,070,147
Montreal, Que.	1,459	4,240,698	1,917	4,876,248	4,745	8,061,604	4,869	8,097,746
New Westminster, B. C.	582	1,023,830	685	1,499,940	3,430	2,360,902	3,406	2,391,080
North Sydney, N. S.	238	111,403	234	110,219	1,720	506,092	1,729	505,681
Powell River, B. C.	186	123,268	210	169,077	3,876	1,528,379	3,876	1,529,796
Prince Rupert, B. C.	1,507	382,605	1,515	380,245	3,186	1,011,099	3,161	1,008,820
Quebec, Que.	324	1,240,169	343	1,169,806	2,671	3,652,194	2,666	3,653,220
Saint John, N. B.	495	1,451,192	527	1,447,696	1,561	2,373,469	1,558	2,387,595
Sydney, N. S.	128	296,609	126	280,392	991	1,633,013	992	1,632,277
Three Rivers, Que.	117	301,758	265	594,328	2,001	2,163,297	2,000	2,163,237
Vancouver, B. C.	2,113	4,525,479	2,131	4,783,372	22,933	14,294,639	23,115	14,323,849
Victoria, B. C.	2,680	3,826,301	2,684	4,121,875	7,055	7,570,199	7,038	7,574,323
Yarmouth, N. S.	355	128,822	385	124,448	819	148,836	822	148,727

largely prevented any improvements in methods of manufacture, and, finally, selfish monarchs entered upon a series of wars which gained nothing at home and lost most of the colonies abroad.

England. In spite of serious wars and intense commercial competition with larger countries, England, by 1750, had become the dominating factor in world commerce. Of the various reasons for her success, two may be considered as fundamental: First, she was a part of Europe and yet was separated from the continent by a wide channel which effectively prevented invasion by land; this condition made the possession of a powerful navy a primary necessity for national safety. Second, England acquired a coherent central government much sooner than did her rivals, and this government was far more flexible and democratic than theirs.

As a basis for exchange with other countries, England had from very early times the products of her sheep industry and of her mines. Manufacturing industries were gradually developed, which changed these raw materials into cloth and metal products. Ships were required to carry the excess production to other countries, and ships were needed also for protection and to supply trained sailors to the navy in time of war. The government, therefore, adopted the policy of encouraging shipping and commerce. Whenever possible, special privileges were secured by the state for English merchants, and success in battle usually meant the addition of foreign colonies in which an extension of trade could be expected.

English Trading Companies. During the 17th century, English commerce was to a large extent controlled by trading companies such as the East India Company, the Guinea Company, the Virginia Company, and the Hudson's Bay Company. A trader who was not a member of one of the companies could deal only with France, Spain, or Portugal. The strict control and regulations of the companies provoked so much antagonism that they finally lost their power and disbanded. The Hudson's Bay Company, however, still exists as an ordinary business corporation.

Having extensive colonies which supplied raw materials and required manufactured articles in return, together with a powerful merchant marine for the distribution of her products, England experienced at home a high degree of industrial development. Textiles and products of iron and steel were the chief commodities manufactured and exported. Homeward bound ships brought wool, cotton, naval stores, grain, sugar, tea, coffee, spices, tobacco, and rum; also silk, linen, and other foreign

GROWTH OF CANADIAN COMMERCE

Imports and Exports of Merchandise, 1870–1950

Fiscal Year	Imports				Exports			
	From Great Britain*	From United States	From Other Countries	Total	To Great Britain*	To United States	To Other Countries	Total
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1870	37,537,095	21,697,237	7,667,742	66,902,074	22,512,991	30,361,328	6,169,271	59,043,590
1880	33,764,439	28,193,783	7,942,320	69,900,542	35,208,031	29,566,211	8,125,455	72,899,697
1890	43,277,009	51,365,661	17,039,903	111,682,573	41,499,149	36,213,279	7,545,158	85,257,586
1900	44,280,041	102,224,917	26,146,718	172,651,676	96,562,875	57,996,488	14,412,938	168,972,301
1910	95,337,058	218,004,556	56,976,585	370,318,199	139,482,945	104,199,675	35,564,931	279,247,551
1920	126,362,631	801,097,318	137,068,174	1,064,528,123	489,152,637	464,028,183	286,311,278	1,239,492,098
1930	252,703,704	847,442,037	148,127,841	1,248,273,682	379,650,268	515,049,763	225,558,271	1,120,258,302
1932	147,811,993	351,686,775	79,005,136	578,503,904	220,064,411	257,770,160	122,201,241	600,035,812
1933	120,384,324	232,548,055	53,451,365	406,383,744	222,118,927	197,424,723	108,520,628	528,064,278
1934	140,403,886	238,187,681	55,207,058	433,798,625	339,006,389	220,072,810	106,874,872	665,954,071
1935	156,186,471	303,639,972	62,604,710	522,431,153	358,199,478	304,721,354	93,705,093	756,625,925
1936	177,721,310	319,479,594	65,518,159	562,719,063	399,311,479	360,302,426	89,416,512	849,030,417
1937	198,182,055	394,419,012	79,274,499	671,875,566	495,598,105	435,014,544	130,569,257	1,061,181,906
1938	186,098,604	424,730,567	66,622,183	677,451,354	442,902,437	270,461,189	124,220,291	837,583,917
1939	188,900,276	496,898,466	65,256,792	751,055,534	430,806,546	380,392,047	113,727,511	924,926,104
1940	267,383,135	744,231,156	70,336,428	1,081,950,719	655,957,139	442,984,157	80,013,124	1,178,954,420
1941	359,942,070	1,004,498,152	84,351,428	1,448,791,650	878,640,907	599,713,463	142,648,805	1,621,003,175
1942	273,776,546	1,304,679,665	65,785,722	1,644,241,933	1,153,816,747	885,523,203	324,433,346	2,363,773,296
1943	238,631,372	1,423,672,486	72,773,032	1,735,076,890	1,401,661,623	1,149,232,444	420,581,210	2,971,475,277
1944	220,353,906	1,447,225,915	91,318,376	1,758,898,197	1,620,450,900	1,301,322,402	518,179,863	3,439,953,165
1945	271,668,462	1,202,417,634	111,689,046	1,585,775,142	1,486,847,837	1,196,976,726	534,505,790	3,218,330,353
1946	340,500,712	1,405,296,699	181,481,991	1,927,279,402	904,700,873	887,940,676	519,573,752	2,312,215,301
1947	354,393,855	1,974,679,178	244,871,092	2,573,944,125	1,168,501,085	1,034,226,394	572,174,876	2,774,902,355
1948	504,113,878	1,805,762,785	327,068,689	2,636,945,352	1,032,391,006	1,500,986,721	542,060,358	3,075,438,085
1949	494,228,816	1,951,860,065	315,118,360	2,761,207,241	1,015,022,448	1,503,458,711	474,479,819	2,992,960,978
1950	645,624,296	2,130,475,929	398,152,913	3,174,253,138	655,089,381	2,020,987,630	442,309,540	3,118,386,551

*Figures refer to Great Britain until 1925; thereafter to all British countries apart from Canada.

textiles. It must not be thought that all of this commerce depended on the colonies, for, at the end of the 18th century, more than half of England's trade was carried on with Europe. The trade with America ranked second in value. That with Africa was very much smaller, but was considered important because it furnished a supply of slaves for sale in America and the West Indies.

Canadian Commerce. The early commerce of Canada was largely under the control of monopolistic companies chartered by the French government. When England conquered the country, this control passed to British traders who confined their commerce almost entirely to the homeland. Trade with the United States was at first carried on by smugglers, until the restrictions on normal traffic were at last removed by Great Britain.

In 1870, Canadian foreign commerce amounted to about 132 million dollars, of which 43 per cent went to Great Britain and 36 per cent to the United States. In 1930, the total commerce had increased to 2368 million dollars, but only 20 per cent went to Great Britain, while 58 per cent went to the United States. During the period 1870 to 1941 the total value of Canadian foreign trade increased from $36.46 to $142.56 *per capita*, making her in this respect the leading trading nation of the world.

To England, Canada sends chiefly grain and meat. Chief exports to the United States were newsprint, wood pulp, wheat, and whiskey. Imports are composed largely of manufactured articles. As shown by the accompanying tables, the Canadian importations from the United States greatly exceed in value those from Great Britain in every group except textiles.

IMPORTS OF CANADA, 1950[1]

Classes of Merchandise	From Great Britain	From United States	From All Countries
	Dollars	Dollars	Dollars
Agricultural and Vegetable products	27,960,410	180,071,719	484,475,331
Animals and Animal products	9,722,031	57,239,707	86,967,642
Fibers and Textiles	112,913,155	151,775,914	364,508,831
Wood and Paper	3,681,765	92,329,456	100,365,624
Iron and its products	148,849,915	811,007,787	980,229,068
Nonferrous metals	38,320,797	135,685,578	215,526,566
Nonmetallic minerals	30,201,816	430,858,904	611,741,427
Chemicals and allied products	14,047,043	134,603,008	158,221,055
All other commodities	18,516,517	136,903,766	172,217,594
Total	404,213,449	2,130,475,929	3,174,253,138

EXPORTS OF CANADA, 1950[2]

Classes of Merchandise	To Great Britain	To United States	To All Countries
	Dollars	Dollars	Dollars
Agricultural and Vegetable products	228,795,224	176,936,913	636,897,823
Animals and Animal products	53,346,185	253,332,871	365,775,038
Fibers and Textiles	1,138,726	18,342,986	29,573,450
Wood and Paper	40,686,608	1,016,395,752	1,112,945,061
Iron and its products	10,099,505	136,445,450	251,108,538
Nonferrous metals	117,400,678	267,043,186	457,262,306
Nonmetallic minerals	9,526,836	73,982,954	103,654,760
Chemicals and allied products	5,993,095	58,498,824	100,525,482
All other commodities	2,923,154	20,008,694	60,644,093
Total	469,910,011	2,020,987,630	3,118,386,551

[1]Excluding gold in all cases. Since September 1939, information as to the movement of gold has not been available. Export of non-monetary gold in 1950 was $162,600,000. [2]Including aircraft and ships.

UNITED STATES

The preceding sections relate the story of commercial progress on the earth, from the days of ancient Babylon to the beginning of the 19th century. At the conclusion of this 4800-year period of development, world commerce had reached a yearly value of about one and one-half billion dollars. Of the total, the United States of America was credited with about one-tenth.

World commerce, due to advanced methods of transportation and communication, increased tremendously from 1800 to the present time, while from 1800 to the beginning of World War I the rise of American foreign commerce was almost proportional to that of the rest of the world. Assembly line methods in production of ships and planes enabled America to lead the world in World War II in its merchant marine tonnage, rail transportation, and air transport.

In the following paragraphs, the development of foreign commerce in the United States is given especial attention. The corresponding growth in other nations is indicated by the commercial relations of these countries with America, and by the comparative importance of each in world trade.

The commerce of the English colonies in North America was such as would be expected between fertile, newly discovered lands, and the older, more advanced countries. Food and raw materials, consisting chiefly of flour, grain, tobacco, lumber, fish, potash, and indigo, were exported in exchange for textiles and other manufactured articles, and for colonial products such as sugar, molasses, coffee, and tea.

It is surprising to note that after the Revolution the United States continued to trade chiefly with England, although that country closed the ports of the West Indies to American ships. The European wars between England on one side, and France, Spain, and the Netherlands on the other, afforded the new nation its first great commercial opportunity. Having ships and sailors equal to any in the world, the American merchant marine developed rapidly, and carried a large share of the world's commerce while Europe was busily engaged in warfare.

This commercial growth received serious checks when France and England both placed arbitrary restrictions on neutral shipping. A general embargo, ordered by the American government in 1807 as a means of retaliation, proved even more disastrous. Commerce declined until the conclusion of the War of 1812, and then, after a few years of sharp fluctuations, experienced a long period of slow growth.

Expansion and Development. This period was, for the United States, one of active territorial expansion and economic development. The West grew rapidly, and in various parts of the country improved highways, new canals, or steamboats on the large rivers supplied better means of transportation. At the same time, more and better manufactured commodities were produced by industries which had originated or developed during the seven years between the passing of the Embargo act and the end of the War of 1812. Domestic manufacturers fought hard to retain the home market which had been created by the temporary shortage of foreign goods. They succeeded to a notable extent because their increased *production* was accompanied

by an even greater increase in *demand*, together with great improvements in the natural means of *distribution*. Although the *per capita* consumption of foreign goods decreased, the total amount of foreign trade continued to increase, and was carried chiefly by American ships. During this period the American merchant marine approached very closely in size that of Great Britain, and was second to none in skill and efficiency.

The change in the economic condition of the country is well shown by the changes in the list of exports. In 1800, grain amounted to one-third, and cotton to less than one-fourteenth, of all exported merchandise; in 1860, cotton accounted for four-sevenths of the total, and grain for only one-thirteenth. Manufactured goods, which stood very low on the earlier list, were second only to cotton in 1860.

Triangular Exchange. The South gave all of its energies to the production of cotton. The North developed extensive manufacturing industries, but it also produced sufficiently large amounts of grain and meat to supply the entire nation and still to have a surplus for export. From New Orleans, enormous quantities of cotton were shipped to Europe. Europe returned to New York textiles, articles manufactured from iron and steel, and luxuries. Finally, the cycle was completed and the South received compensation for its cotton in the form of food and manufactured products sent from the North.

Effects of Civil War. Intersectional warfare checked for a time the development of American commerce; it decided that the country should be one political unit; and it abolished slavery. It also had the effect of definitely marking the economic paths to be followed by the opposing sections. The world demand for cotton, and the consequent high prices paid for this staple, forced the South to resume the production of white fiber as rapidly as possible. In the North, a shortage of labor accentuated the advantages that were to be obtained by the extensive use of machinery in the factories and on the farms.

In an earlier paragraph, the year 1838 has been given as the beginning of the period in which ocean commerce was carried by steamships. Obviously, the change was not made abruptly in any single year. Sailing vessels, in 1850, were still carrying the larger part of seagoing traffic, although the more efficient steamer was gradually supplanting its rival. The use of railroads and of power machinery had a similar period of development.

1850 to 1900. During the second quarter of the 19th century the annual production of coal increased from one-half million to six million tons, and the economic value of railroads was clearly demonstrated. Between 1850 and 1860, thousands of miles of track were laid, especially in the middle west. Our domestic exports, which amounted to 316 million dollars in 1860, averaged less than 225 million dollars a year until 1870; but by 1880 they became 824 million, and in 1892 they exceeded one billion dollars for the first time.

The last half of the 19th century was marked throughout the civilized world by the expansion of industrial and commercial activities. That the United States was able to hold a position of decided commercial importance is shown by the tables, *Economic Growth of the United States* and *World's Progress in Commerce and Production.*

Merchant Marine. This position was retained in spite of a great decline in American shipping. Many conditions contributed to this marked decrease in tonnage. The country was expanding and developing so rapidly that there were unusual opportunities for profits in domestic rather than in foreign trade. Higher tariff rates gave protection to home industries but did not help the merchant marine. Lower priced, foreign built ships were not purchased because, according to the law, they could not obtain American registry. And, finally, we were not prepared to build iron ships at a cost that could compete with those built in England.

In 1860, 70 per cent of our exports and 63 per cent of the imports were carried by American vessels. These ratios fell to about 10 per cent in 1910 but rose to more than 35.8 per cent by 1935. The foreign commerce of the United States amounted to $21.26 *per capita* in 1860. Fifty years later, although population was three times as great, the figures had in-

FOREIGN TRADE (COMMERCE) OF LEADING COUNTRIES*

Showing their trade with the United States

Country	Imports		Imports from the United States		Exports		Exports to the United States	
	Total	Per Cap.			Total	Per Cap.		
	Dollars	Dol.	Dollars	%	Dollars	Dol.	Dollars	%
Argentina	430,374,000	33.20	75,960,000	17.6	437,922,000	33.80	37,071,000	8.5
Australia	556,387,000	80.30	88,431,000	15.9	557,961,000	80.50	13,403,000	2.4
Belgium	763,518,000	88.20	84,084,000	11.0	724,394,000	83.65	48,747,000	6.7
Bolivia	25,754,000	7.60	6,556,000	25.4	34,613,000	10.20	1,595,000	4.6
Brazil	295,389,000	6.70	71,518,000	24.2	295,558,000	6.70	101,437,000	34.3
Bulgaria	61,302,000	9.60	1,662,000	27.1	69,305,000	10.85	2,362,000	3.4
Canada	676,601,000	60.35	424,008,000	6.3	825,205,000	73.60	258,625,000	3.1
Chile	102,835,000	22.15	28,634,000	27.8	140,737,000	30.35	22,122,000	1.6
China	263,938,000	.55	44,817,000	17.0	163,133,000	.35	18,552,000	11.4
Colombia	89,063,000	10.25	44,422,000	49.9	80,796,000	9.30	42,605,000	52.7
Costa Rica	12,621,000	20.25	6,165,000	49.1	10,146,000	16.30	4,628,000	45.6
Cuba	106,007,000	25.40	75,152,000	70.9	142,678,000	34.20	108,363,000	76.0
Czechoslovakia	291,448,000	21.40	29,602,000	10.2	335,491,000	25.15	22,978,000	6.8
Denmark	354,728,000	93.90	27,920,000	7.9	334,986,000	88.70	3,856,000	1.2
Dominican Republic	11,342,000	7.15	6,088,000	53.5	14,111,000	8.95	4,371,000	31.5
Ecuador	11,068,000	4.00	3,829,000	34.6	12,619,000	4.60	4,733,000	37.5
Egypt	184,498,000	11.60	12,312,000	6.7	143,308,000	9.10	3,547,000	2.5
Estonia	28,525,000	25.15	1,872,000	6.6	27,655,000	24.40	1,228,000	4.4
Finland	185,445,000	48.35	19,252,000	10.4	180,532,000	47.05	16,684,000	9.2
France	1,334,189,000	31.80	151,894,000	11.4	880,686,000	21.00	48,406,000	5.5
Algeria	143,832,000	19.90	2,393,000	1.7	163,615,000	22.60	2,806,000	1.7
Tunisia	44,906,000	17.20	1,610,000	3.6	39,261,000	15.05	2,026,000	5.2
Morocco, French	63,396,000	10.05	3,376,000	5.3	43,884,000	6.95	812,000	1.9
Germany (old)	2,188,657,000	32.15	162,494,000	7.4	2,111,399,000	31.00	59,814,000	2.8
Greece	132,233,000	18.60	9,581,000	7.2	90,916,000	12.80	15,507,000	17.1
Guatemala	16,761,000	5.50	7,492,000	44.7	16,336,000	5.35	11,346,000	69.5
Haiti	7,595,000	2.80	4,126,000	54.3	6,946,000	2.55	2,972,000	42.8
Honduras	9,468,000	10.70	5,871,000	62.0	7,356,000	8.30	6,362,000	86.5

*Figures are derived from or based on official data published by the United States Bureau of Foreign and Domestic Commerce. Per capita trade figures are calculated from population statistics of year as determined either by census or official estimate.

FOREIGN TRADE (COMMERCE) OF LEADING COUNTRIES—Con.

Showing their trade with the United States

Country	Imports		Imports from the United States		Exports		Exports to the United States	
	Total	Per Cap.			Total	Per Cap.		
	Dollars	Dol.	Dollars	%	Dollars	Dol.	Dollars	%
Hungary	122,942,000	12.15	6,282,000	5.1	153,449,000	15.15	3,740,000	2.4
India	561,497,000	1.55	41,736,000	7.4	592,018,000	1.60	48,953,000	8.3
Burma	74,600,000	5.10	2,700,000	3.6	171,600,000	11.70	300,000	.2
Ireland (Eire)	202,445,000	68.75	23,003,000	11.4	116,753,000	39.65	555,000	.5
Italy	585,172,000	13.40	69,213,000	11.8	545,991,000	12.50	40,707,000	7.5
Japan	757,746,000	10.50	260,660,000	34.4	765,240,000	10.60	123,836,000	16.2
Latvia	44,026,000	22.55	2,788,000	6.3	44,000,000	22.55	623,000	1.4
Lithuania	37,602,000	14.60	1,387,000	3.7	39,292,000	15.25	948,000	2.4
Malaya, British	313,628,000	61.45	9,751,000	3.1	325,121,000	63.70	97,328,000	30.0
Mexico	109,694,000	5.65	63,255,000	57.7	186,064,000	9.55	125,396,000	67.4
Netherlands	778,250,000	89.25	84,367,000	10.8	571,629,000	65.55	20,430,000	3.6
Netherlands Indies	263,056,000	4.10	33,104,000	12.6	360,233,000	5.60	49,072,000	13.6
New Zealand	217,449,000	134.40	26,913,000	12.4	221,532,000	136.90	5,611,000	2.5
Nicaragua	5,120,000	5.10	3,058,000	59.7	5,884,000	5.90	3,961,000	67.3
Norway	292,986,000	100.30	29,261,000	10.0	193,219,000	66.15	14,978,000	7.8
Paraguay	8,982,000	9.40	860,000	9.6	8,251,000	8.65	1,010,000	12.2
Peru	58,328,000	8.95	20,005,000	34.3	76,705,000	11.80	20,560,000	26.8
Philippines	132,607,000	8.30	90,357,000	68.1	115,795,000	7.25	89,445,000	77.2
Poland	245,135,000	7.10	29,878,000	12.3	223,437,000	6.50	11,868,000	5.3
Portugal	101,121,000	13.90	11,396,000	11.3	50,506,000	6.95	2,663,000	5.3
Rumania	137,474,000	7.05	6,670,000	4.9	157,726,000	8.05	2,074,000	1.3
Russia (U.S.S.R.)	284,576,000	1.65	81,172,000	28.5	266,385,000	1.55	19,350,000	7.3
Salvador, El	9,147,000	5.60	4,275,000	46.7	10,946,000	6.70	6,759,000	6.2
South Africa, Union of	416,979,000	41.80	80,066,000	19.0	136,115,000	13.65	3,441,000	2.5
Sweden	524,579,000	83.15	85,294,000	16.2	464,509,000	73.60	41,651,000	9.0
Switzerland	363,322,000	86.85	28,648,000	8.0	300,823,000	71.90	20,753,000	6.9
Thailand (Siam)	50,891,000	3.50	2,579,000	4.0	75,916,000	5.25	546,000	.7
Turkey	120,033,000	7.05	12,561,000	10.5	116,115,000	6.85	14,234,000	12.3
United Kingdom	4,500,388,000	94.75	576,398,000	12.8	2,302,338,000	48.50	100,153,000	4.4
United States	1,949,624,000	14.70			3,057,169,000	23.05		
Alaska	42,852,000	595.15	42,677,000	99.6	56 650,000	786.80	56,045,000	98.9
Hawaii	109,252,000	258.30	101,818,000	93.2	115,096,000	272.10	113,207,000	98.4
Puerto Rico	88,684,000	47.45	80,746,000	91.0	86,531,000	46.30	84,664,000	97.8
Uruguay	42,688,000	20.00	5,040,000	11.8	54,887,000	25.75	2,180,000	4.0
Venezuela	97,812,000	28.20	55,287,000	56.5	275,545,000	79.45	35,271,000	12.8
Yugoslavia	115,005,000	7.35	6,921,000	6.0	116,671,000	7.45	5,914,000	5.1

For footnote see foot of page 1204.

creased to $34.78. In 1920, following the World War, the amount became $120.81, but fell to $77.59 by 1929. It was $48.92 in 1940.

Exports and Imports of the U. S. American exports were formerly composed of large quantities of comparatively few types of products. In 1860, 80 per cent of these were agricultural. In 1940, although raw cotton was still one of the largest items of export, manufactured goods formed by far the largest group, automobiles and machinery taking the lead. Petroleum, steel, tobacco, copper, fruits, and nuts are other important exports.

The imports consist mainly of manufactured articles, raw materials, and food. Manufactured goods, which, in 1860, amounted to more than one-half the total, in 1940 comprised less than one-fifth. The principal items of import include rubber and tin from British Malaya and the Dutch East Indies, silk from Japan, wood pulp, newsprint, nickel, and asbestos from Canada, tea from China and Ceylon, jute and shellac from India, coffee from Brazil, cocoa from West Africa, sugar from Cuba, and bananas from Central America.

Customers of the U. S. In 1913 the total foreign trade of the United States was 4240 million dollars. The leading nations sharing this trade were: Great Britain 18 per cent, Canada 13, Germany 12.5, France 7, Cuba 4.5, Japan 3.8, The Netherlands 3.8, Brazil 3.3, Italy 3.2, and Mexico 3.1.

In 1938, the total foreign trade of the United States stood at a figure only 20 per cent higher but with marked changes in the percentages shared by some of the chief participating countries, indicated as follows: Canada 13.5, Great Britain 13.4, Japan 7.6, Germany 4.4, France 4.0.

Internal Commerce of the U. S. Although the United States ranks high in world commerce, the internal or domestic trade is of far greater importance. Within American boundaries, sections of widely diversified economic and geographical character specialize in the production of commodities to which the locality is best adapted. Excess production may be transported to any part of the country, or may be shipped out without any hindrance of toll or tariff except the cost of transportation. The great size of this free market has been a vital factor in American economic development.

World Commerce. Until 1938, Great Britain led the world in total volume of foreign commerce. In 1946, the United States emerged from World War II as the world leader in foreign trade, having $787,200,000 monthly value of exports and an import value of $383,500,000 monthly. Following the United States in exports came the United Kingdom, Canada, Argentina, Brazil, Australia, France, Switzerland, Sweden, and Belgium. In the value of imports, the United Kingdom led the United States slightly, with France, Canada, Belgium, Netherlands, Switzerland, Sweden, and Australia coming next in the order mentioned. Recent economic developments, such as German and Japanese rehabilitation and the Marshall Plan or European Recovery Program, assure the United States an increased activity in the shipment of food, fuel, manufactured articles, and raw materials to the countries concerned.

In 1948, the sixteen nations willing to work together under the Marshall Plan signed a convention forming the Organization for European Economic Co-operation. The participating nations pledged themselves to close economic co-operation and the preparation and execution of a joint recovery program. It called for credits and loans for the four years 1948-51 of approximately 22 billion dollars.

Characteristics of Modern Commerce. Commerce is a natural process. It permits of a division of labor, helps to adjust the productive inequalities of different lands and peoples, and makes possible the development of manufacturing and the consequent

growth of large cities. Foreign trade has a tendency to raise the standard of living.

Today, commerce supplies the necessities of existence to a large proportion of the population in all civilized countries. Consequently, the wares most characteristic of modern commerce are food, raw materials, manufactured articles, and fuel. The qualities characterizing modern commerce are safety, regularity, economy, and sensitiveness. These are due largely to the improvements that have been made in transportation, communication, and finance.

ECONOMIC DEPENDENCE OF THE UNITED STATES†

The United States is more favorably situated in regard to raw materials than any other country. Nevertheless, her high scale of living and enormous consuming power create many needs that cannot be satisfied by materials obtainable within her own territories. The following table presents a summary of the most essential commodities for which she is dependent chiefly on foreign sources of supply. Those in *italics* are of especial importance for national defense in the event of war. An asterisk (*) appears after those of which there is practically no supply native to the United States.

Material	Chief Uses	Quantity Imported 000 omitted	Chief Sources
*Antimony**	printing, glass enamels, cables	18,814 lbs.	Mexico, Bolivia
Bananas*	food	54,660 bnchs.	Honduras, Costa Rica
Bristles	brushes	4,827 lbs.	China
Camphor	celluloid, photographic films	147 lbs.	China
Castor Beans*	lubrication, perfumery	289,936 lbs.	Brazil, Haiti
Chalk	crayons, paints, polishes, linoleum	3,068 lbs.	United Kingdom
Chicle*	chewing gum	6,426 lbs.	Mexico
Chinawood Oil* (Tung)	paint, varnishes	64,968 lbs.	China, Argentina
Chromite	hard steels, paint	475,064 tons	Turkey, Philippines, Union South Africa, S. Rhodesia
*Cobalt**	steel alloys, colored enamels	7,603 lbs.	Belgium, Belg. Congo
Cocoa*	candy, beverages	631,573 lbs.	Brazil, Gold Coast
Coffee*	beverage	2,923,000 lbs.	Brazil, Colombia
*Cork**	bottle stoppers, life preservers, insulation	228,656 lbs.	Portugal, Spain, Algeria
Flaxseed	paint oil	8,274 lbs.	Canada
Graphite	lubrication, polish, paints, lead pencils	63,611 lbs.	Mexico, Ceylon, Madagascar
Gutta Percha*	insulation	440 lbs.	British Malaya
Hat Braids	hats	373,151 lbs.	China, Japan, Switz.,Mex.
Hides and Skins	shoe leather, travel goods	169,509 lbs.	Canada, Brazil, India, New Zea.
*Iodine**	disinfectant	490 lbs.	Chile
*Jute**	twine, burlap, bags, linoleum, carpet	587,706 lbs.	Pakistan, India
Kauri Gum*	varnishes	244 lbs.	Indonesia
Manganese	structural steel	1,347,000 lbs.	India, Un. S. Af., Gold Coast, Brazil
Mercury	explosives, medicinal agent	7,839 lbs.	Italy, Spain
Mica	electrical equipment, lubrication	24,934 lbs.	India, Brazil
*Nickel**	steel, electroplating	194,287 lbs.	Canada, Norway
Nitrate of Soda	fertilizers, explosives	676 tons	Chile
Nutgalls*	dyeing, inks, color printing	1,674 lbs.	China, Korea
*Nux Vomica**	medicinal agent	1,038 lbs.	India, Fr. Indochina, Fr. China
*Opium**	medicinal agent	32 lbs.	Turkey, Iran, Yugoslovia
Palm Oil	soap, tin plate	82,340 lbs.	Indonesia, Belg. Congo
Pigments (mineral earth)	paints	34,239 tons	Belgium, Canada, Spain
Platinum	electrical equipment, jewelry, chemical industries	5050 oz.	Canada, Columbia
Potash Materials	fertilizer	36,582 tons	Canada, Belgium, Germany
Pulp	paper	1,763 tons	Canada, Sweden
Quebracho Extract*	leather tanning	114,633 lbs.	Paraguay, Argentina
*Quinine** (*Cinchona* Bark*)	medicinal agent	453 lbs.	Guatemala, Indonesia, Philippines, Belg. Congo
Rabbit Fur and Coney	felt hats	23,566 lbs.	Australia, N. Zealand, Belgium
Rattan*	furniture	3,647 lbs.	Indonesia, Philippines, China, Br. Malaya
*Rubber** (crude)	tires, electrical equipment, footwear, raincoats	1,480,000 lbs.	Br. Malaya, Siam, Ceylon, Indonesia, Liberia, Belg. Congo
*Shellac**	varnishes, insulation, phonograph records, paint	12,778 lbs.	India, Siam
*Silk, Raw**	textiles	2,766 lbs.	Japan, China, Italy
Sisal Hemp	binder twine	126 tons	Mexico, Cuba, Haiti
Sugar	food, confections	7,457,000 lbs.	Cuba, Philippines, Dom. Rep.
Pagua Nuts*	buttons,	3,310 lbs.	Ecuador, Panama
Tea*	beverage	94,962 lbs.	India, Ceylon, China, Japan
Tin	canning, dyeing, textile mfr.	38,348 tons	Bolivia, Siam, Indonesia, Belg. Congo
Tungsten	high-speed steels, electric lights	6,688 lbs.	China, Korea, Siam, Bolivia, Spain
Vanadium	hard steels	985 lbs.	Peru
Wool, Carpet	rugs	117,572 lbs.	Argentina, China, Pakistan, India, New Zea., Australia, Syria, Lebanon, Iraq
Wool, Other	clothing	159,611 lbs.	Argentina, Uruguay, Brazil, New Zea., Australia

†Prepared in the Department of Commerce, by International Economic Analysis Division, Office of International Trade, from basic data of the Bureau of the Census.

COMMERCIAL RAW MATERIALS

By far the most important commercial raw materials are those commodities which are utilized for food, for clothing, for the production of machinery and of power, and for structural purposes. These are obtained from all parts of the earth as contributions from the three kingdoms of nature—the vegetable, the animal, and the mineral.

The following classification is based primarily on this natural division, and secondarily on the purpose for which each commodity is generally employed. In the various groupings are included the most important commercial raw materials, together with representative examples of a vast number which are of minor importance.

VEGETABLE PRODUCTS

Cereals: Wheat,—including emmer and spelt,—rice, corn, oats, rye, barley, the sorghums, millet, and buckwheat (not a true cereal but used as such).

Other Starchy Foods: Potatoes, yams, sweet potatoes, arrowroot, cassava (tapioca). See *Starch.*

Pulses: Peas, beans, lentils, soy beans.

Sugars: Cane sugar, beet sugar, maple sugar, palm sugar (jaggery), and glucose.

Vegetables: Artichoke, asparagus, beans (string), beet, cabbage, carrot, cauliflower, celery, cucumber, eggplant, endive, garlic, kohl-rabi, leek, lettuce, mushrooms, okra, onion, parsnip, peas (green), pumpkin, radish, rhubarb, spinach, rutabaga, squash, tomato, turnip, and various others.

Fruits: Orchard fruits,—apple, apricot, cherry, peach, pear, plum, prune, and quince; various grapes,—table, raisin, wine, and currant; berry fruits,—blackberry, blueberry, cranberry, currant, gooseberry, huckleberry, loganberry, mulberry, raspberry, and strawberry; melon fruits,—cassaba melon, muskmelon, watermelon; citrous fruits,—citron, grapefruit, kumquat, lemon, lime, and orange; subtropical fruits,—carob (Saint-John's-bread), date, fig, olive, persimmon, and pomegranate; tropical fruits,—avocado, banana, guava, mango, papaw, soursop, and tuna, or prickly pear.

Nuts: Almond (sweet and bitter),—Jordan almonds are a choice hard-shelled variety of sweet almond from Malaga, Spain; chestnut, native to the eastern United States, also imported from southern Europe; cashew nut, from India and Brazil,—poisonous until roasted; coconut, commonly grown in tropical countries; filbert, grown in southern Europe,—see *Hazelnut*; hickory nut, native to the eastern United States; litchi nut, a dried fruit from China; peanut, not a true nut but the fruit of a legume; pecan, both wild and cultivated in the southern United States; pine nuts, oily seeds of pines native to southern Europe and southwestern Asia; piñons, nuts from pines native to the southwestern United States and Mexico; pistachio, grown in Mediterranean countries; and the English walnut, extensively cultivated.

Beverages. The plant materials chiefly used for making beverages are coffee, the cleaned seeds of the coffee tree; cocoa, prepared from the seeds of cacao; maté, the dried leaves of a South American holly; and tea, the variously cured leaves of the Asiatic tea shrub. With these are sometimes grouped fermented beverages, such as beer, wine, sake (Japan), and pulque (Mexico), and also distilled liquors, such as whisky, brandy, rum, gin, mescal (Mexico), arrack (Orient), and vodka (Russia), which, strictly speaking, are manufactured products.

Timber. The most important kinds of commercial timber cut in the United States are shown in the table entitled *Production of Lumber in the United States.* Of imported woods, the most valuable include mahogany, teak, lignum-vitæ, Spanish cedar, Circassian walnut, rosewood, or Jacaranda (from Brazil), satinwood (from the East Indies and West Indies), ebony, greenhart (from South America), lancewood (from Jamaica), and rule boxwood (from West Indies and South America).

Fibers. Textile and cordage fibers include cotton, flax, hemp, jute, ramie, manila hemp, sisal hemp, bowstring hemp, sunn hemp, coir, pineapple fiber, and raffia. Among brush fibers are broom corn, piassaba (from the West Indies and from Brazil), saw palmetto (from Florida), and palmyra (from Ceylon). Other fibers or fiber-like products are kapok, or silk cotton; luffa, a vegetable sponge; Spanish moss, from the southern United States, used for upholstery; rattan, from the East Indies, used in making furniture, baskets, and whips. Fibers used for paper making are exceedingly numerous (See *Paper.*). Panama hat straw, or toquilla, is prepared from the young leaves of a South American screw pine.

Alkaloidal Stimulants and Narcotics. These include tobacco, the most extensively used narcotic; cola leaves, chewed by the Indians of South America; pituri leaves, used by the natives of Australia; the kola nut, containing caffeine, chewed by the natives of Africa; betel leaf and betel nut, widely used by Malayan peoples; hashish, from Indian hemp, used by the peoples of southern Asia; and opium, the dried juice of the poppy, used widely in the Orient.

Medicinal Plants. Many plants contain medicinal principles which experience has proved to be of such value that they are employed more or less widely by all civilized nations. Among plants used for their leaves are belladonna, one source of atropin; coca, the source of cocaine; digitalis, or purple foxglove, grown in Europe and in America; and senna, from Egypt and India. Some of the best-known medicinal roots are aconite, hydrastis (golden seal), gentian, ginseng, licorice, may apple, rhubarb, and sarsaparilla.

Among the most highly prized medicinal barks are cascara sagrada, native to California and Oregon, and cinchona, or Peruvian bark, the source of quinine, now obtained chiefly from cultivated trees in Java. Nux vomica (the source of strychnine), chaulmoogra, and the castor oil plant are valued for the medicinal properties of their seeds. Plants yielding medicinal juices include aloes and also the poppy, the source of opium. Among medicinal resins are asafetida, balsam of Peru, and guaiac.

Gums and Resins: Rubber, gutta-percha, balata, chicle (See *Sapodilla.*), gum arabic, gum Senegal, gum tragacanth, turpentine, rosin, and copal (See *Varnish.*).

Tanning Materials. These include various barks, woods, roots, fruits, and nuts which contain tannin. Among these are oak bark, hemlock bark, chestnut bark and wood, sumac leaves, canaigre root, myrobalans (unripe fruit), divi-divi (seed pods), quebracho wood, gambier (twigs and leaves), mangrove bark, and oak galls.

Dyestuffs: Logwood, fustic, Brazilwood, Lima wood, Osage orange, indigo, archil, and cudbear.

Vegetable Oils. *Drying oils,* used extensively in paints and varnish, include linseed oil, perilla oil, Chinese wood oil (tung oil), candlenut oil, hempseed oil, walnut oil, soy bean oil, poppy-seed oil, and sunflower oil. *Semidrying oils,* used for various purposes, include corn oil, cottonseed oil, sesame oil (benne oil), rape oil (colza oil), olive oil, apricot kernel oil, peach kernel oil, almond oil, castor oil, and peanut oil.

Vegetable Fats. These substances, which are solid at ordinary temperatures, include cocoa butter (See *Chocolate.*), coconut oil, palm oil, palm kernel oil, and Japan wax.

Essential Oils. Many of these form the basis of natural perfumes; as, for example, attar of roses, geranium oil, lemon-grass oil, lavender oil, neroli, ylang-ylang oil, and patchouli oil. Peppermint oil and spearmint oil are widely used for many purposes.

Spices and Condiments: Allspice (or pimento), cinnamon, cloves, mace, mustard, pepper, tonka bean, and vanilla.

ANIMAL PRODUCTS

Food. Beef, pork, mutton, poultry, and game form the chief items in the meat supply of most civilized countries. In some parts of the world, meat from the whale, horse, camel, and reindeer is also used. Eggs, almost universally an important article of food, are a commercial source of albumin and are used also in tanning. Milk is the source of butter, cheese, casein, milk sugar, and various fermented beverages, such as koumiss and lèben. Butter, cheese, condensed milk, preserved meats, canned meats, and meat extracts, though often classified as manufactured products, may also be listed here.

Fish, oysters, clams, lobsters, crabs, and shrimps, marketed fresh, dried, canned, or otherwise preserved, are used in great quantities for food. See *Fisheries*.

Animal Oils. Oils used for food include butter, lard, tallow, and oleo oil (See *Oleomargarine*.). Medicinal cod-liver oil is expressed from the livers of freshly caught cod. Large amounts of other fish oils are obtained, especially menhaden oil. (See *Fisheries*.) Sperm oil, valued as a lubricant, is obtained from the sperm whale. Wool wax, widely used in making salves and ointments, is the natural grease from sheep's wool.

Animal Fibers. Wool, produced chiefly by the sheep, is obtained also from the alpaca in Peru and from the Kashmir goat of central Asia. Silk, produced by the silkworm, ranks next in value to wool among animal fibers. Long hair from the tails of cows and from the manes and tails of horses is used in making bows for musical instruments, for weaving into haircloth, and for stuffing mattresses. Short hair from various animals is used as stuffing material and in making plaster. Swine bristles from Russia and China are largely used in making brushes. The hair of the Australian rabbit is one of the most important materials entering into the manufacture of felt hats.

Hides and Skins. See *Leather*.

Furs. The most expensive furs are probably those of the sea otter, the Russian sable, and the silver fox. Among other valuable furs are those of the seal, ermine, marten, weasel, mink, skunk, mole, chinchilla, beaver, muskrat, karakul sheep (yielding the Persian lambskin), various species of fox, wolf, and bear, and the larger cats, such as the lion, the tiger, and the leopard.

Horns, Hoofs, Bones, and Tusks. Ivory is obtained chiefly from the tusks of the elephant, but also from the tusks of the hippopotamus, the horn of the narwhal, the tusks of the walrus, and the tusks of the extinct mammoth whose remains are still found in Siberia. Horns and hoofs are utilized for the production of buttons, combs, ornaments, and of cyanide compounds. Bones are used for making buttons and ornaments, for the production of fertilizer, and for the preparation of bone black and bone charcoal.

Bird Products. Besides eggs, the most important bird products include feathers, plumes (See *Ostrich*.), edible birds' nests, eider down (See *Eider*.), and guano (See *Fertilizer*.).

Insect Products. In addition to silk, the most valuable of all, insect products include honey, beeswax, lac, and cochineal.

MINERAL PRODUCTS

The immense number of commercial products obtained from the mineral kingdom may be classified as (1) ores, metals, and other minerals; (2) fuels; (3) building materials; and (4) gems and precious stones. These are described in detail in the sections entitled *Mining and Mineral Production*; *Useful and Precious Metals*; *Rocks, Minerals, Gems, and Precious Stones*; and *Everyday Chemicals*.

COMMUNICATION

By communication is meant the transference of thoughts and of information from person to person. Underlying, as it does, all human cooperation, it has an importance which can scarcely be exaggerated. The initial step, and unquestionably the most important in making possible an unimpeded exchange of ideas, was the invention of spoken and, later, of written language.

A great length of time elapsed during which communication between distant points could be effected only by means of messages, oral or written, which were carried by messengers. The great development of electrical signaling devices and the vast improvements which have taken place during the past century in the means of transportation have reduced to comparative insignificance the time element in communication. With the help of the printing press, they bring to the whole population of every civilized country a knowledge of all events of importance in the whole world within a few hours of the time of their occurrence.

Early Postal Systems. The complicated postal organization of today had its origin in the system of private messengers employed by ancient rulers. Each messenger was given a fixed station where he should always hold himself in readiness to receive a message and to carry it to the next post. The emperor Diocletian was apparently the first to establish such a post open to the use of private persons. In the 12th century a commercial post was organized by the Hanse Towns of northern Germany, and in the 13th century a postal system was developed by the University of Paris for the benefit of its students. The national postal system in France was established by Louis XI in 1464.

Postal System in England. In England, private postal systems were used in the 14th century, but it was not until 1533 that Sir Brian Tuke was appointed the first "Master of the Post" by Henry VIII. Improvements in the service were gradually made, but, in 1812, the cost of sending a single sheet varied from 8 cents to 35 cents according to the distance. A money order system was begun in 1792 for the convenience of soldiers and sailors.

Due to reforms initiated by Sir Rowland Hill, a rate of one penny was established throughout the United Kingdom in 1840. The first adhesive postage stamp was issued in May of that year. This one-penny stamp was black and carried the profile of Queen Victoria. It had to be cut from the printed sheet. Perforated stamps were not officially issued until 1854. If the postage was not prepaid by means of a stamp, a double rate was charged upon delivery of the letter. The use of postage stamps made possible the mail box, which was first introduced in 1855.

Universal Postal Union. In 1874 an International Postal Union was organized at Berne, Switzerland. This was followed in 1878 by a larger organization known as the Universal Postal Union, which includes practically all nations on the globe. All these countries are declared to be "a single postal territory for the reciprocal exchange of correspondence." Postal accounts between countries are adjusted every three years by checking the amount of correspondence for a month. In all countries the one-cent stamp, or its equivalent, is green, the two-cent stamp, pink, and the five-cent stamp, blue.

Postal System in America. The general court of Massachusetts in 1639 ordered that the house of Richard Fairbank was to be the official distributing point for overseas mail. In 1691, Thomas Neale was by royal patent granted authority for the establishment and control of an American post, and, in 1693, Andrew Hamilton was appointed the first colonial postmaster-general. In 1707, control of the post was purchased from Neale by the English

government, which held it until the Revolution.

Under the new order, Benjamin Franklin was appointed the first postmaster by the Continental Congress in 1775. The first Federal postage stamps were issued in 1847, although in 1845 the postmasters of various large cities were permitted to issue five- and ten-cent stamps at their own expense. Stamped envelopes were first used in 1853.

It was not, however, until 1856 that prepayment was required and stamps came into general use. In 1851 the rate was reduced to three cents up to a distance of 3000 miles, and in 1863, under Lincoln, this rate was established for all distances and free delivery was begun in some of the larger cities.

COMMUNICATION PRINCIPAL COUNTRIES

Country	Telephones*	Radio Sets
Australia	1,530,680	1,440,000
Canada	3,857,400	2,314,000
Denmark	864,980	1,285,000
France	2,945,564	7,926,000
Germany Fed. Repub.	3,445,363	10,873,000
Italy	2,036,788	4,261,000
New Zealand	496,293	492,000
Norway	558,074	819,000
Sweden	2,097,738	2,256,000
Switzerland	1,141,443	1,123,000
United Kingdom	6,483,040	12,946,000
United States	57,210,000†	143,500,000

*American Telephone and Telegraph Company, 1956.

A money order system was established in 1864; postal cards came into use in 1873; a two-cent rate went into effect for the first time in October 1883; a special delivery service, for which an extra charge was made, began in October 1885; and rural free delivery was inaugurated in 1896. A two-cent rate between the United States and England was established in 1908.

Parcel Post. By the provisions of the general parcel post act which took effect January 1, 1913, and by its subsequent revision, the transportation of parcels within certain limits of size and weighing up to 70 pounds is undertaken by the post office department. By facilitating the cheap transit of merchandise, this service has opened up throughout the entire country a market for goods sent by mail. For rate making purposes, the United States and certain other territories are divided into units of area which are the basis of eight postal zones. The zones represent an area having a mean radial distance of 50, 150, 300, 600, 1000, 1400, 1800, all beyond 1800, miles from the center of any given unit of area which is the mailing point. Rates are then based on the number of zones which the parcel must traverse in reaching its destination.

The value of the parcel post service is enhanced by the privilege of insuring the contents of the parcel against loss by the payment of a small additional fee. Parcels may also be sent C. O. D., special delivery, or as first class mail.

Air Mail Service. In 1918 the regular use of airplanes was initiated by the United States government for the carrying of air mail. By 1929 each of the 48 states had air mail service and several foreign countries were included in regular air mail service with the United States

Since the first air mail service, accomplished by the U. S. Army for the government in 1918 with one round trip a day between Washington, D. C. and New York, delivery and receipt of mail by air has grown immensely. Today, by air to the U. S. coast or border exchange offices, thence by ordinary means to destination, the rate is six cents an ounce or fraction. Air mail addressed for delivery to A. P. O's. or Fleet Post Offices outside the continental U. S., care of postmaster, is also five cents an ounce, with a limit of 8 ounces. Foreign air rates are now given for practically every country in the world. Domestic rates include Alaska, Canal Zone, Guam, Hawaii, Midway island, Puerto Rico, U. S. Virgin Islands, Wake Island. Canada and Mexico are now also included in the six-cents-an-ounce rate.

Dead Letter Office. Every year about 20,000,000 pieces of mail matter are received by the Post Office so carelessly or incorrectly addressed that they can not be delivered. These are sent to the Dead Letter Office at Washington, D. C., where, by means of maps and directories, skilled clerks are able to guess correctly the destinations of about one-half the items. The others are opened and those with addresses inside are returned to the sender. The fee for this service is 3c. Only about 16% can be returned; all others are destroyed. Approximately 3,500,000 of the total number are Christmas cards.

Currency, checks, and money orders amounting to more than $1,000,000 are received annually. Merchandise which cannot be delivered or returned to the sender is sold at auction, letters are burned, and thousands of magazines, picture cards, and holiday cards are sent to hospitals. Insured parcels are held for six months; ordinary parcels for 60 days. Parcel sales are held periodically at each Dead Letter branch post office from two to six times a year. The fees from return postage from unclaimed packages along with the money which was inclosed in some of the letters amounts to about $250,000, which is only $20,000 less than the entire operating expense. The Dead Letter office originated in 1825.

Postal Service in Canada. The postal system of Canada is similar to that of the United States in its main features, and includes the services comprised under the headings of registration, insurance, money orders, postal savings, parcel post, and C. O. D. delivery systems. Rural free delivery was inaugurated in 1908, and an air mail service in 1927. The latter is of especial value in Canada in establishing communication between isolated settlements and the more populous portions of the country. Thus in 1929 an air mail route was established southward from Aklavik, which lies 300 miles within the Arctic Circle.

Telegraphic Communication. Postal communication depends for its speed on the available means of transportation. These are in any case comparatively slow, although the present system of transporting special mail by airplanes has effected great improvement. A means of communication even more rapid than the modern airplane was opened to the public in 1844 when Morse's telegraph began commercial operations.

As the advantage of the land telegraph became apparent, there naturally arose a demand for telegraphic communication between localities separated by bodies of water. The first submarine cable in North America was laid in 1852 between Prince Edward Island and New Brunswick. A transatlantic cable was successfully completed in 1866, thereby reducing the time required to send a message between the Old World and the New from weeks to minutes.

Telephony. Vocal communication over long distances became possible when Bell invented the telephone in 1876. Improvements on the original device were made by many of the greatest inventors of the world. The advantages of the telephone have been so obvious that in the United States there is an average of one telephone for every 3.1 persons. Sweden has one telephone for every 3.5 persons. In the per capita use of telephones the following nations rank in order after the United States and Sweden: Canada, New Zealand, Switzerland, Denmark, Australia, Norway, United Kingdom, Finland, The Netherlands, and Belgium.

Teletypewriter. A service was inaugurated in 1931 by which two-way communication by typewriter became possible over telephone or telegraph wires. By this system, two people, equipped with teletypewriters, on being connected through a central exchange, can converse in type, the words of both parties being recorded for future reference. This instrument, operating at about 60 words per minute, is employed extensively also for one-way communication, where it is desirable to send the

GROWTH OF UNITED STATES POSTAL SERVICE

Item	1880	1900	1920	1930	1940	1950
Post offices, no.	42,989	76,688	52,638	49,063	44,095	41,464
City carriers, no.	2,628	15,322	36,142	53,762	58,551	90,189
Cost carrier service	$2,363,693	$14,512,190	$74,932,540	$146,531,671	$161,184,553	$405,816,000
Rural delivery mileage	.....	28,685	1,151,832	1,334,842	1,401,690	1,493,365
Rural delivery cost, $	.....	$420,433	$75,562,424	$106,338,000	$91,447,713	$159,387,000
Money orders, $	$103,816,680	$255,670,027	$1,365,659,884	$1,787,284,000	$2,094,543,479	$4,598,024,000
Air mail service, cost, $	.....	.....	$1,264,495	$14,618,000	$18,855,306	$64,596,000
Postage stamps issued, no.	875,681,970	3,998,544,564	13,212,790,033	16,269,000,000	16,381,427,297	20,647,000,000
Postal cards issued, no.	272,550,500	587,815,250	986,156,087	1,643,000,000	2,400,188,380	45,064,000,000
Paid to postmasters, $	$7,708,407	$19,112,097	$40,108,080	$52,850,000	$49,238,362	$109,100,000
Gross revenue, $	$33,315,479	$102,354,579	$437,150,212	$705,484,000	$766,948,627	$1,677,487,000
Gross expenditure, $	$36,542,804	$107,740,267	$454,322,609	$803,667,000	$807,629,180	$2,222,906,000

In 1949 the gross revenue was $1,571,851,202, while the gross expenditure was $2,149,297,352.

same message to numerous places throughout the country. Market quotations, financial news, and weather reports for airports are broadcast by wire in this manner.

Radio Communication. With the beginning of the 20th century, radiotelegraphy became a practical means of transmitting messages, so that ships at sea were enabled to keep in continuous communication with each other and with many stations ashore. Navigation became at once more safe and more accurate, because a captain can always obtain the exact time and, during a fog, can usually obtain his bearings from a land station equipped with direction-finding apparatus known as the radio compass. All seagoing passenger ships must now be equipped with "radio" apparatus.

Long distance conversation by means of the radiotelephone became possible in 1915. Owing to developments made in the research laboratory of the American Telephone and Telegraph Company, the wire systems may be used in connection with the radiotelephone. By this method it is now possible to establish communication with a properly equipped ocean liner at sea from any commercial telephone in North America. On January 7, 1927, a regular transatlantic radiotelephone service was inaugurated between New York and London. This was followed by extensions which make possible direct vocal communication between any telephone in North America with any telephone in Europe. See *Cable, Submarine; Radio; Telegraph; Telephone; Phototelegraphy.*

Newspapers. The preceding articles have outlined the development of two-way communication. But of no less significance for the world's history is the growth of one-way communication from its primitive forms to the high-speed printing presses and radio broadcasts of the present day.

The prototype of the modern newspaper is to be seen in the *Acta Diurna* ("Daily Events") issued during the Roman Empire and posted in a public place. Copies were made by hand and dispatched to subscribers at a distance.

The invention of printing made possible the first genuine newspaper to be regularly published. It was the *Avisa Relation oder Zeitung*, printed first in 1609 in Germany. In 1622 appeared the first newspaper in England, *The Weekly Newes from Italy, Germany, etc.*, published in London. The earliest news sheet to appear in the Western Hemisphere was the *Relación*, issued in 1594 at Lima, Peru, but it was not until 1620 that a regular newspaper was published there. The first regular newspaper in British America was *The Boston News-Letter*, first printed in 1704.

Before the days of the telegraph, enterprising newsmen employed carrier pigeons, fast ships, pony expresses, and even semaphore signaling systems for gathering news. With the rise of telegraph and telephone systems, this task was greatly simplified and was put on an organized basis. See *Newspaper Press Associations.* With the development of phototelegraphy, it has become possible to transmit news in picture form with practically the same speed as verbal messages.

Improvements in printing presses make it possible now to issue editions within a very few minutes of the receipt of the last items of news. Thus important information from any part of the world may be in the hands of readers in all the chief centers of population throughout the world within an hour or two of the occurrence of the event.

Broadcasting. Within the decade 1920–30, a second means of rapid dissemination of information grew into effective rivalry with newspapers. This was the system of radio broadcasting.

Experimental dissemination of speech and music from a central sending station to owners of receiving sets began some years prior to 1920. Lee De Forest was one of the leaders in this development. Station KDKA, operated by the Westinghouse Electric and Manufacturing Company at East Pittsburgh, Pa., broadcast the presidential election returns in 1920. The popularity of this broadcast led the way for a phenomenal increase in the number of receiving sets owned and for a corresponding increase in broadcasting stations. By 1940, there was an average of one radio receiving set for each 2.4 persons in the United States, and programs for every taste and purpose had become a regular feature of American life.

By utilizing telephone wires, chains of stations may be connected so as to send out identical programs. In this manner, nation-wide and world-wide "hook-ups" afford opportunities for statesmen, entertainers, or advertisers to reach the ears of millions of listeners. By 1940, there were 675 broadcasting stations in the United States. Canada and Russia ranked next in number, the total for the world being a little fewer than 2,000.

Radio broadcasting for entertainment, news value, educational value, and advertising purposes has developed tremendously since the introduction of television and FM, so that in 1956 there were a total of 2824 American standard broadcasting stations, 482 television stations, and 540 FM stations. Most cities are serviced by one of the four major networks—the American Broadcasting Company of 339 stations, the Columbia Broadcasting System of 218 stations, the Mutual Broadcasting System of 557 stations, or the National Broadcasting Company of 212 stations. The broadcasting industry, due to its promotion and program planning, has been an incentive for the manufacture of radio sets, television and other equipment, and for the employment of thousands of artists, musicians, technicians, salespersons, and writers.

Television. The rapid growth of television has added a potent force to the enlightenment, education, and entertainment of the American people. Commercial television was inaugurated July 1, 1941 over WNBT, New York, but the first television receivers were not made generally available to the public until after World War II. The first coast-to-coast hookup came in 1951, as did also the first color program. From a limited number of stations and sets covering only part of the country, television today blankets America, with over 37 million families possessing receiving sets.

TRANSPORTATION

TRANSPORTATION is conducted chiefly by the use of vehicles operated upon the water, upon the land, and, more recently, through the air. Water transportation was early conducted by means of sailing vessels. Land transportation, except upon pack animals, required the construction of roads and railways, as well as the invention and improvement of appropriate vehicles.

Sailing Vessels. Long before the Christian era, the Egyptians, the Phœnicians, and the Greeks made use of sails to propel the small vessels of their time. To a large extent the Greeks, and especially the Romans, propelled by oars the ocean craft with which they navigated the Mediterranean. In the larger boats, called galleys, the oars were arranged in two or three rows or banks. The largest type of vessel widely used in ancient times for commercial or war purposes was the trireme, equipped with three banks of oars. The life of the oarsmen in these galleys was a hard one, and slaves were commonly employed. This practice gave rise to the term "galley slave."

The sailing vessels employed by the Venetians, Italians, Spanish, Portuguese, Danes, Norsemen, and the early English navigators were small craft which seldom ventured far from sight of land. But, beginning with the 14th century, the increasing use of the mariner's compass made it possible for sailing vessels to make voyages of great length.

According to present standards, the ships then employed seem small. Few people now living would willingly undertake a transatlantic voyage in a ship of the size of the *Mayflower*, in which the Pilgrims, early in the 17th century, came to their new home in America. But, in small sailing vessels of these or similar types, men in those days were making voyages halfway round the world, and, in a few instances, daring sailors circumnavigated the globe.

Steamships. The great revolution in transportation came when mechanical power was substituted for wind power on the ocean and for muscle power on the land. In performing the service of transportation, mechanical power was first applied to vessels. As early as 1787, John Fitch, a Pennsylvania farmer, propelled a boat on the Delaware by steam power. The *Charlotte Daudas* in 1802 towed two vessels of 140 tons 3½ miles an hour against a strong wind in the Forth and Clyde canal. Robert Fulton ,five years later ran the *Clermont* from New York to Albany by steam power and demonstrated the practical success of steam navigation.

Upwards of twenty years more elapsed before the steam locomotive was perfected by the English engineer, George Stephenson, whose famous "Rocket," produced in 1829, was the first notably successful locomotive. A few years more were to pass before a vessel crossed the ocean entirely by steam power. The first transatlantic voyage of a steamer was the one made by the *Royal William*, which sailed from Quebec to the Isle of Wight in 1833. This was a wooden vessel, but in 1845 an iron steamer, the *Great Britain*, built by I. K. Brunel, a celebrated British engineer, was put in operation upon the transatlantic service.

The latter vessel is notable also because it was the first large merchant ship driven with a screw propeller. While its basic principle had long been known, the modern practical screw propeller was invented almost simultaneously in 1836 by Francis B. Smith, an English farmer, and by John Ericsson, a Swedish engineer.

Highways. The extensive use of vehicles upon the land could not precede the building of roads. The earliest road building on a large scale was carried on by the Romans. By maintaining order and by building permanent highways in the lands about the Mediterranean and in far-away Britain, the Romans made possible the development of Western civilization.

The first of the modern nations to undertake road building on an extensive scale was France. Beginning in 1597 under Sully, this progressive country proceeded to construct 15,000 miles of surfaced road. Colbert, who became prime minister in 1661, introduced the corvée system of forced labor upon the roads. The method was bad, but it gave France good roads in advance of other nations.

Two Scottish engineers, Thomas Telford and John L. McAdam, who did their work between 1800 and 1830, have fixed their names permanently to types of roads now largely built. Both men emphasized the necessity of providing adequate drainage for roads. Telford roads have a foundation of large broken stones surfaced by more finely broken or crushed rock; macadam roads are built without the foundation of larger stones. Hard surfaced roads are now constructed of the following materials: Sand clay, gravel, water bound macadam, surface treated macadam, bituminous macadam, cement concrete, brick and other block paving materials. The development of the motor car has given great impetus to road construction.

Canals. Canals are nearly as old as human history. The Assyrians built them. The Egyptians connected the Nile with the Red Sea by a canal. The Chinese are said to have constructed canals more than 2000 years ago. They built their Grand Canal, a system about 1000 miles long, in the 13th century. In the 15th century the famous artist, Leonardo da Vinci, invented the canal lock which was introduced into the canals of Milan. France began her existing system of canals early in the 17th century. England built her canals in the 18th century. In the first half of the 19th century numerous canals were built in North America.

Along with the construction of canals went the canalization of rivers until various countries, such as France and England, were equipped with a co-ordinated system of canalized rivers connected by canals. During the early development of the United States and Canada, however, it was impossible, because of physical obstacles, to create a fully co-ordinated system of inland waterways.

Railways, Steam and Electric. Before the system of inland navigation was completely worked out in the United States and Canada, the superiority of the railroad had been demonstrated. By 1830, the Baltimore and Ohio, the Mohawk and Hudson, predecessor of the present New York Central, and a few other railroad systems began to operate in a small way. The completion of the Union Pacific in 1869 opened the first transcontinental span of railroad in America.

By 1890 the electric railway became commercially important for its passenger travel and cargo transport. Today, because of its cleanliness in operation and speed, it is utilized in mountainous areas throughout the world where hydroelectric power is available and on such heavily travelled passenger lines as in Washington and New York.

OCEAN TRANSPORTATION

Ocean Vessels in Colonial Times. The *Mayflower*, in which the Pilgrims came to America, was a typical sailing vessel of its time. It was a three-masted, square-rigged ship, only 100 feet long, and between 20 and 25 feet wide. It was registered as of 180 tons burden or, as it would be measured today, of about 160 tons gross register. Aboard this ship were 102 Pilgrims and the crew. The *Speedwell*, which started across the ocean with the *Mayflower* but which had to turn back, was only one-third the capacity of the *Mayflower*.

At the beginning of the 19th century, many ships were owned and operated by the merchant princes of America; as, for example. Elias Haskett Derby of Salem, Mass., and Stephen Girard of Philadelphia. The ships were square-rigged sailing vessels—ships and barks with three masts and brigs with two masts—of 100 or 200 tons register, a few being as large as 300 tons. The American merchants, lumbermen, planters, and fishermen of that period usually operated their own vessels instead of employing the services of common carriers. Derby, with his fleet of small sailing vessels, built up an extensive trade with the East Indies. Stephen Girard used forty sailing ships to carry on his trade with the West Indies and other parts of the world. The small vessels which these men used were well adapted to the service requirements of their time and brought fame and wealth to their owners.

Common Carriers on the Ocean. In American commerce, the common carrier on the ocean dates from 1816, when the Black-Ball Line was established from New York to England. Even in Great Britain the common carrier was hardly known until the beginning of the 19th century. For hundreds of years men had owned ships for hire or for charter to those who desired to use them, but transportation services on the ocean were not organized and conducted by common carriers until a little more than a century ago. The early common-carrier lines employed sailing vessels, but, from about 1840 in England and from about 1870 in America, steamship lines began to replace sailing vessels.

Oil Tankers. An outstanding development of marine traffic is the oil tanker. The demand for fuel oil is increasing. Despite heavy losses of oil tankers during World War II, the world's oil-carrying fleets are today twice as large as they were in 1939.

In June 1954, the new supertanker *W. Alton Jones*, 38,000-ton flagship of the Cities Service fleet, entered New York harbor. With a length of 707 feet, a beam of 93 feet, a speed of 17½ knots, and a cargo capacity of 14,112,000 gallons, the ship is the first of four new giant American-built tankers. Constructed at Newport News, Virginia, at a cost $9,500,000, the *Jones* brings oil from the Near East to America.

In January 1957, the 46,500-ton tanker, *World Beauty*, a 737-foot vessel with a 102-foot beam and a capacity of 16,500,000 gallons, was launched at Quincy, Mass., for the Greek shipping interests of Stavros S. Niarchos. In the backwash of the Suez Canal crisis, still larger tankers were announced.

American Clipper Ships. In the 1840's the Cunard and other British companies began to use steamships and iron vessels. Thereupon the shipbuilders and seamen of America sought to increase the size and speed of the wooden sailing vessel so as to enable it to compete successfully with its new rival. Out of this competition grew the famous American clipper ships of the late 1840's and early 1850's. These were square-rigged sailing vessels, some of them between 2000 and 3000 tons gross register—fifteen times the size of the *Mayflower*. They derived their name from their long, overhanging prow and their sharp lines forward.

For a time the swift-sailing clippers held their own in competition with the steamship. But, as the marine engine became more efficient and iron and steel vessels of increasing dimensions were constructed, sailing tonnage rapidly declined. The last serious effort to enable the sailing vessel to maintain its place on the high seas was made at the close of the 19th century. About that time huge six- and seven-masted, steel-hulled sailing vessels of over 5000 tons register were built. Some of these vessels could carry 7000 tons of cargo.

Ocean Steamships. The steamship has had an interesting history. The marine engine, first successfully employed in the 1830's to propel vessels entirely across the Atlantic, was installed in wooden vessels with paddle wheels. English builders began to use the screw propeller for transoceanic service in the 1840's. It was more than a decade later before American builders substituted the screw for the less efficient paddle wheels. Indeed, even some of the British lines, such as the Cunard, kept to the use of paddle wheels until after 1860. The celebrated *Great Eastern*, completed in 1859, was equipped both with screw and with paddle wheels. This ship marked the transition from the older to the newer type of steam vessel. The *Great Eastern* was too large to be successfully driven by the engines of its day.

MERCHANT SHIPBUILDING 1954*

Place of Building	Number of Vessels	Gross Tons
Australia	20	113,688
Belgium	23	222,667
Canada	4	36,200
Denmark	50	305,600
France	71	733,109
Germany	160	1,272,741
India	9	45,400
Ireland, Republic of	2	2,300
Italy	21	249,488
Japan	41	462,020
Netherlands	138	1,158,174
Norway	68	556,636
Spain	32	190,136
Turkey	1	3,800
United Kingdom	485	4,629,503
United States	24	354,100
Total	1149	10,335,562

*One thousand gross tons or more.

The Marine Engine. Most steamships are today equipped with the inverted direct-acting marine engine. This type was used first in 1854, and most of the early engines were single expansion, although from the beginning some double expansion engines were constructed. The triple expansion marine engine made its appearance in 1881. However, it was not until 1894, when the *St. Louis* and the *St. Paul* of the American Line were built by the Cramps of Philadelphia, that the quadruple expansion marine engine was constructed.

During this same year, 1894, an entirely new type of engine, the turbine, was also applied to the propulsion of vessels. The first large ocean vessel to be equipped with turbines was the *Carmania* of the Cunard Line, built in 1905. The leviathans of recent construction usually have either turbines or both turbines and reciprocating engines.

The Diesel Engine. Both of these types of marine engines are, however, being displaced by an entirely different kind of engine, which is far more efficient and requires much less fuel. This is the internal combustion engine, named after its inventor, Rudolf Diesel. This engine has no boilers or furnaces but burns oil as fuel in the cylinders. The principal limitation upon the immediate use of the Diesel engine is its relatively large cost, but, in 1927, the tonnage of new ships being equipped with this type of engine exceeded for the first time that of steamship construction. See *Internal Combustion Engine.*

The Diesel driven engines were extensively constructed and used in World War II and proved so efficient that in 1948 practically every major railroad line in America had Diesel engines on order.

Ocean Leviathans. The large vessels of today have little resemblance to the ocean vessels of a century ago. The remarkable increase in the size of vessels is indicated by the developments of the first thirty years of the 20th century. The *Mauretania* (I), which began operation in 1908, was considered a marvel because she registered nearly 30,700 tons gross. She held the transatlantic speed record until 1929. In 1910 the *Olympic* was launched. This ship's length was slightly over 850 feet; its gross registered tonnage was 46,439.

Then, in 1912 and shortly thereafter, came the

NOTABLE OCEAN LINERS*

Name	Registry	Length (Feet)	Tonnage
Queen Elizabeth	Great Britain	987.4	83,673
Queen Mary	Great Britain	975.2	81,235
United States	United States	980.0	51,500
*Liberte***	France	890.2	49,746
Ile de France	France	763.4	43,456
Nieuw Amsterdam	Netherlands	713.7	36,677
Mauretania II	British	739.4	35,677
Caronia	British	587.5	34,183
America	United States	663.6	33,532
Pasteur	British	670.7	30,447
Washington	United States	668.4	29,627
Edinburgh Castle	British	717.9	28,705
Pretoria Castle	British	717.9	28,705
Oronsay	British	681.7	28,500
Orcades	British	681.7	28,164
Himalaya	British	681.7	27,955
Brittanic†	British	683.6	27,666
Georgic†	British	682.8	27,469
Capetown Castle†	British	702.9	27,002
Dominion Monarch†	British	657.6	26,443
Empress of Scotland	British	644.0	26,032
Constitution	United States	683.0	26,000
Independence	United States	683.0	26,000
Andes†	British	643.3	25,676
Athlone Castle†	British	696.0	25,567

*The following famous Atlantic liners were either lost or so seriously damaged in World War II as to be unfit for further use: *Normandie, Rex, Bremen, Conte di Sovia, Empress of Britain,* and *Columbus.* **Formerly the Europa. †Motorships.

Imperator (renamed the *Berengaria*), the *Vaterland* (renamed the *Leviathan*), and the *Bismarck* (renamed the *Majestic*), all approximately 900 feet long. The *Bremen*, also about 900 feet long, was launched in 1929. It crossed the Atlantic in nearly 9 hours less time than the *Mauretania*. The first liner to exceed this length substantially was the *Normandie*, (renamed *Lafayette*), which was launched in 1932, and later burned in New York harbor. The greatest speed attained by any Atlantic (screw) steamship was 35.59 knots per hour in 1952 by the American-built liner *United States* on her passage from New York to Bishop's Rock in 3 days, 10 hours, and 40 minutes, a total of 3,144 sea miles.

The American Marine. The British colonists in America were a maritime people. They had to build ships in order to market their products in the West Indies and in Europe. With low-priced material for shipbuilding from the abundant forests, American shipping prospered until the Civil War.

During the Civil War there was a shrinkage of nearly a million tons in American shipping on the high seas. Four-fifths of this shrinkage was due to war losses and to the transfer of American vessels to foreign flags to escape the hazards of war. Moreover, this blow to the American marine came at the time when the steamship was taking the place of the sailing vessel, and when iron was supplanting wood in the shipyards of the world.

The American marine of 1860 was composed almost entirely of wooden sailing vessels but by 1870 the marine engine had provided the steamship with superiority over the sailing vessel. The American marine declined for half a century because the cost of building an iron or steel ship was less in Britain. World Wars I and II saw American manufacturing methods provide America with one-fifth of the world's merchant marine tonnage.

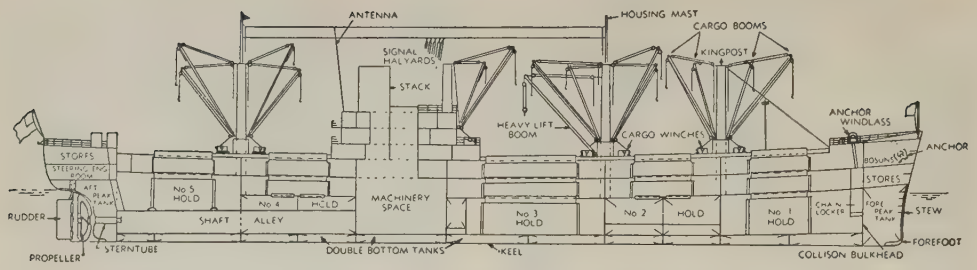
Despite this large tonnage of American shipping, little more than one-third of the foreign commerce of the United States is carried on its American vessels.

THE WORLD'S MERCHANT MARINE

Number and Tonnage of Vessels of 1000 Tons and Upward

Flag	Merchant fleet as of January 1, 1956 (In 1000 tons)			Merchant fleet as of Sept. 1, 1939		
	Number	Gross Tons[2]	Dwt. tons[3]	Number	Gross Tons	Dwt. tons
United States[1]	3,304	25,250	35,539	1,379	8,125,756	11,681,700
British Commonwealth	3,060	19,813	25,972	3,319	17,770,919	24,053,700
Argentina	146	906	1,171	45	196,627	267,700
Belgium	75	462	635	72	356,862	494,000
Brazil	194	766	1,077	122	413,646	541,600
Bulgaria	5	12	22	8	22,306	29,700
Chile	1	2	3	50	153,959	180,900
China	140	416	584	100	204,062	276,000
Cuba	9	23	31	12	17,504	21,700
Denmark	315	1,547	2,240	379	1,041,756	1,575,800
Egypt	25	115	131	23	98,177	128,000
Estonia	.....	.....	.....	94	176,376	274,400
Finland	227	701	1,053	232	530,285	826,000
France	570	3,663	4,546	555	2,678,435	2,998,800
Germany	652	2,494	3,826	854	3,915,978	5,177,100
Greece	201	1,180	1,717	436	1,697,986	2,791,000
Honduras	58	353	500	27	82,068	90,500
Hungary	2	2	3	6	22,748	39,900
Ireland	15	45	66	.....	.....	.....
Israel	27	126	170	.....	.....	.....
Italy	598	3,811	5,141	667	3,178,120	3,910,800
Japan	622	3,436	5,007	1,180	5,102,346	7,145,400
Latvia	.....	.....	.....	73	199,058	325,600
Mexico	28	148	213	10	23,815	31,600
Netherlands	535	3,403	4,491	537	2,670,149	3,424,600
Nicaragua	5	11	16	2	3,023	4,200
Norway	1,102	7,145	10,740	1,072	4,499,086	6,931,200
Panama	513	3,876	5,856	130	719,041	1,105,600
Peru	22	81	113	7	25,834	31,100
Philippines	20	77	103	33	82,695	105,200
Poland	68	290	402	31	113,644	101,200
Portugal	87	427	516	54	197,307	263,200
Rumania	8	32	40	25	101,807	129,000
Siam (Thailand)	7	12	17	2	2,622	2,000
Spain	291	1,111	1,474	217	749,681	1,051,700
Sweden	571	2,586	3,813	484	1,311,763	2,033,100
Turkey	135	489	662	67	173,847	223,800
Uruguay	10	58	88	5	13,791	14,300
U.S.S.R.	604	1,830	2,426	354	1,135,783	1,597,900
Venezuela	50	201	301	27	70,089	93,200
Yugoslavia	61	246	378	98	375,811	604,000
Other	785	5,768	8,892	60	15,582	23,400
Total	15,148	92,944	129,975	12,798	58,270,374	80,600,600

Source: United States Maritime Administration. [1] Excludes vessels on the Great Lakes and Inland Waterways. [2] Gross tonnage is the internal cubic capacity of a ship expressed in tons of 100 cubic feet to the ton. [3] Deadweight tonnage is the total carrying capacity of a ship expressed in tons of 2240 pounds.



TYPICAL CARGO VESSEL, UNITED STATES MERCHANT MARINE

During the year 1935 the water-borne foreign commerce of the United States was valued at $3,786,000,000, of which 35.8 per cent was carried in American vessels and 64.2 per cent in foreign. If the commerce is measured by tonnage, however, the proportion of the total commerce carried in ships of American registry rises to approximately 40 per cent, indicating that a larger amount of goods bulky in relation to their value, such as grain and petroleum, are carried in American ships. These figures show clearly that, in the overseas commerce of the United States, American vessels in 1935 were playing a minor rôle. This rôle, which had diminished steadily since 1830, expanded remarkably during and immediately after World War I, then fell, but climbed precipitately during World War II.

TRANSPORTATION ON LAKES, RIVERS, AND CANALS

River Navigation. Long before men had the capital or the knowledge required for the construction of highways, and centuries before railroads were thought of, rivers and lakes were used wherever possible for inland transportation. Not only in ancient Egypt, Babylonia, and China, but in modern European countries, such as Austria, Germany, France, Holland, England, and others having navigable streams, the rivers were the only avenues over which traffic could move from interior points to seaboard markets.

For a long time rivers were used without improvement. Later their channels were improved by the removal of obstacles and, to some extent, by the construction of dams, locks, and canals past the rapids in the streams. The importance of rivers as avenues of inland transportation in Europe during the middle ages is indicated by the practices established by the feudal barons. These medieval rulers often maintained their power by constructing castles and barriers along the rivers. Possessing these strategic strongholds, they secured their revenues by exacting tolls from all those who used the streams for commercial purposes.

Canal History. As a result of improving their rivers and of constructing canals during the 17th and the 18th century, Holland, France, and England in turn acquired the economic leadership of other European countries. By building canals to connect their natural waterways, each of these countries was able to develop industrially, to accumulate capital, and successively to play an important rôle in international affairs.

Canal construction in the Netherlands required no special engineering skill, and it was to be expected that the people of that country would extend their numerous natural waterways by artificial channels. In countries like France and England, however, superior engineering skill was required. To France first credit must be given, for in that country as early as 1605, during the reign of Henry IV, construction was begun on the Briare canal to connect the Seine and the Loire rivers. It took until 1642 to finish the work. In 1675 the Orleans canal connected the same rivers by another route, and in 1681 the celebrated Languedoc canal was completed, connecting the Bay of Biscay with the Mediterranean. The summit level of this canal was 600 feet above the sea.

The greatest names in English canal history are Francis, duke of Bridgewater, and his engineer, James Brindley. The Bridgewater canal, connecting Manchester and Liverpool, was begun in 1759. During the succeeding 75 years one inland canal after another was constructed in England and Scotland until the principal streams of the island were connected by a network of waterways. Until after the middle of the 19th century, the waterways of Great Britain, France, and of several other European countries were far more important as freight carriers than were the railways.

Canals in the United States. River and canal transportation in the United States dates from colonial days. The first great leader in the development of inland waterways was George Washington. Washington was a surveyor, and the knowledge he gained in the French and Indian war, which took him as far west as the Ohio river, gave him a lifelong interest in waterways. In 1774, before the Revolution, he brought about the establishment of a company, chartered by Virginia and Maryland, for the improvement of the Potomac river. The ultimate purpose of this company was to connect the Chesapeake bay and the Ohio river by a canal, if possible, or at least by a portage road westward from Cumberland on the Potomac river.

The Revolutionary War interrupted the plans of the colonies for joining the Potomac and Ohio. However, upon the termination of the Revolution, Washington again returned to the prosecution of the project, only to be interrupted once more by being called to the presidency of the new republic. Much later, and in a different manner than Washington had planned, the Chesapeake bay and the Ohio river were connected by the construction of the Baltimore and Ohio railroad which reached Wheeling on the Ohio river in 1851. Forty years earlier, a highway, called the National Pike, had joined the two waterways.

The first man to plan a comprehensive system of inland navigation and of inland waterways and highways in the United States was Albert Gallatin, who for twelve years served as secretary of the treasury under Jefferson and Madison. In the year 1808 Gallatin made a report to Congress outlining

SOME IMPORTANT CANALS

Name	Location	Length (miles)	Width (feet)*	Minimum Depth (feet)†	Number of Locks	Opened	Approximate Cost
Adolf Hitler	Oder-Klodnitz, Germany	26	121.4	11.5	6	1938	
Albert	Antwerp-Liège, Belgium	76	52.5	11.5	6	1939	$ 80,000,000
Amsterdam Ship	Ijsselmeer—North Sea, Netherlands	16.7	164	32.1	5	1876	12,700,000
Cape Cod	Buzzards Bay—Barnstable Bay	7.68	250	27	none	1914	13,500,000
Chesapeake-Delaware	Delaware and Maryland	13.63	24	19	none	1829	9,000,000‡
Chicago Drainage and Ship	Chicago—Lockport, Ill.	38.6	174	22	1	1900	55,250,000
Corinth	Gulf of Corinth—Ægina Gulf	4	69	26	none	1893	13,750,000
Cronstadt	Leningrad—Bay of Cronstadt	18.75	275	22	none	1884	10,000,000
Hohenzollern	Berlin—Stettin, Germany	136	32	9.8	19	1914	12,500,000
Houston Ship	Galveston Bay—Houston, Texas	50	150	30	none	1925	20,000,000
Illinois-Mississippi	LaSalle, Ill.—Mississippi River	75	35	7	33	1906	7,600,000
Josef Stalin	Baltic-White Sea, Russia	141			19	1935	
Kaiser Wilhelm (Kiel)	Baltic—North Sea, Germany	61	147.6	36	2	1895	95,000,000
Lake Washington	Seattle—Puget Sound	8	80	34	1	1916	3,500,000
Languedoc	Garonne R.—Mediterranean, France	148	19.7	6.5	119	1681	3,500,000
Manchester	Manchester—Mersey River, England	35.5	80	28	4	1894	90,000,000
Moscow-Volga	Russia	80	143	18	11	1937	§180,000,000
New Orleans	Mississippi River—Lake Pontchartrain	5.5	300	30	1	1923	20,000,000
New York Barge	Lake Erie—Hudson River	540.8	44.44	12	57	1918	168,000,000
Ohio River	Pittsburgh, Pa.—Cairo, Ill.	968	110	9	53	1929	125,000,000
Panama	Through Isthmus of Panama	50.5	110	41	6	1914	400,000,000
Port Arthur	Taylor's Bayou—Sabine Pass, Texas	7	150	26	none	1899	1,500,000
Rhine-Main-Danube	Germany	110	98.4	12	91	1939	150,000,000
Rhone	Rhone River—Marseille, France	51	82	10.5	3	1926	20,000,000
Sabine Neches	Sabine River—Port Arthur Canal	23	150	30	1	1926	18,100,000
Sault Ste. Marie, U. S.	Lake Superior—Lake Huron	1.6	100	25	1	1896	17,500,000
Sault Ste. Marie, Can.	Lake Superior—Lake Huron	1.41	60	19.5	1	1895	5,000,000
Suez	Mediterranean to Red Sea	104.5	147.6	39.4	none	1869	136,000,000
Canadian Canals	**Lakes to the Sea**						
Welland Ship	Lake Ontario—Lake Erie	27.6	80	30	8	1930	131,860,000
Williamsburg	St. Lawrence River	12.5	45	14	6	1847	13,550,000
Cornwall	St. Lawrence River	11.0	43.47	14	6	1842	7,240,000
Soulanges	St. Lawrence River	14.6	45	15	5	1899	7,897,000
Lachine	Lachine—Montreal, St. Lawrence R.	8.7	45	14	5	1826	14,043,000
Trent	Georgian Bay—Lake Ontario	275.4	33	6	42	1826	19,951,000

*Width of locks or bottom of channel. †A depth greater than 20 feet indicates a ship canal. ‡Converted, 1926, from lock to sea-level canal. §1,800,000,000 roubles.

in detail a plan for a system of inland waterways and of highways extending throughout the then settled portion of the United States. But again an armed conflict, the War of 1812, interrupted transportation development.

History of "Internal Improvements." During the War of 1812–15 the United States had great difficulties in conducting land campaigns. The practical failures of most of the land campaigns of that war made it clear to every one that both military and economic considerations demanded the development of transportation facilities. The railroad had not been invented, and the public naturally turned to improving the rivers, constructing canals, and building highways. The movement for "internal improvements" was led by the ardent young statesman, Henry Clay, and was supported by John Quincy Adams. For a time, leaders of the South, such as John C. Calhoun, advocated Federal support for canals and roads.

But, from 1820 on, the conflict over slavery and state rights caused the leaders of the South to oppose internal improvements by direct action of the Federal government. During the administration of John Quincy Adams, 1825–29, the Federal government gave active support to canal and road building. But after Andrew Jackson became president he supported the strict constructionists, and took the position that the Federal government could not constitutionally carry on works of internal improvement within the states. His popularity and powerful personality put an end to the policy of Federal aid for canals and roads.

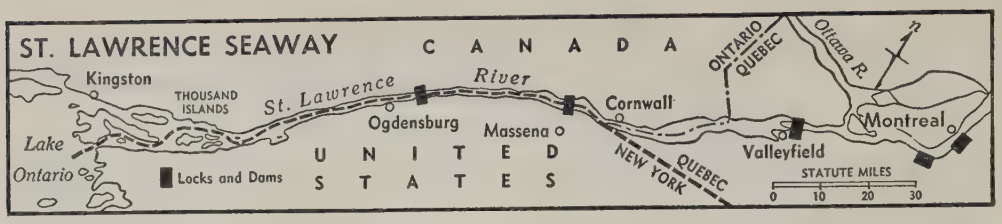
During the year that Andrew Jackson was inaugurated president, the construction of railroads was begun in the United States. Within a decade it became evident that the railroads were to be efficient carriers of freight as well as of passengers, and that the inland waterways must at least share their traffic with the railroads. Indeed, as time went on, the waterways lost most of their traffic to the rival railroads.

Nevertheless, the states which had begun works of internal improvement during the two decades following the War of 1812 continued to carry on such works until the Civil War. The activities of some of the states continued beyond the period of the Civil War. Many millions of dollars were spent upon internal improvements by the states, either directly or in support of canal and highway companies. See table *Some Important Canals.*

River and Harbor Works. The Civil War settled the controversy as to the power of the Federal government. After 1865 no question was raised as to the power of the United States to expend funds upon the improvement of harbors, upon the channels of the Hudson, the Mississippi, the Ohio, and other rivers, and upon the connecting channels and the ports of the Great Lakes. From 1870 on, the Federal government regularly appropriated funds for rivers and harbors.

River Traffic. Railroads are now so generally used for freight traffic and passenger travel that it is hard to realize the great rôle played by the Mississippi, Missouri, Ohio, Kentucky, Tennessee, and other rivers, in the development of the country from 1840 to 1870. The steamboat, which began to run on the Hudson in 1807, made its appearance on the Ohio in 1811, and its use increased with the settlement of the Mississippi Valley states. St. Louis, on the Mississippi, near the mouth of the Missouri, became the principal trading city of the Mississippi valley, and New Orleans became the chief export city of the United States. The traffic of the great Middle West and of much of the South moved with the river currents to the Gulf, borne by the busy steamboats.

The Erie Canal. The canal which had most influence upon the economic development of the United States was the Erie canal—De Witt Clinton's



"big ditch"—constructed by the State of New York from 1817 to 1825. It connected the Hudson river and New York City with the Great Lakes, and thus made New York City the ocean gateway of the rapidly growing traffic of the Great Lakes. The Erie canal enabled New York to take advantage of its excellent harbor and to become the unquestioned commercial metropolis of the United States. After 1870, railroad competition and rate wars caused the Erie Canal traffic to pass steadily to the railroads so that before the end of the 19th century the waterway had lost the larger share of its business. See *New York State Barge Canal.*

Canals in Canada. Canada had an exceptional opportunity for the development of river and lake transportation by canalizing the St. Lawrence river and by connecting Lake Erie with Lake Ontario. The possibility of connecting Georgian bay with the Ottawa river, and thus with the St. Lawrence river at Montreal, was also early apparent.

The St. Lawrence river has four rapids, which render upstream navigation impossible except by the construction of canals and locks along the river past the rapids. The Lachine rapids are just above Montreal, and a canal past those rapids was begun in 1824. At later dates, canals past the other rapids of the river were constructed. These were equipped with locks 270 feet by 45 feet, and 14 feet deep.

The first Welland canal, enabling boats to pass from Lake Erie to Lake Ontario, was opened in 1829. This waterway has been enlarged from time to time, and in 1912 work was authorized which, when completed in 1930, gave the waterway the dimensions of an ocean ship canal. In addition to one guard lock, there are seven lift locks, each of which is 800 feet in length by 80 feet in width, with a depth of 30 feet of water above the sills, each lock having a lift of 46½ feet. The canal connects Port Colborne, on Lake Erie, with Port Weller, on Lake Ontario. The total cost exceeded 122 million dollars.

The St. Lawrence Seaway. After more than thirty years of discussion, legislation authorizing the United States to join Canada in building the St. Lawrence Seaway was signed by President Eisenhower, May 13, 1954. Congress acted after Canada announced it was ready to construct the Seaway alone within its own boundaries if the United States did not approve a joint program and President Eisenhower declared the project necessary for the national security. By dredging the St. Lawrence River, ocean-going vessels of 27-foot draft, which have long had access to Montreal from the sea, will be able to proceed as far as Toledo, Ohio, on the Great Lakes, and, following further Congressional action, continue to Duluth, Minnesota.

Canada will undertake dredging and the building of canals and locks on the 68-mile river stretch between Montreal and International Rapids, and will also deepen the Welland Canal between Lake Ontario and Lake Erie. The United States on its side will build two canals with three locks, extending 46 miles along the river at International Rapids between Ogdensburg, N. Y., and Cornwall, Ontario.

The Suez Canal. The first great interoceanic canal to be constructed was the Suez, which connects the Mediterranean and the Red Sea. It was begun in 1859 and opened in 1869, and was constructed by a French company under the leadership of the celebrated Ferdinand de Lesseps.

The canal is about 100 land miles in length and is a sea-level waterway. Its original dimensions were: depth 26 feet, 3 inches; bottom width 72 feet, 2 inches. By successive enlargements, the canal has been given a depth of 39 feet, 4 inches, and a bottom width of 147 feet, 7 inches. It may now be navigated by vessels of 35 feet draft. The original cost was $80,000,000 and the total capital investment is approximately $136,000,000.

During the first decade of operation the traffic of the canal developed slowly. This was because the Suez route cannot be used by sailing vessels, which were the only vessels then employed in the traffic between Europe and the East Indies and the Orient. After the introduction of steamships, traffic development was so rapid as to yield dividends to the stockholders of from 25 to 30 per cent. In 1876 the British government, under the leadership of Disraeli, acquired 176,000 of the 400,000 shares of stock, and thus became the largest stockholder, although the British government has never controlled a majority of the company's stock.

Before World War I, the Suez Canal was serving about 20,000,000 tons of shipping annually. This tonnage diminished during World War I, then rose to 27,000,000 tons and, since World War II, more than 6000 vessels with a net tonnage of about 34,000,000 annually use the canal. The concession, held by a French company, Companie Universelle du Canal Maritime de Suez, in which the British government holds 295,026 out of a total of 652,932 shares, expires November 17, 1968.

The Panama Canal. Encouraged by their success at Suez, the French sought to construct a canal across the isthmus of Panama. A concession was secured from the Colombian government by the French company in 1879, and construction work was begun in 1881. But, at Panama, the failure of the French was as signal as was their success at Suez. It was found that the physical obstacles to be overcome at Panama were greater than had been anticipated. The real causes, however, of the collapse of the French enterprise at Panama were the yellow fever and malaria. Twenty years later, when the United States undertook the work, the part played by the mosquito in the transmission of these diseases had been clearly established. Hence it was possible to eliminate these fevers from the isthmus and to make the Canal Zone one of the healthiest spots on the globe.

At the time of the French failure at Panama in the late 1880's an American company was undertaking to construct a canal across Nicaragua by way of the San Juan river and Lake Nicaragua. This company failed and it became manifest that, if an Isthmian canal was to be constructed, the project would have to be carried out by the United States.

Because of the scandal connected with the failure of the French company at Panama, the United States turned to the Nicaragua route, and consideration was given first to the project of a canal in that location. After the subject had been investigated, the United States in 1902 decided in favor of the Panama route, after the French agreed to sell their interest for $40,000,000.

In June 1902, Congress passed the Spooner act authorizing President Roosevelt to construct a canal by the Panama route, or by the Nicaragua route in case he could not obtain a concession from the Colombian government giving the United

FAMOUS STREETS

Below Looking south on Biscayne Boulevard from N. E. 5th Street in Miami, Florida. Modern Hotel Biscayne and Hotel Everglades at the center. Stately palm trees run nearly the entire length of this famous Florida thoroughfare.

Above The well-known Hollywood Boulevard in Los Angeles, California. Grauman's Chinese Theatre at the left where the footprints of numerous Hollywood picture stars are seen in the cement sidewalk. At the far end of the Boulevard are the large radio and television studios.

Left The crossroads of the world, Times Square, New York. Famous Broadway on the right and, at the left, Seventh Avenue. Hotel Astor marquee on the left, and in the center are the recruiting stations for the Armed Forces.

Below The upper end of the Michigan Avenue Bridge is known as Chicago's Magnificent Mile. At the left is the Wrigley Building. On the right the Tribune and behind it the Sheraton Hotel. The Palmolive Building is in the distance on the right and beyond that the famous swank Gold Coast apartments.

Above Canal Street in New Orleans, America's widest business street, measures 171 feet. It includes two 21-foot sidewalks and 58-foot neutral ground in the center on which there are four street car tracks. Canal Street was named from a projected waterway, which was intended to join the Mississippi River and Lake Pontchartrain.

Left The Dewitt Clinton, the third locomotive engine built in America, was constructed by the West Point Foundry in 1831. The first experimental trip of this three and one-half ton engine was made on the fifth of July, 1831. On August 9, 1831, a train of passenger cars was hauled from Albany to Schenectady, a distance of 14 miles, in 46 minutes; horse-drawn cars traveled the same distance in 75 minutes. The cars, as they were then called, were the style of old-fashioned stage coaches, with a driver's seat or box, on the outside at either end.

Above A 4000 horsepower Diesel Streamlined Passenger Train speeds on its way over the Rock Island Lines. Modern equipment like this diesel engine has a great economic advantage over its predecessor, the steam engine. Less engine is needed to pull greater loads and fueling operations are simpler and quicker. The engine weighs more than 300 tons.

Above The Fast Mail train over the New York Central and Lake Shore and Michigan Southern Railroads left the Grand Central Station for Chicago on September 16, 1875 and arrived in that city less than 26 hours later, saving nearly 12 hours train time over previous runs.

Below The Northern Pacific's first North Coast Limited, from a photograph made in April, 1900.

PROGRESS OF RAIL TRANSPORTATION

States the necessary rights at the Isthmus of Panama. During the same year President Roosevelt attempted to secure a concession from the Colombian government. However, the amount, ultimately $50,000,000, demanded by Colombia for the concession was far in excess of the $10,000,000 which the United States thought it was worth.

When it seemed that the Colombian government was blocking indefinitely the construction of a canal at Panama, the state of Panama by revolution achieved its independence, November 4, 1903, and established the Republic of Panama. The United States promptly recognized the new Republic of Panama, made a treaty with it, and secured a concession for the construction of a canal. In 1904 work was begun upon it. Ten years later, in August 1914, the canal was opened for traffic.

The Panama Canal was constructed by the United States government under the Secretary of War, and by a commission consisting mostly of United States army engineers. In 1904 Col. Wm. C. Gorgas, who banished yellow fever from Havana, was sent to the Isthmus of Panama. He introduced and carried out effective sanitary measures which made possible the construction of the canal under most favorable health conditions. The engineer to whom greatest credit is due for the remarkable success of the United States in the construction of the Panama Canal is Col. George W. Goethals. His success at Panama was as great as that of De Lesseps at Suez, although the engineering problems at Panama were far more difficult than those encountered at Suez. After the canal was completed, Colonels Gorgas and Goethals were justly raised to the rank of major general in recognition of their services.

The length of the Panama Canal is about 44 nautical miles or 50 statute miles. The minimum depth is 41 feet, and the minimum bottom width through the divide is 300 feet. Navigation for most of the distance from one ocean to another is in lake channels. Four and one-half miles from the Caribbean shore are the Gatun Hills, through which the torrential Chagres River had cut an opening 1½ miles wide. This opening has been closed by the huge Gatun Dam, which created Gatun Lake, 164 square miles in area, one of the largest artificial lake in the world. The level of the lake is 87 feet above the sea. A vessel passing from the Caribbean Sea to the Bay of Panama proceeds through a sea-level channel across the swamp district to Gatun, where, by means of three locks, the vessel rises to the level of the lake. Thence, the channel is through the lake to the Continental Divide, where, through a cut nine miles in length, the vessel passes to within a few miles of the ocean. At Pedro Miguel the vessel is lowered 30 feet to Miraflores Lake, a small body of water 1½ miles in length, created by the construction of a dam at Miraflores. Two locks at Miraflores lower the vessel 55 to 57 feet to mean sea level. From this point the vessel proceeds by a short canal and a submerged channel into the Bay of Panama.

Transit from sea to sea occupies 7 to 8 hours, with passage through the locks 3 to 3½ hours. In 1955 there were 9,760 transits of which 7,997 were commercial vessels of more than 300 tons, carrying a record of 40,646,301 tons of cargo. Tolls on commercial ships totaled $33,918,993; on government vessels, $1,217,993. The canal is operated and regulated financially by the Panama Canal Company, a governmental agency.

The total cost of the Panama Canal has been over $400,000,000. Under a new treaty signed with Panama in 1955, the United States raised the annuity paid Panama for the use of the Canal Zone from $430,000 to $1,930,000 annually, and among other concessions, agreed to return land no longer needed for canal operation.

Cape Cod Canal. The growth in the coastwise commerce of the United States has given rise to renewed interest in projects intended to facilitate coastwise shipments. In 1914, a canal across the Isthmus of Cape Cod was opened for the purpose of shortening the distance between New England ports and New York and other Atlantic ports to the south. By using this canal the dangerous and often foggy outside route is avoided. In 1921, the owners of this canal agreed to sell it to the United States government for $11,500,000, although it cost approximately $13,500,000 to construct. The government purchased it in 1928.

Coastwise Canals. In 1824, the Chesapeake and Delaware Canal Company constructed a canal connecting the Chesapeake and Delaware bays. This canal was acquired by the United States government in 1919. The Engineer Corps of the Army took in hand the work of improving the canal by the elimination of curves and the removal of locks, converting it into a sea-level canal. These improvements, completed in 1926, were calculated to reduce a ship's transit time from ten hours to four hours or less.

Attention is being given to the project of enlarging the Delaware and Raritan Canal across New Jersey into a waterway that may be used for ocean vessels and for warships. This project will probably not be carried out for some years. Eventually, vessels of commerce and of war may be able to proceed from Boston by the Cape Cod Canal, Long Island Sound, the Delaware and Raritan Canal, and the Chesapeake and Delaware Canal to Hampton Roads and Norfolk. Barge canals connect Norfolk with Albemarle sound and the North Carolina seaboard.

New York State Barge Canal System. The canal system of New York State consists of the Erie, Champlain, Oswego, and Cayuga-Seneca canals, and the Cayuga Lake inlet at Ithaca. The Glens Falls Feeder is not adapted for canal traffic but is used to feed the summit level at Fort Edward. The Black River Canal is not adapted for canal traffic, but is used to feed the summit level at Rome. The lakes, rivers, reservoirs, feeders, harbor basins, and canal terminal docks connected with these canals and natural bodies of water also form part of the canal system. The Shinnecock and Peconic Canal, on Long Island, is no longer a part of the canal system. It was turned over to Suffolk County authorities many years ago. Canal facilities exist between the Saranac River and Lower Saranac Lake and Middle Saranac Lake. Locks on these two canals are maintained and operated by the state although the channels and navigation aids themselves are maintained by local civic groups.

Erie Canal. The trunk of the system, the Erie Canal, begins at the Federal Lock at Troy, and follows the Hudson River north to Waterford. At Waterford the canal turns west and extends across the state to Tonawanda, and thence, by way of the Niagara River, to Buffalo.

Champlain Canal. From the eastern end of the Erie Canal at Waterford, the Champlain Canal extends north to Lake Champlain at Whitehall. Barges may thus have continuous passage from the mouth of the Hudson to the International boundary line, and thence, in connection with Canadian waterways, to the Saint Lawrence River.

Oswego Canal. About midway between Waterford and Buffalo, the Oswego Canal extends north from its junction with the Erie Canal at Three River Point, and connects the system with Lake Ontario at Oswego.

Cayuga and Seneca Canal. The south central counties of the state are served by the Cayuga and Seneca Canal, which leaves the Erie at a point about a half mile west of the village of Montezuma and connects first with Cayuga Lake and then with Seneca Lake. Canal channels are provided to the southern extremities of both of these lakes.

The following table gives the exact lengths of the various canals:

Erie Canal	Miles
From the Erie Basin, Buffalo, to Tonawanda	12.43
From Tonawanda to Waterford	337.9
From Waterford to Federal lock at Troy	2.45

Champlain Canal	
From Whitehall on Lake Champlain to junction with the Erie canal at Waterford	60.41
Oswego Canal	
From Lake Ontario at Oswego to Erie canal at Three River Point	23.8
Cayuga and Seneca Canal	
From Erie canal to Ithaca and to Montour Falls, including Cayuga and Seneca lakes	92.23
Canal harbors at Utica, Syracuse, and Rochester	10.41

The total length of the canals, including the connecting rivers and lakes which serve as part of the system, is 801.3 miles.

The canals are all at least 12 feet deep, with a minimum bottom width of 75 feet when dredged through earth, and of 94 feet where cut through rock. There are 302 bridges across the canal system. These are required to clear the water by at least 15.5 feet. Each of the 56 concrete locks built by the state is 300 feet long by 45 feet wide. The Federal lock at Troy, however, has a width of 44.44 feet. The locks will accommodate a barge 300 feet long and 43 feet wide, with a draft of about 10 feet and a height of 15 feet above the water line. Such a vessel could transport up to 4000 tons. The barges most commonly used have a capacity of 600 to 700 tons dry cargo and 2000 to 2500 tons liquid cargo.

The lock at Little Falls has a lift of 40½ feet, one of the highest in the world. The series of 5 locks at Waterford raise a vessel 169 feet—a lift twice as great as that to the summit of the Panama canal.

RAILROAD TRANSPORTATION

When in 1829 Stephenson succeeded in running "The Rocket" at the rate of 44 miles an hour in the contest at Rain Hill near Liverpool, England, he inaugurated a new epoch in the world's history. The effect of Stephenson's achievement was greater even than that of Watt, for the influence of the locomotive upon the industrial and social life of the world has been more fundamental than that of the stationary engine. The locomotive has made possible the rapid settlement and development of the continents of North and South America and of Australia, and is rapidly opening up Africa.

History of American Railroads. The railroad has had its most rapid and its largest development in the United States. The chartering of railroad companies in the United States began in 1826, and construction, on a small scale at first, soon followed. The first locomotives were run in 1830. Several roads, the antecedents of the present Baltimore and Ohio, New York Central, and Pennsylvania systems, started at about the same time. The Baltimore and Ohio was chartered in 1827, and the first rail of this historic road was laid July 4, 1828, by Charles Carroll who was then the only surviving signer of the Declaration of Independence.

The Mohawk and Hudson, from which the great New York Central system has developed, was chartered in 1826. Construction was begun in 1830, and the first 17 miles of the line were opened in 1831. These early roads developed slowly, but Buffalo was reached in 1842. The Baltimore and Ohio reached Wheeling in 1851. The most active center of railroad construction in the 1830's was Philadelphia, which was connected with the Susquehanna river by rail in 1834 and thus with Pittsburgh by rail and canal lines. The Camden and Amboy connected the Delaware river with New York bay in 1837, and Baltimore was reached by rail in the same year.

Between 1830 and 1835 three lines were built out from Boston, one north to Lowell, one south to Providence, and the other west to Worcester. By 1841 this third line had been extended to Albany, and before the close of the following year one could travel from Boston to Buffalo by an all-rail route.

Periods of Railroad Construction. It is interesting to note the growth and recent decrease of railroad mileage as indicated in the table *Growth of Railroads in the United States.*

GROWTH OF RAILROADS IN THE UNITED STATES*

Year	Miles of Line in Operation	Annual Increase in Mileage	Year	Miles of Line in Operation	Annual Increase in Mileage	Year	Miles of Line in Operation	Annual Increase in Mileage†
1837	1,497	224	1875	74,096	1,711	1913	249,777	3,000
1838	1,913	416	1876	76,808	2,712	1914	252,105	2,328
1839	2,302	389	1877	79,082	2,274	1915	253,789	1,684
1840	2,818	516	1878	81,747	2,665	1916	254,037	248
1841	3,535	717	1879	86,556	4,809	1917	253,626	−411
1842	4,026	491	1880	93,262	6,711	1918	253,529	−97
1843	4,185	159	1881	103,108	9,846	1919	253,152	−377
1844	4,377	192	1882	114,677	11,569	1920	252,845	−307
1845	4,633	256	1883	121,422	6,745	1921	251,176	−1,669
1846	4,930	297	1884	125,345	3,923	1922	250,413	−763
1847	5,598	668	1885	128,320	2,975	1923	250,222	−191
1848	5,996	398	1886	136,338	8,018	1924	250,156	−66
1849	7,365	1,369	1887	149,214	12,876	1925	249,398	−758
1850	9,021	1,656	1888	156,114	6,900	1926	249,138	−260
1851	10,982	1,961	1889	161,276	5,162	1927	249,131	−7
1852	12,908	1,926	1890	163,597	2,321	1928	249,309	178
1853	15,360	2,452	1891	168,403	4,806	1929	249,433	124
1854	16,720	1,360	1892	171,564	3,161	1930	249,052	−381
1855	18,374	1,654	1893	176,461	4,897	1931	248,829	−223
1856	22,016	3,642	1894	178,709	2,248	1932	247,595	−1,234
1857	24,503	2,487	1895	180,657	1,948	1933	245,703	−1,892
1858	26,968	2,465	1896	182,777	2,120	1934	243,857	−1,846
1859	28,789	1,821	1897	184,428	1,651	1935	241,822	−2,035
1860	30,626	1,837	1898	186,396	1,968	1936	240,104	−1,718
1861	31,286	660	1899	189,295	2,899	1937	238,539	−1,565
1862	32,120	834	1900	193,346	4,051	1938	236,842	−1,697
1863	33,170	1,050	1901	197,237	3,891	1939	235,064	−1,778
1864	32,908	738	1902	202,472	5,235	1940	233,670	−1,394
1865	35,085	1,177	1903	207,977	5,505	1941	231,971	−1,699
1866	36,801	1,716	1904	213,904	5,927	1942	229,174	−2,797
1867	39,250	2,249	1905	218,101	4,197	1943	227,999	−1,175
1868	42,229	2,979	1906	224,363	6,262	1944	227,335	−664
1869	46,844	4,615	1907	229,951	5,588	1945	226,696	−639
1870	52,922	6,078	1908	233,468	3,517	1946	230,500	3,804
1871	60,301	7,379	1909	236,834	3,366	1947	227,679	−2,821
1872	66,171	5,870	1910	240,293	3,459	1948	225,149	−2,530
1873	70,268	4,097	1911	243,979	3,686	1949	224,511	−638
1874	72,385	2,117	1912	246,777	2,798	1950	223,779	−832

* Single track mileage. For 1840–89, 1916–40, calendar years; for 1890–1915, years ending June 30. † Decrease (—)

RAILWAY MILEAGE OF THE UNITED STATES BY STATES

State	Miles of Line 1930	Miles of Line 1940	Miles of Line 1954
Alabama	5,249	4,996	4,699
Arizona	2,494	2,228	2,152
Arkansas	4,826	4,482	4,000
California	8,240	7,947	7,518
Colorado	4,972	4,552	3,871
Connecticut	969	887	831
Delaware	325	295	293
District of Columbia	36	35	35
Florida	5,666	5,218	4,691
Georgia	6,671	6,334	6,001
Idaho	2,965	2,746	2,704
Illinois	12,500	11,949	11,385
Indiana	7,106	6,889	6,634
Iowa	9,698	8,950	8,516
Kansas	9,339	8,564	8,416
Kentucky	4,054	3,691	3,563
Louisiana	4,654	4,357	4,024
Maine	2,193	1,882	1,795
Maryland	1,443	1,367	1,281
Massachusetts	2,022	1,793	1,694
Michigan	8,072	7,303	6,712
Minnesota	8,779	8,421	8,297
Mississippi	4,209	3,919	3,741
Missouri	7,897	7,042	6,732
Montana	5,228	5,149	5,004
Nebraska	6,174	6,044	5,782
Nevada	2,109	1,941	1,649
New Hampshire	1,165	1,002	870
New Jersey	2,299	2,108	1,971
New Mexico	2,973	2,812	2,475
New York	8,312	7,739	7,338
North Carolina	5,161	4,668	4,326
North Dakota	5,275	5,266	5,257
Ohio	8,804	8,501	8,415
Oklahoma	6,678	6,302	5,957
Oregon	3,456	3,385	3,232
Pennsylvania	11,141	10,328	9,457
Rhode Island	191	194	181
South Carolina	3,780	3,466	3,194
South Dakota	4,238	4,006	3,949
Tennessee	3,940	3,573	3,432
Texas	17,069	16,356	15,355
Utah	2,196	2,082	1,745
Vermont	1,056	919	845
Virginia	4,516	4,261	4,135
Washington	5,442	5,243	5,023
West Virginia	4,046	3,831	3,713
Wisconsin	7,288	6,639	6,265
Wyoming	2,036	2,008	1,890

It will be seen that construction was especially rapid during the third decade of railway history, that is, from 1850 to 1860, when the mileage was increased from 9000 to over 30,000 miles. This was the decade preceding the Civil War, and it was the construction of railroads in the South during that decade that gave the Southern states the economic strength that enabled them to prosecute the war vigorously against the North for the four years, 1861-65. During this same decade, railroads were built extensively between the Allegheny mountains and the Mississippi river and to some extent beyond that river. It was these railroads that enabled the North to defeat the South in the Civil War.

After the Civil War, two or three years elapsed before railroad building became especially active, but beginning with 1868 there was a period of very rapid construction. During the five years ending with 1873, 28,000 miles of road were added. Then followed the severe panic of 1873, the effects of which lasted for fully five years. This was caused mainly by the construction of railroads in the Middle West and Far West in advance of traffic needs. It was distinctly a railroad panic, but, by 1880, its effects had been practically overcome.

From 1880 to 1890, more than 73,000 miles were added to the American railroad net. Building operations were carried on in all parts of the country, especially in the new states of the central and western portions.

By 1890 the principal railway systems required to meet the commercial needs of the country had been constructed. From that time on most new railroads were built to supplement or to extend existing systems. Some 30,000 miles of new line were placed in operation from 1890 to 1900; about 50,000 miles, from 1900 to 1910. The peak was reached in 1916, when the total owned was 254,037 miles. More than 20,000 miles net were abandoned subsequently, owing to the rise of other forms of transportation, such as automobiles, trucks, busses, airplanes, and pipe lines.

PASSENGER TRAFFIC
Millions of Passenger Miles and Percentage of Total

Year	Railroads	%	Busses	%	Air Carriers	%
1930	26,876	68.5	7,100	18.1	73	0.2
1940	23,816	64.5	9,800	26.5	1,052	2.8
1943	87,925	73.9	25,500	21.5	1,634	1.4
1944	95,663	74.2	26,920	20.8	2,178	1.7
1945	91,826	72.9	27,027	21.4	3,362	2.7
1950	31,790	45.3	26,436	37.7	10,072	14.3
1954	29,310	38.4	25,614	33.6	19,568	25.6
1955	28,500	36.1	25,400	32.2	23,100	29.3

RAILWAY MILEAGE OF UNITED STATES DEPENDENCIES

Possession	Miles of Line	Miles per 100 Sq. Mi. of Area	Population per Mile of Line
Alaska	536	.1	135
Hawaii*	192	3.0	2,205
Puerto Rico	386	11.2	4,843

* Does not include plantation railways estimated to be about 670 miles of track.

Standard Gage. The standard gage of railroads is 56.5 inches from the inside of one rail to the inside of the opposite rail, measurement being made about $\frac{5}{8}$ of an inch from the top of the rail head.

Distribution of Railroad Mileage. About 39 per cent of the entire railway mileage of the world is in the United States. Somewhat over three-tenths is in Europe, while all the other countries of the world have only three-tenths of the total.

The state of Texas, because of its great territorial area, surpassing that of France or Germany, naturally has the greatest mileage. Illinois comes second and Pennsylvania third, while Iowa, Kansas, Minnesota, Ohio, New York, Missouri, and Michigan also rank high. New Jersey ranks first among the states in the number of miles of railroad per hundred square miles of area. Nevada, because of its large size and small population, has the lowest mileage per hundred square miles of area, but the highest ratio of mileage to population of any of the states.

History of Canadian Railroads. In many respects the development of Canadian railways corresponds with that of the United States. As was the case in the States, the Canadian colonies devoted their attention first to canal building and the establishment of inland waterways. During the first half of the 19th century, these were the chief improvements made in transportation.

The first railway in Canada was placed in operation in 1836. This was a line 16 miles in length, connecting Montreal and St. John's on the Champlain route to New York. Up to 1850 only 50 additional miles of railway had been constructed. But the great activity in American railroad building during the 1840's convinced the Canadians that they too must have railroads to supplement their canals.

In 1849 the Canadian government adopted a vigorous policy regarding railway construction by undertaking to guarantee 6 per cent interest on a sum not to exceed one-half the cost of railways 70 miles in length or longer. As a result, the St. Lawrence and Atlantic railway, connecting Montreal and Portland, Maine, was completed in 1853,

and, during the same year, the Northern railway from Toronto to Collingwood was placed in operation. In 1854 the Great Western railway, connecting Niagara and Detroit, was opened. The Grand Trunk railroad, chartered in 1852, operated the St. Lawrence and Atlantic under a lease, and, in 1856, completed the main line from Toronto to Montreal, thereby connecting the chief commercial districts of Canada with the Atlantic seaboard.

By 1860 more than 2000 miles of Canadian railways were in operation. These were constructed largely by heavy outlays of British capital. But the financial crisis of 1857, together with the pecuniary embarrassments of most of the lines, prevented extensive railway construction for the ensuing 10 years. Except for the completion of local lines, there was but little additional railway building until after the confederation of the various provinces of the Dominion was effected in 1867.

Fulfilling a condition of Confederation in the East, the Dominion government undertook the completion of the Intercolonial railway between the province of Quebec and the ice-free Atlantic ports of Nova Scotia and New Brunswick. In 1876, at a cost exceeding $20,000,000, this line was completed. A corresponding condition of western federation, demanded by British Columbia, was fulfilled by the construction of the Canadian Pacific railway. At a cost to the country of $62,000,000 in cash and 25,000,000 acres of land, this notable enterprise in railway transportation was begun in 1881 and completed in 1885. It is worthy of note that in the United States at this time only three transcontinental railway connections with the Pacific coast had been established. These were the Central Pacific, from Ogden to San Francisco, finished in 1869; the Southern Pacific, from the Texas seaboard to San Francisco, completed in 1877, and the Atchison, Topeka, and Santa Fé, from the Missouri river to Los Angeles, opened in 1885.

The railways of Canada have been built largely under various forms of government aid, consisting of land grants, cash subsidies, loans, and guarantee of bonds or interest. The total so granted, up to 1940, exceeded 47,000,000 acres.

Government Railways in Canada. A feature wherein railway development in Canada sharply differs from that in the United States is found in the large mileage owned or controlled by the Dominion government. The Prince Edward Island railway, completed in 1875, and the Intercolonial railway, completed in 1876, were the earliest government owned lines. In 1903 the Dominion government began the construction of the eastern division of the National Continental railway from Moncton, N. B., to Winnipeg. This line was to be leased to the Grand Trunk railway. Upon the failure of the latter to operate the new road after it had been completed at a cost of $165,000,000 up to 1919, the Dominion government undertook its operation.

At the beginning of 1918 the Canadian government railways had a total mileage of 5150, comprising the Intercolonial, 2305 miles; St. John and Quebec railway, 128 miles; Prince Edward Island railway, 314 miles, and National Continental railway, 2403 miles. During 1918 branch lines in New Brunswick aggregating 143 miles were taken over for operation. In the same year the Dominion government acquired the capital stock and control of the Canadian Northern Railway Company. The Canadian Northern system at this time had a total mileage of 9566 miles. With the later acquisition of various subsidiaries, including the Hudson Bay railway, the Canadian Northern system, as controlled by the government, comprised fully 10,000 miles of line. In 1920, the Grand Trunk Pacific railway, having a mileage of about 2700 miles, was taken over and operated by the government. The Grand Trunk railway, also, with about 3600 miles, was placed under government management in 1921.

In this manner the government acquired about 21,500 miles of railway; the total was increased to over 24,000 in 1935. This is over one-half the total mileage in the Dominion, which in 1954 amounted to 42,824, of which 90% is controlled by the government-owned Canadian National and the privately owned Canadian Pacific.

Technical Triumphs of American Railroads. The triumph of American railroads has been quite as great in the development of equipment as in the rapidity of track construction. The success of railroading in the United States depended upon the ability to move heavy trainloads long distances and over such grades as were required to surmount the Appalachian and the Rocky mountains.

The great grain fields of the country are in the Mississippi valley, and the products of the Middle West have to be transported 1000 or 1500 miles on the average to reach the markets of the East or the seaboard for export. The chief sources of iron ore are in northern Michigan and northern Minnesota. The important coal fields are on the western slopes of the Appalachians and in Illinois, Iowa, Kansas, and Oklahoma. The leading oil fields are in the Appalachians, Kansas, Texas, Louisiana, Oklahoma, and southern California. The great lumber producing forests are in the upper Mississippi valley, in the South, and in the Far West.

Moreover, the locations of many other important natural resources are equally scattered and remote. The immense distances and diversities involved indicate the complex nature of the transportation problem which the railroads solved.

The Steam Locomotive. To provide transportation for the products of forest, mine, and field, the steam locomotive has been enormously increased in size and tractive power. From the tiny locomotive of the 1830's and 40's, weighing from 5 to 20 tons, has been developed the huge triplex articulated locomotive of the present day with 24 driving wheels and a total weight of 853,000 pounds. This is an extraordinarily large locomotive and is intended for work on heavy mountain grades. But the standard freight locomotive, with eight driving wheels, now has a total weight of about 500,000 pounds. The average tractive power of locomotives in the United States more than doubled in the first 40 years of the 20th century, being over 50,000 pounds in 1940. The number in use was 44,333. The maximum of 65,358 was attained in 1924.

Since World War II, however, there has been a sudden and dramatic change from steam locomotives to Diesel engines. By 1957 the railroads owned only 3,820 steam locomotives as against 22,360 Diesels (26,126 units). But the amount of service each performs tells the true tale of the steamer's passing. Diesels now perform almost 70 per cent of all freight service, more than 70 per cent of all passenger service, and nearly 80 per cent of all switching service. More than 20 railroads are now completely dieselized. In place of the steamer has come a locomotive of greater economy and dependability.

The Car. Such heavy trainloads would not be possible except for the size and the strength of the freight cars now in use. At the close of the Civil War, the standard freight car had a capacity of about 20 tons. By the end of the 19th century the standard had been raised to 40 tons. The average capacity climbed from 42.5 in 1921 to 53 tons in 1953. The only limit to the size of the car is the strength of the tracks and bridges.

The Electric Locomotive. The earliest electric locomotive was used to haul cars in mines in 1882, but the most important early use of this form of traction was in subways and tunnels, where it has obvious advantages in the fact that electric locomotives do not emit smoke and noxious gases. The first tunnel in which electric locomotives were used was that of the City and South London Railway under the Thames River, opened for traffic in 1890.

Other situations in which electric locomotives have proved of value sufficient to justify the high initial cost of electrification are: in terminals and suburban divisions of railroads; on steep mountain

grades; and on routes carrying heavy traffic and requiring fast service.

Diesel-Electric Locomotive. Although electrically driven, this type of locomotive does not require that tracks be electrified so as to transmit current from a central station. On the contrary, it generates its own current by means of a dynamo driven by a Diesel engine. The current drives motors geared to the wheels. The Diesel uses much less fuel than the steam locomotive. It also requires less maintenance and inflicts less wear and tear on tracks. It allows easier starting for heavy loads, and can maintain higher speeds for longer periods. The first Diesel-Electric locomotive for commercial use was built in 1925. This was the Jersey Central Railroad's No. 1000, which is still in service.

Streamlined Trains. The purpose of molding the outline of locomotive and cars as a unit is to cut down air resistance. Increase in beauty is an important but secondary consideration. Traction efficiency can be increased greatly by this method. The first completely streamlined train in America was put into service on November 11, 1934, by the Chicago, Burlington and Quincy railroad. Known as the "Zephyr," it ran between Lincoln, Nebr., and Kansas City, Mo. In 1956 some railroads began operating new lightweight streamliners with short low-slung coaches that can take curves faster than standard equipment.

TRANSPORTATION UPON ELECTRIC RAILWAYS

Tramways. The first electric railways were built to take the place of horse car lines or tramways in the cities. The tramways had been preceded by bus lines, which began to run in New York City in 1830 and in Philadelphia the following year. It was not until 1832 that the first horse car was built in the United States. The first street railway in Boston dates from 1853, and, in Philadelphia, from 1858. Chicago's first line was started in 1859. These horse car lines provided a service of four or five miles an hour, and were fairly adequate for the transportation needs of the times.

Cable and Elevated Roads. By 1870, more rapid transit than could be provided by horse car lines had become necessary, and in one important city, San Francisco, steep hills made horse cars impracticable. The cable lines were the first to provide rapid transit. San Francisco opened a cable line in 1873, Chicago in 1878, Philadelphia in 1884.

In New York City, rapid transit was provided by the construction of elevated railways. The franchise for the first of these elevated railways was granted in 1867. Construction followed in due course, and by 1879 New York City had a fairly complete system of elevated roads. It was intended at first to use cable traction upon these elevated lines, but, before operation began, it was decided to use dummy locomotives. Twenty-five years later these steam locomotives were displaced by electric locomotives. Chicago began the construction of elevated roads in 1888; Boston, in 1903; and Philadelphia, in 1907.

Subways. The earliest underground railway for passengers was opened in London in 1863. It was operated with steam locomotives at first, but electric traction began to be used in 1890. The term "tube" is ordinarily applied in England to these railways. Budapest and Glasgow followed with the inauguration of electric train subways in 1896. A subway was opened in Boston in 1898. A subway service in Paris was initiated in 1900. The first line of the New York subway system was opened in 1904. Construction in this city presented peculiar difficulties. The subways had usually to be blasted through rock and, in certain sections, buildings of enormous weight had to be safeguarded while tunnels were driven beneath them. More recently, Philadelphia, Rochester, Toronto, Berlin, Tokyo, and Moscow have constructed transit facilities of this type. Chicago has a freight subway with a network of tunnels beneath the street level.

Technical Development. The electric railway was made possible by the dynamo, which was developed for practical use shortly after the middle of the nineteenth century. However, it was not until 1888 that an electric trolley line was actually demonstrated to be commercially practicable. After its introduction during that year, the electric railway made rapid progress in all cities. By the end of the century it had almost completely displaced horse car lines. It has since been largely displaced by the motor bus.

Electric Trains. At first, electric cars for passenger transportation were operated singly. This method required the services of a motorman for every car. But at present, on electric urban lines and upon interurban electric roads, the multiple unit train is run. By the multiple unit system, invented by Frank J. Sprague, cars may be run either singly or in trains. When several cars are united in a train, they are managed by a single motorman.

During the first decade of the 20th century, the development of interurban and long distance electric railways proceeded rapidly, particularly in New England and also about Detroit, Indianapolis, and Los Angeles. With the growing use of the motor bus and the private automobile for travel, however, electric railway travel fell off rapidly. Steam railways suffered severely from the competition but electric railways suffered still more severely.

RURAL ROADS IN THE UNITED STATES—1950

State	Total Mileage	Surfaced	Non-surfaced	Gov't Control
Alabama	60,028	41,581	18,447	6,895
Arizona	27,168	9,307	17,861	3,852
Arkansas	62,941	26,283	36,658	9,219
California	97,681	58,853	38,821	12,902
Colorado	75,968	16,339	59,629	11,849
Connecticut	10,548	10,227	321	2,730
Delaware	3,772	2,988	784	3,772
Florida	40,844	18,794	22,050	8,985
Georgia	89,398	23,136	66,262	13,751
Idaho	39,421	19,529	19,892	4,511
Illinois	103,416	87,704	15,712	10,417
Indiana	84,040	75,146	8,894	9,693
Iowa	101,172	69,326	31,846	8,789
Kansas	125,955	52,429	73,526	9,415
Kentucky	58,006	36,612	21,394	12,768
Louisiana	39,967	24,379	15,588	14,126
Maine	20,704	17,105	3,599	10,573
Maryland	16,378	13,498	2,880	4,426
Massachusetts	17,548	16,482	1,066	1,866
Michigan	92,759	68,635	24,124	8,291
Minnesota	109,738	78,530	31,208	11,335
Mississippi	61,634	34,087	27,547	6,766
Missouri	100,453	73,078	27,375	17,908
Montana	69,697	20,614	49,083	8,713
Nebraska	99,969	33,447	66,522	9,206
Nevada	25,490	6,608	18,882	5,773
New Hampshire	12,539	8,906	3,633	3,668
New Jersey	18,249	14,560	3,689	1,793
New Mexico	61,733	8,992	52,741	10,225
New York	82,724	71,952	10,772	14,744
North Carolina	64,536	43,703	20,833	63,388
North Dakota	114,044	27,919	86,125	6,587
Ohio	86,286	76,112	10,174	16,076
Oklahoma	91,871	24,428	67,443	9,619
Oregon	52,488	27,042	25,446	7,652
Pennsylvania	87,883	53,938	33,945	41,781
Rhode Island	2,057	1,867	190	575
South Carolina	47,036	17,567	29,469	20,503
South Dakota	93,403	31,689	61,714	6,114
Tennessee	64,807	51,816	12,991	7,827
Texas	196,426	78,987	117,439	34,620
Utah	24,920	11,083	13,837	4,877
Vermont	12,970	10,199	2,771	1,834
Virginia	49,242	45,098	4,144	47,700
Washington	46,841	34,986	11,855	5,992
West Virginia	33,017	17,884	15,133	31,597
Wisconsin	86,314	77,496	8,818	10,090
Wyoming	25,955	7,678	18,277	4,564
Total	2,990,036	1,678,619	1,311,417	580,357

TRANSPORTATION ON THE PUBLIC ROADS

Highway History. In colonial days and until within a few decades, road building in the United States was carried on mainly by local governments. The work of construction was done by townships and towns in the middle and eastern states, and by counties and subdivisions of counties in the southern states. These local highways were mostly dirt roads and were not suitable for the handling of freight and passenger traffic between distant points. The first long distance or through-transportation highways were the turnpike roads, built by corporations chartered by the several states. The first important turnpike was the one from Philadelphia to Lancaster, Pa., begun in 1792 and completed two years later. Early in the 19th century, turnpike roads in large numbers were built in Pennsylvania, New York, and other states.

For a time the government of the United States gave aid to highway construction. Works of internal improvement then included highways as well as canals. But the policy of national aid to public highways came to an end in the 1830's, when it was held that Federal works of internal improvement were unconstitutional. By 1850 most of the states had come upon financial difficulties in attempting to build or aid canals, railroads, and highways. As a result, the old colonial policy again prevailed.

Until near the end of the 19th century, the railroads performed long distance transportation in the United States with great efficiency and with a fair degree of adequacy. But by that time a large part of the United States had become closely settled and industry had reached an advanced stage of development. In this changed situation improved highways were recognized as necessary.

Good Roads Movement. About 1890 a "good roads" movement started in Massachusetts, New Jersey, New York, and other states. Following 1910, this movement was powerfully re-enforced through the need for roads more suitable for motor vehicles, which by that time were coming into general use. Rural roads began to be hard-surfaced on an extensive scale. Normally the United States spends over a billion dollars annually on highway construction.

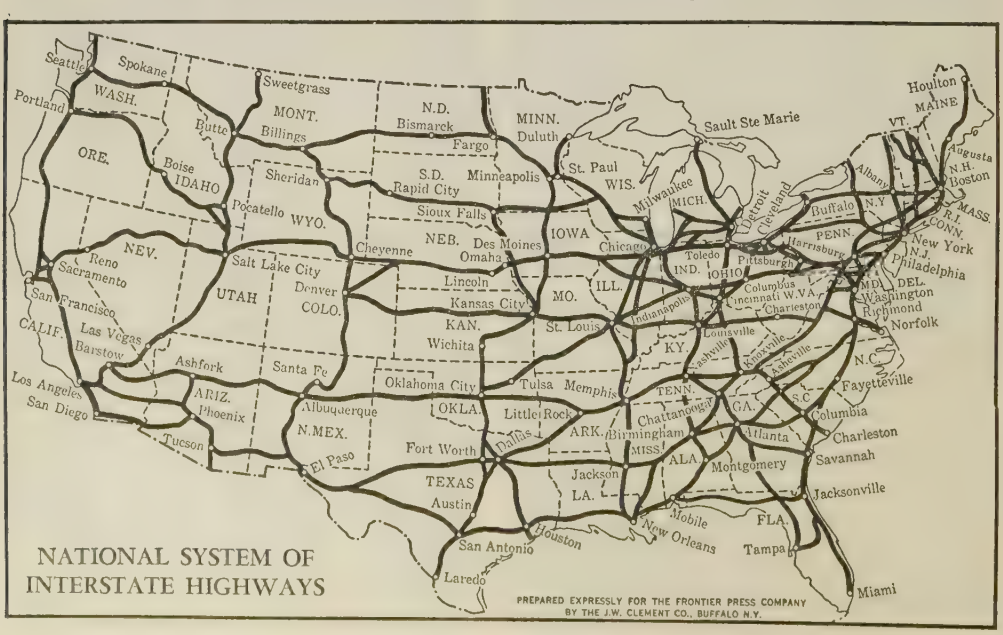
Motor Trucks and Busses. In the decade 1920-30, motor trucks and busses, operating over paved highways, developed into formidable rivals of the railroads. Low initial investment and flexibility of operation gave them important advantages. At the same time, a beginning was made toward coordinating the two types of transport through the medium of financial control of both. Among the improvements thus made possible were door-to-door transportation service and use of motor carriers on "feeder lines" for gathering rail traffic. A recent development is the so-called "piggyback" freight trains which carry truck trailers on special flatcars.

The Federal government stepped into the picture in 1935 with a law placing regulation of interstate bus and truck lines under the Interstate Commerce Commission. Schedules of rates must be filed with the commission and are reviewable by it. Permission to operate interstate motor lines is dependent on possession of "certificates of convenience and necessity" issued by the commission.

National Aid to Highways. Motor truck transportation necessitated interstate highways, and in 1921 the Federal government granted aid for Federal highway construction. Again, during the depression of the 1930's, Federal aid was spent for highway construction.

In June 1956, Congress passed a federal highway construction bill designed to provide over a thirteen-year period a 41,000-mile network of super-highways costing $33,482 billion. The largest construction program ever undertaken by any government, the network will connect 42 state capitals and 90 per cent of all cities with a population exceeding 50,000. Under the plan, the Federal government will pay $28.057 billion of the total cost, the states $5.425.

Increased taxes to help pay for the new road-building program were provided. Under the act some $14.814 billion additional tax revenue will be collected during the next sixteen years. The tax on gasoline and other motor fuels was raised from 2 to 3 cents a gallon, and the tire tax from 5 to 8 cents per pound. A new tax of 3 cents a pound was placed on tread rubber. Taxes on trucks, buses, and trailers were increased from 8 to 10 per cent of the manufacturers' prices. Heavy vehicles such as trucks, buses, and the like using highways and weighing more than 26,000 pounds are subject to a use tax of $1.50 per 1,000 pounds on the weight of the vehicle. To carry out the program, the office of Federal Highway Administrator was created.



AERONAUTICS AND TRANSPORTATION BY AIR

Early History of Aircraft. The earliest *attempts* at flight were made with craft heavier than air. This fact was probably due to the every-day example of the flight of birds.

The Greek inventor Archytas is said to have constructed, about 400 B. C., a wooden pigeon which maintained itself for a short time in the air. About 1500 A. D., Leonardo da Vinci constructed models of helicopters, with propellers rotating in a horizontal plane, which hovered in the air. He is, therefore, properly credited with the invention of the helicopter and also of the propeller with rotating blades. He first conceived also of the parachute and he drew plans for ornithopters, that is, for aircraft to be propelled by flapping wings. These were to be operated by the arms and legs of the aeronaut. Many later inventors continued to experiment on these lines despite the fact that Giovanni Borelli (1606-79) pointed out that man's pectoral muscles have less than one-tenth the power possessed by the wing-operating muscles of birds when the weight of the body is taken into consideration.

Attempts at gliding are said to have been made in Rome in the time of Nero. About 1660, a French acrobat named Allard undertook a gliding flight in Paris before Louis XIV. These and many subsequent attempts ended in injury or death to the would-be aeronauts.

Aeronautics. Mechanical flight is pre-eminently a development of the 20th century. Its success demanded the improved gasoline engine, a light, strong metal, such as duralumin, and a knowledge of air dynamics. These discoveries led to the evolution of the airship from the balloon and to the building of successful heavier-than-air machines, or airplanes. See *Airplane* and *Airship*.

The flight of an airplane is analogous to that of a kite. The string by which the kite is drawn forward corresponds to the forward drive of the propeller, and the upward pressure of the air on the kite corresponds to the lift exerted on the wings of the airplane. This lift is due partly to the pressure exerted on the under side of the wings, and partly to the suction caused by a partial vacuum on the upper side of the wings. Neither surface of the wing is flat. The cross section of the wing follows certain stream-line designs which are a balance between three requirements—maximum lifting power, strength, and minimum resistance in passing through the air. The last mentioned requirement demands also that the body of the airplane should conform to stream-line design.

To exert effective lifting power the wings must be driven forward at a certain minimum speed and must be inclined upward at an angle of from 2° to 20°. Below this limit, or above it, the air resistance, or "drag," causes the plane to "stall;" that is, to fall below the minimum speed necessary for horizontal flight or control. The minimum speed required to keep the average plane in the air is about 35 miles an hour. Average flying speed approximates 250 miles per hour. The record speed exceeds 575 miles per hour.

The mechanisms for stabilizing the airplane's course include a vertical tail fin and a horizontal tail plane. Control of its course is effected through an "elevator," jointed to the tail plane, a rudder, jointed to the fin, and ailerons, or adjustable wing flaps. Landing on rough ground is facilitated by the use of pneumatic tired wheels on axles fitted and designed for maximum shock absorbing capacity.

While the control of an automobile involves only two main factors—speed and steering in a horizontal plane—the control of an airplane involves at least two additional factors. One is steering in a vertical plane; that is, going upward, downward, or on the level. The other is maintaining an even keel; that is, avoiding undue tipping, or "banking." Most planes have a so-called stick control. Moving the "stick" forward or backward causes a fall or rise in height; moving it sideways causes tipping to the right or left. Steering right or left is accomplished by a foot bar.

For the aviator's guidance, the plane is equipped with numerous instruments: special compasses; the altimeter for recording elevation; the terrain clearance indicator, showing distance from the earth's surface. Radio direction finders, tuned to beams sent out from airports, give him his course. Radar devices, largely developed during World War II, give warning of obstacles in a plane's line of flight and accurate altitude readings in overcast or darkness. At airports equipped with radar approach systems, planes can land in fog. Directions are radioed from the ground to the pilot as the plane's course is noted on radar screens.

Improved construction of the planes, and equipping them with several motors, assures relative safety. The construction of numerous airports further reduces the danger of forced landings on unsuitable ground. Lighted airways and powerful revolving beacons afford direction for night flying. Improved weather forecasting service reduces the peril of inclement weather.

Jet and Rocket Propulsion. The urgency for higher speeds, particularly for military planes, led to the development of so-called jet and rocket planes. Both jet and rocket propulsion are based on the same fundamental principle. Just as a shotgun "kicks," or is pushed in a direction opposite to that taken by the projectile it fires, so are rocket or jet engines pushed by the reaction of their own exhaust gases. The principle of Conservation of Momentum (*q.v.*) leads to the conclusion that the forward momentum of the engine proper will be equal to the rearward momentum of the exhaust gases. Ejection of the exhaust gases at high speed is therefore seen to be desirable.

In both rockets and jets, fuels are burned rapidly at high temperature, and the combustion products, ejected at high speed, result in large driving forces. The distinguishing feature between rockets and jets lies in the way oxygen is provided for combustion. In a jet engine, air is taken in through an opening at the front of the engine and fed into the combustion chamber where it reacts with the fuel, and from which the exhaust is expelled rearward. Jet-propelled aircraft have flown at speeds exceeding the speed of sound. They cannot, however, operate outside the earth's atmosphere, since oxygen from the atmosphere is required for combustion.

Rockets, on the other hand, operate in or outside the earth's atmosphere—better outside, in fact, since they carry their own oxygen supply, usually as liquid oxygen, and air resistance plays no part. Both fuel tank and oxygen tank are connected to the combustion chamber, and again expulsion of the exhaust gases results in a driving force on the rocket proper. Rockets may be attached to vehicles, or may themselves be used as missiles. Modifications of the German V-2 rocket, using alcohol and liquid oxygen, have attained altitudes of well over 100 miles.

TRANSPORTATION BY AIR

The airship, being lighter than air, rises by its own buoyancy. It was the first type of aircraft to attain success. An account of its invention and early development will be found in the article on *Airship*, page 1324. It was also the first type to be used commercially in aerial transportation.

The first regularly organized aerial transport company was the "Delag," abbreviated from *Deutsche Luftschiffart Actien Gesellschaft* ("German Airship Transport Corporation"). This company, organized in 1910 by Count Zeppelin, operated with a total of six dirigibles and carried 34,228 passengers in the three years preceding the outbreak of World War I. The first trip was made June 22, 1910, by the *Deutschland* from Friedrichshaven to Düsseldorf, a distance of about 300 miles.

Airship Transportation. The following dates are significant milestones in the progress of the balloon and dirigible airship as a practical means of transportation:

Aug. 27, 1783—Hydrogen first used in a balloon by Prof. J. A. C. Charles, of Paris. The earlier balloons employed hot air.

Jan. 7, 1785—The first crossing of the English channel in a balloon, by J. J. Blanchard, a Frenchman.

Jan. 9, 1793—The first ascent of a balloon in America, at Philadelphia, by J. J. Blanchard, in the presence of George Washington.

Sept. 24, 1852—The first flight of a balloon whose direction was controlled by a power driven propeller, by Henri Giffard, in Paris.

1897—The first rigid aluminum airship powered by a gasoline engine, built by Schwarz, in Germany.

1904—The first airship built in the United States, the *California Arrow*, by Captain T. S. Baldwin.

June 22, 1910—The first flight of an airship on a regularly operated transportation service, by Count Zeppelin at Friedrichshaven, Germany.

July 2-6, 1919—The first transatlantic flight by an airship, the British *R-34*, from Scotland to Long Island, 3200 miles in 108 hours, 12 minutes.

1929—First circumnavigation of the globe in an airship, by Dr. Hugo Eckener in the *Graf Zeppelin*.

May 1936—First commercial transatlantic air service between Germany and United States inaugurated with air liner *Hindenburg*.

As a practical means of transportation, the airship lacks flexibility, and a huge amount of capital is required for the construction of each unit and for hangars in which the ships must be housed.

Airplane Transportation. An account of the invention of the airplane and principles of its flight will be found in the article on *Airplane*. Outstanding dates in the history of airplane transportation are:

1809—Sir George Cayley, an Englishman, suggested flight in a rigid-plane mechanism driven through the air by propellers connected with an internal combustion engine.

1848—The first power-driven airplane which actually flew, a 9-pound model, steam-driven, constructed by John Stringfellow, an Englishman. It flew 120 feet.

1891—Otto Lilienthal, in Germany, began the practice of gliding, introducing the curved wing and thickened front edge. He traversed distances up to 850 feet. Edgar Dittmar, a German, in 1929, succeeded in gliding 165 miles. Later records have exceeded 280 miles.

Dec. 17, 1903—First successful piloted flight in a power-driven airplane, at Kitty Hawk, N. C., by Wilbur Wright, 120 feet in 12 seconds. Nine days previously Samuel P. Langley's "aerodrome" had crashed in a take-off, but was later proved capable of flight by Glenn Curtiss and flown successfully at Hammondsport, N. Y., Sept. 17, 1914.

Aug. 22, 1906—First successful flight in Europe and first in the world without launching aids, by Alberto Santos-Dumont at Bagatelle, France.

July 25, 1909—First airplane flight across the English channel, by Louis Bleriot, 20 miles in 37 minutes.

1914-18—Phenomenal development in speed and stability under the impetus of World War I.

May 16-27, 1919—First transatlantic airplane flight, in three hops, by *NC-4*, a U. S. Navy plane.

May 15, 1918—First regular air mail route in America inaugurated, between New York and Washington.

June 14, 1919—First non-stop transatlantic airplane flight, by Alcock and Brown, Newfoundland to Ireland, 1936 miles in 15 hours, 57 minutes.

Nov. 1, 1920—First American airplane passenger service inaugurated between Key West and Havana.

1924—First aerial circumnavigation of the globe, by United States Army planes in 175 days.

1930—Development of "blind flying."

1931—Aerial circumnavigation of the earth in 8 days, 15 hours, 51 minutes, by Post and Gatty, as compared with the first circumnavigation in 1519 by Magellan, which required 37 months.

1934—First west to east crossing of the Pacific, by Sir Charles Kingsford-Smith and Capt. P. G. Taylor, 7365 miles in 51 hours flying time.

Nov. 1935—First transpacific air mail service—San Francisco to Manila.

June 17, 1939—Transatlantic passenger service inaugurated between U. S. and Europe.

1940-42—Experience in World War II establishes airplane as military and naval factor of revolutionary importance.

Commercial Air Transportation. The year 1940 marked the end of the second decade of commercial air transport in the United States. By that time the country had 2331 airports in operation. Scheduled flight routes totaled 94,079, of which 30,480 were equipped with beacons for night flying. The total number of aircraft in operation was 16,903. A total of 3,185,278 passengers were carried, and the freight and express traffic amounted to 14,188,178 pounds. The number of airplane pilots was 82,277, including 2377 women.

Mass production of aircraft began in the United States in 1942 under the pressure of war. In that year also was begun the production of large transport planes, each capable of the transoceanic transport of many tons of freight on each trip. The possibility of using such planes in large numbers opened up new vistas in trade, travel, and use of geographical areas, particularly in view of the fact that national safety would require continuous operation of such fleets regardless of commercial profitableness.

In general, European countries subsidize aviation directly, because of its indispensability in wartime. In the United States, however, commercial aviation has not been subsidized except for the mail contracts. The United States, because of its system of competitive free enterprise, production methods, and advanced research, took the world lead in airplane production and operation during World War II and is today the undisputed leader in air transportation of the world.

Federal Control. Federal promotion and regulation of civil aviation are carried out by two bodies—the Civil Aeronautics Administration and the Civil Aeronautics Board. The Civil Aeronautics Board is an independent agency concerned primarily with the issuance of certificates of public necessity, economic regulation, the formulation of safety regulations, and the investigation of accidents in civil aircraft.

The Civil Aeronautics Administration is an operating agency of the Department of Commerce. Its principal activities are the building and operation of air navigation aids, the enforcement of safety regulations, and the promotion of a national airport system.

Airports. In 1957 there were more than 6,000 airports in the United States, two-thirds of them civilian fields of which over half were municipally owned. There were between three and four hundred military fields, but none of these was open to civil aircraft, except by prior permission of the commanding officer of a field. While the public was not prohibited from using the numerous private fields, aircraft services at these places were either limited or not available. The annual *Airport Directory* (McGraw-Hill) gives the location and description of all U. S. airports, with types of runways, field markings, beacons and obstructions, facilities, including weather reports, and distances from town.

LABOR RELATIONS

SINCE the days of feudalism, the world's work has been done under what is known as the system of free contract, which means that the employee delivers his work to his employer for a stipulated price. Forced labor, as under slavery, and labor exacted as a duty because of social status, which prevailed under feudalism, theoretically at least have no part in labor relations today among democratic nations.

Before the rise of large-scale industry, as on many farms today, the relation between employer and employee was close and personal. But as the small property owner yielded to the large corporation as the typical employer, the relation of employee to employer became rather that of production worker to manager with personal acquaintance replaced by rules and policies. In a corporation, the management itself consists of employees of the corporation. Its interests, however, lie chiefly with the owners of the corporation rather than with the production workers. This fact provides the setting for the problems of labor relations in industry.

Management and Workers. The interests of management and workers conflict in so far as each group seeks to obtain a larger share of the revenue of the enterprise. Their interests overlap, however, in that neither could operate the enterprise without the aid of the other and both stand to profit by enlarged revenue. Under normal conditions, ownership and management have the initial advantage that they do not need workers as much as the workers need them. That is to say, the workers are usually much more dependent upon the weekly or monthly pay check than the owners of capital are upon profit or dividends from business. The owners are likewise able, as a group, to employ their superior money resources as a purveyor of power through political activity, use of the courts, and publicity. To offset this advantage, workers eventually built up strong organizations—labor unions—to mobilize countervailing economic and political power.

Role of the Government. For these reasons the labor problem in an industrialized nation enters vitally into government itself. On the one hand, two groups, one the wealthier and the other the more numerous, compete for control. But the government, which represents all other interests as well as these, has a primary concern in seeing that peace is preserved, production of goods is promoted, and the causes of strife are eliminated. It has also an interest in seeing that the health and well-being of the citizenry are not impaired by substandard conditions of work.

In so-called totalitarian states, labor unions are either suppressed or become in effect branches of the governmental organization. In either event, their freedom of action in striking and consequently in negotiations with employers is lost. Wages and working conditions are apt to be set by the government.

INDUSTRIAL CONFLICT

In the early 19th century, the legal relation of employer and employee was still that of master and servant, a relic of the feudal system. Concerted action by employees to obtain better wages or working conditions was punishable by the courts as conspiracy, for which prison sentences might be imposed. In 1842, however, the Supreme Judicial Court of Massachusetts, then perhaps the most influential court in the country, ruled that employees might lawfully organize for mutual aid.

This right was slow in obtaining recognition. Its practical exercise, however, and the use of it to better the conditions of labor provide the key to most of the economic conflict between capital and labor both before and since.

The ultimate weapons of industrial conflict are the strike on the part of employees and the lockout on the part of employers. These simple forms of economic pressure, however, are usually supplemented by other actions intended to break the resistance of the opposing parties. Strikes may be of the aggravated forms known as stay-in, or sit-down, strikes or they may be widened into sympathetic strikes. They are usually accompanied by picketing and may be supplemented by boycotts. Lockouts are much rarer than strikes. Most employer action in industrial disputes, therefore, takes the form of combating strikes.

Early History of Strikes and Unions. The first recorded strike in America took place in 1741, when New York bakers quit work as a protest against a municipal ordinance regulating the price of bread. The earliest known strike for higher wages took place in 1786, when the Philadelphia printers ceased work as a means of enforcing their demand for a minimum weekly wage of six dollars. A sympathetic strike took place in 1799, when the shoemakers, belonging to the organization known as the Federal Society of Journeymen Cordwainers, were compelled to lay down their tools in order to aid the bootmakers, who were seeking an increase in wages. This action may be regarded also as the first *organized* strike in America. Sympathetic strikes, however, did not play an important part in industrial disputes until the last two decades of the 19th century.

A successful attempt to establish a 10-hour working day was made by the unions of Philadelphia in 1835. Fifty-one years later, in 1886, occurred the first nation-wide strike for an eight-hour day.

Many trade unions were formed in the period between 1792 and 1810, especially in the cities of New York, Baltimore, Philadelphia, and Pittsburgh. The first central organization of trades in one city was formed at Philadelphia in 1827. It was called the Mechanics Union of Trade Associations.

In 1833, there were 29 organized trades in New York City. Many of these affiliated to form the New York Trades Union. Similar organizations followed quickly in other cities, so that when a convention was called in New York in August 1834, delegates were present representing the trades unions of Boston, Brooklyn, Philadelphia, Poughkeepsie, New York, and Newark. At this convention was inaugurated the National Trades Union. A trades union, comprising as members *unions* in various trades, must be distinguished from a trade union, which comprises as members *individual workers* in *one* trade only.

The printers were apparently the first craft to unite their local units into a national association, so that the Typographical Union, organized in 1850, is the oldest *national* trade union in America. The Stonecutters effected a national organization in 1853; the Hat Finishers, in 1854; the Molders, and the Machinists and Blacksmiths, in 1857.

In addition to unions of the workers in a particular trade, two organizations on a national scale arose prior to 1870, each of which admitted workers of any trade. The first was known as the National Labor Union, founded in 1866. The second, established in 1869, was called the Noble Order of the Knights of Labor. It began as a secret society, but the policy of secrecy was abandoned in 1878. Dissensions within these organizations led, in 1881, to the formation at Pittsburgh of the Federation of Organized Trades and Labor Unions of the United States and Canada. This federation merged with a separate trade union conference on December 8, 1886, forming the present American Federation of Labor. In 1889, the new federation recognized the continuity of its existence by dating its records from 1881.

Strikes. A strike is a concerted cessation of work on the part of the employees to compel an employer to meet their wishes as to wages or other conditions. It is a two-edged weapon, however; sometimes it cuts three ways. While its purpose is to cause loss to the employer, it also cuts off earnings of employees and may entail serious consequences for the public.

To enable employees to stand the loss of wages, labor organizations usually accumulate strike funds from which payments may be made to needy strikers in the form of strike benefits.

When the effect of strikes on the public goes beyond mere inconvenience and threatens disorganization of customary ways of living, as when electric power is cut off, the government is likely to intervene. Some states make strikes against public utility companies unlawful. The Federal government has the power by law to delay strikes which the president finds to imperil the public health or safety.

Sit-down Strike. This is a term applied when strikers, instead of leaving their jobs, remain at their places and refuse to work. Such action amounts practically to taking over the shop. When first used, in 1937, the sit-down strike brought workers some conspicuous successes, but it was later made illegal in many states, and participants were deprived of the protection of Federal labor laws which they would otherwise have enjoyed.

Sympathetic Strike. This is a strike called by a union against an employer with whom the union has no quarrel, the purpose being to aid a sister union involved in a dispute with another employer.

Picketing. The picket line is the commonest means of adding to the effectiveness of a strike. It usually takes the form of a file of strikers carrying signs near a plant entrance, the signs conveying in simplified form the strikers' version of the dispute. The signs, for example, may read, "Unfair to organized labor." Sometimes sound trucks are pressed into service to give the public a more detailed account of the strikers' case.

The effectiveness of a picket line may be much greater than the number involved would lead one to expect. This is because crossing a picket line is regarded by large numbers of people as a species of treason to the employee class or the labor movement. The picket line helps to make a strike complete.

When feelings run high, picketing may become much more than an advertisement of the strikers' case. The pickets may attempt forcibly to prevent nonstrikers or customers from entering the employer's premises. This is sometimes known as obstructive or violent picketing as opposed to peaceful picketing.

Peaceful picketing has been declared by the United States supreme court to be a right protected by the Constitution as a form of free speech. On the other hand, courts ordinarily take the view that violent picketing is unlawful and may be forbidden by injunction. Even peaceful picketing when engaged in for unlawful purposes falls under the ban of many laws which define such purposes.

Boycotts. In addition to picketing, unions frequently seek to exert pressure on employers with whom they are in controversy through destroying their markets by means of boycotts. That is to say, members and others are asked not to patronize the employer concerned.

Secondary Boycott. A boycott is secondary when it is aimed only indirectly at the employer with whom the union has a quarrel. It seeks to reach him by forcing his customers, suppliers, or employees to cease doing business with him until he consents to what the union wants. An example would be picketing a radio store to prevent it from handling radios made by a company against which the union was striking. Such tactics are forbidden by Federal law and by some state laws.

Union Label. The use of a special label for goods made in factories where labor is unionized is another form of aiding a consumer's boycott. In another sense it is a form of advertising so as to permit preferential buying, comparable to the injunction to "buy home goods."

Strikebreaking. The usual strategy of the employer in combating a strike, the picket line, and boycott is to attempt to operate his business with nonstrikers or new employees and weaken the morale of the strikers. Injunctions against picketing and boycotts may be sought. Attacks on morale of strikers may take the form of enlisting the aid of a citizen's committee to organize a "back to work" movement, obtaining police aid in escorting nonstrikers through picket lines, and sending "missionaries" to strikers' families to undermine confidence in the union's leaders and in the ultimate success of the strike. Professional strikebreakers ("finks") may be employed to create the impression that the plant is fully manned. Or an impression may be created that the plant will close down permanently.

LABOR INJUNCTIONS

It is impossible to understand industrial conflict without appreciating that, while the objective of employees is better pay and working conditions, these can be achieved as a rule only when the employees are able to act together effectively. Only by organizations can strikes, picketing, or boycotts be made into effective instruments.

For this reason, in the earlier stages of the industrial age, employers' efforts to combat employee demands were aimed at preventing employees from organizing. One method used was to insist that new employees sign what came to be called "yellow-dog contracts." These were undertakings not to join a labor organization on pain of discharge. Even without such contracts, many employers considered membership in such organizations ground for discharge.

When conflicts came into the open through strikes and picketing, the weapon of court injunctions was relied on. An injunction is a court order usually issued to prevent the violation of someone's right. If it is disobeyed, the violators may be punished at the court's discretion through fines or imprisonment.

The first labor injunction by a Federal court was issued in 1885 (*U. S. v. Kane*) to prevent an act threatening a bankrupt property which was directly under the guardianship of the court. This precedent was extended to protect private property rights in the case of Casey v. Cincinnati Typographical Union, decided in 1891. Thereafter injunctions were used freely to prevent picketing and other strike action, frequently without the union being notified or given a chance to reply.

Antitrust Laws. In 1890 Congress passed the Sherman Antitrust act designed to break up combinations of capital. Combinations in restraint of interstate commerce were made subject to injunctions and to suit for triple damages by persons injured by the combinations. This law was utilized to prevent picketing and boycotts where interstate commerce was affected.

The supreme court of the United States, in 1906 and 1908 respectively, decided that a boycott conducted by a labor union against goods of a manufacturer with which the union has a dispute and a boycott against retailers buying from such a manufacturer fall under the prohibitions contained in the Sherman act. (See *Buck Stove and Range Case* and *Danbury Hatters' Case.*) The Clayton act, amending the Sherman act in 1913, provided that the antitrust laws should not apply to labor unions acting lawfully in pursuit of their legitimate purposes. The courts held, however, that action which interfered with interstate commerce was not part of the legitimate activity of unions, thus leaving the earlier decisions of the supreme court in effect.

Norris-LaGuardia Anti-Injunction Act. This act, passed in 1932, attempted, among other things, to do what the Clayton act failed to do. It forbids Federal courts to issue injunctions in labor disputes except under narrowly defined circumstances. The result was that labor organizations were pretty largely freed of injunctions issued by Federal courts at the instance of either the government or employers. One exception was made in 1947, however, where the government was the employer through seizure of an industrial property under wartime powers. A coal strike was prevented by injunction despite the act.

Injunctions Under Taft-Hartley Act. The Labor-Management Relations act, 1947, popularly known as the Taft-Hartley act, punched at least two holes in the Norris-LaGuardia act. First, it allows injunctions in labor disputes at the instance of the national labor relations board, an agency established for regulating labor relations. This agency is *required* to seek orders to stop secondary boycotts and certain other kinds of "unlawful" acts by unions. It is *permitted* to seek such orders to stop "unfair labor practices." (See *Taft- Hartley Act* below.)

The other major modification in the Anti-Injunction act is a provision of the Taft-Hartley act under which the attorney general of the United States may obtain injunctions to delay up to 80 days any strikes found by the president to affect the public health or safety.

RIGHT TO ORGANIZE

As stated above, a key objective of employees in industrial conflict is the right to organize for mutual aid and protection. The chief obstacles to the exercise of this right have been these: (1) the discharge of employees known to be members of unions or active in forming unions; (2) refusal by employers to recognize and deal with unions organized by employees to act as their agents; and (3) undermining the unions of employees by organizing so-called company unions which the employer could control.

After decades of costly controversies in which these tactics were combatted by unions through the use of their economic weapons of strikes, picketing, and boycotts, Congress adopted legislation to curb those employer practices which undercut the right of employees to organize. The six principal steps in this legislation are as follows:

In 1924, the Railway Labor act asserted the duty of railroads to deal with freely chosen representatives of their employees for the establishment of wages, hours, and other conditions of employment. In 1929, the United States supreme court held that employers violate this law by forming company unions and dealing with them as though they were the freely chosen representatives of employees (*Railway Clerks v. Texas & New Orleans Ry.*).

In 1932, the Norris-LaGuardia act, already referred to, forbade "yellow-dog contracts." It thereby put an end to the practice of requiring employees to consent in advance to their discharge if they joined a union.

In 1933, the National Industrial Recovery act authorized industry codes in which it was obligatory to incorporate terms which (1) prohibited employers from discriminating against employees for union activity and (2) required employers to recognize as bargaining agent of employees any union selected by the majority of the employees. The act was declared unconstitutional in 1934.

In 1934, the Railway Labor act was amended to provide for designation of employees' bargaining agents by a government agency, the national mediation board. That representative—union or person—must be designated for which the majority of the employees in any craft or class have voted to represent them in dealing with the railroad employing them.

Wagner Act. In 1935, Congress adopted the National Labor Relations act, popularly known as the Wagner act. This law served as a basic guarantee of the right to organize and bargain collectively. There were two principal reasons for its effectiveness.

First, it brought under Federal regulation nearly all forms of business except small local enterprises. This it did by making its terms apply to all employers whose operations, if interrupted by a labor dispute, might burden or affect interstate commerce. By holding that this provision extended the power of the government to manufacturing, the United States supreme court vastly enlarged the authority of the national government in respect to labor relations and in other respects as well (*National Labor Relations Board v. Jones & Laughlin Steel Corp.*).

Second, the act provided an enforcing agency, the national labor relations board, which prosecuted violations at government expense and without cost to the complainant.

In 1947, this basic labor law was made still more sweeping by a new act. At the same time its emphasis was changed. While the purpose of the Wagner act was to remove certain causes of labor strife by restraining conduct of employers, the Labor Management Relations act, 1947, was designed to guard rights of the public, of employers, and of individual employees. In doing so, it abridges in some respects the collective rights of employees which had been guaranteed by the Wagner act.

TAFT-HARTLEY ACT

The Taft-Hartley act, officially known as the Labor Management Relations act, 1947, contains as Title I the National Labor Relations act (the Wagner act of 1935) as amended in 1947. The other titles, or divisions, of the act relate to restrictions on payment of benefits to employees or unions, outlawry of certain kinds of union conduct, suability in the Federal courts for breach of agreements, and handling of disputes imperiling the national health or safety. The act also establishes the United States mediation and conciliation service and defines its rôle in the settlement of labor disputes.

The most important part of the law is Title I. This is the part which forbids as "unfair labor practices" certain types of conduct on the part of employers and of unions. It describes the methods by which the conduct may be stopped through action by the national labor relations board and the courts. It also prescribes means by which the union chosen by the majority of employees may be given official status through "certification." Finally, it imposes certain conditions with which unions must comply before they are permitted to use the services of the board.

Unfair Labor Practices. This is the term with which Title I of the act brands forbidden conduct. There are four principal unfair labor practices of employers and six unfair labor practices of unions or their agents. Those of employers were forbidden by the Wagner act of 1935 and are carried forward with a few changes into the later law. Those of unions were added by the Taft-Hartley act in 1947.

Practices Forbidden Employers. Employers are forbidden to engage in the following practices:

(a) *Discrimination for Union Activity.*—This prohibition acts as a limitation on the right of employers to hire and fire at will. It means in practice that employers may not discharge or otherwise discriminate against workers for the reason that they are or are not union members or that they have engaged in concerted activity (or refused to do so) to advance their interests.

(b) *Domination of a Labor Organization.*—This means organizing, or encouraging employees to organize, an inside labor union or it may mean merely giving financial or other support to a union which the employees have organized on their own initiative.

The reason which frequently actuates employers in supporting inside unions is the desire to forestall organizers from outside. When organized from outside, employees typically affiliate their local organization with a national union and draw strength and support from it in dealing with their employer. An inside group dominated by the employer is frequently referred to as a "company union."

(c) *Refusal to Bargain.*—This is an unfair labor practice which has an exact counterpart among those forbidden to unions. The meaning of it will be described below.

(d) *Interference with Employee Rights.*—This also has its counterpart among unfair practices of unions. The rights with which interference is forbidden are the rights to join, and refrain from joining, unions formed for the purpose of dealing with employers. As applied to employers, the term has a very broad meaning. It may include the conduct described in (a), (b), and (c) above and many other acts. Some acts which have been forbidden under this head include: Insisting on employees' signing of individual contracts in place of bargaining collectively through a union; espionage and questioning employees about their union membership; and maneuvers to weaken unions, such as transferring production from a plant where the union is strong to a plant where it has not obtained a foothold.

Practices Forbidden Unions.—Unions and their representatives are forbidden to engage in these unfair labor practices:

(a) Coercion of employees in their right to join or refrain from joining labor organizations formed for the purpose of collective bargaining.

(b) Coercion of employers in the selection of their agents in dealing with employees either when bargaining or handling grievances.

(c) Refusal to bargain with employers, provided the union represents the majority of employees.

(d) Participation in secondary boycotts or striking and picketing for three other specified improper purposes. The purposes which are declared improper or unlawful are: (1) Organization from the top down through picketing, as when a union, without any members among employees, goes to their employer and compels him, by picketing, to give it a contract covering his employees; (2) supplanting an officially certified bargaining agent by compelling the employer to recognize the picketing union instead; and (3) forcing the solution of a dispute over work jurisdiction, as when a carpenters' union pickets an employer to compel him to let its members do work which he is having members of a machinists' union do.

(e) Charging discriminatory fees to members where the employee is permitted to hold his job only if he joins the union. There are special rules under the law which govern such compulsory membership. They are explained below.

(f) Compelling an employer to pay money, in the nature of an exaction, for work which is not intended to be performed.

Some of these unfair labor practices—those of employers—have been defined more concretely by judicial interpretation over a period of years. The one known as refusal to bargain, which is forbidden both to employers and unions, is defined at some length in the law itself. Important points in the elaboration of "discrimination," "domination," and "refusal to bargain" follow.

Discrimination Interpreted. In determining whether the discharge of an employee was for union activity or for some reason not forbidden by the law, such considerations as the following are taken into account.

1. Did the employer know of the employee's union membership? If he did not, the discharge could not have been for this reason.

2. If the alleged ground of discharge is inefficiency, were non-union employees of less efficiency for the same kind of job retained? If so, the employer's defense is weak.

3. If the discharge is said to be because the employee broke a rule against engaging in union activity on company time, are other rules against outside activity similarly enforced? If not, there is a presumption that the discharge is unlawful.

When persons unlawfully discharged are ordered reinstated, persons hired to replace them must be dismissed by the employer if necessary to make room for them. The same applies when employees are ordered reinstated after participating in a strike caused by an employer's unfair labor practice. If the strike, however, is economic, that is, for the purpose of obtaining better working conditions, the strikers are entitled to their jobs back only if the jobs are still available.

Strikers or unlawfully discharged employees are not entitled to reinstatement if they have been guilty of crimes in connection with the labor dispute, have participated in sit-down strikes, or have, through their union, breached a contract with an employer.

Unlawful Aid to Unions. Support or aid which the law forbids employers to give to organizations of employees has been held to include the following procedures:

1. Suggesting the formation of a union, either personally or through supervisors, or facilitating its formation by advice or by provision of space or supplies free of charge.

2. Pressure placed on employees to join, particularly if the pressure includes threats of reprisals or promises of benefits.

3. Paying officers of the organization for time spent on the activities connected with it.

4. Eagerness in recognizing and executing a contract with the organization or giving it credit for wage increases granted, particularly if an outside union claims at the same time to represent a majority of the employees.

Duty to Bargain. The courts have held that, by making unlawful a refusal to bargain, Congress has created a positive duty to bargain in good faith. The Taft-Hartley act imposes this duty on both employers and unions, whereas the Wagner act imposed it on employers only.

The Taft-Hartley act defines the duty to bargain to include meeting at reasonable times, conferring in good faith on conditions of employment, negotiating an agreement or a dispute arising out of an agreement, and executing a written contract on request embodying the points agreed upon. The law, however, does not compel either party to agree to a particular proposal or to make a concession.

The definition of bargaining adds this point for parties who already have a contract. Sixty days before the contract expires, either party desiring a change must so notify the other and, if no agreement on new terms is reached in 30 days, must also notify the national and state mediation agencies. Throughout these 60 days, no change may be made in working conditions; any employee who strikes need not be reemployed.

Freedom of Speech. The unfair labor practice of interference with employees' organizational rights was interpreted in the early years of the Wagner act to prevent employers or supervisors from expressing their views to employees about unions. The courts held that the words of employers were "loaded" in view of the employers' economic power over their employees. The Taft-Hartley act, however, specifically provides that expressions of opinion may not be considered evidence of an unfair labor practice unless the words contain a threat of reprisal or promise of benefit.

Union Security. This term is applied to agreements between employers and unions under which employees must belong to the union if they are to continue in their jobs. It has a very special relation to the unfair labor practice of discrimination.

It should be explained first that carrying out such an agreement by discharging an employee who is not a union member amounts on its face to discrimination in respect of union membership. The Taft-Hartley act, however, permits this exception to its ban on discrimination but hedges it about with a number of conditions.

In the first place, the law forbids the closed shop.

The *closed shop* is an arrangement under which the employer is restricted to hiring persons who are members of the union. Sometimes under this arrangement the union takes over the responsibility of securing new employees but usually permits nonmembers to be hired if enough members are not available, issuing the nonmember a permit to work until a member can be found who is acceptable.

The law does permit the union shop or a membership-maintenance agreement—but with some "ifs."

The *union shop* is an arrangement whereby employers may hire regardless of union membership, but employees, to keep their jobs, must join the union within a stated period (30 days under the Taft-Hartley act) and must thereafter remain members. Otherwise, the employer is required to discharge them.

Membership maintenance is an arrangement whereby those employees who are members of the union on a given date or who later become members must remain members if they are to keep their jobs. An "escape period" may be allowed for resignations before the rule goes into effect.

In regard to the union shop and membership maintenance, the Taft-Hartley act lays down these two conditions:

First, a majority of the employees involved must vote affirmatively for such an arrangement in a specially conducted referendum before the employer may enter into it. The authority may be revoked in a referendum after a year's elapse.

Second, failure of the employees to continue their membership for any reason other than nonpayment of dues will not justify discharge. For example, if a member is expelled from the union for violating its rules of conduct but offers to pay his dues, he may not be discharged from his job by the employer because of his lapse of union membership.

If these conditions are ignored, it becomes an unfair labor practice for the employer to discharge the employee for nonmembership in a union and it becomes an unfair labor practice for the union to try to force the employer to make the discharge. Either the employer or the union or both may be required to make good the wages lost by an employee discharged under these circumstances.

Bargaining Agents. It is a basic principle of labor law that, if a majority of the employees concerned select a union to represent them in bargaining, the employer has the duty of dealing with that union. But the determination of whether a particular union is the majority's choice is beset with many practical difficulties.

The first problem is, who are the "employees concerned"? Are they the employees in one department, in the entire plant, or in some other grouping? To solve this problem, the national labor relations board is given the duty of deciding which employees are in a bargaining unit.

The second problem is, do the employees really wish the union to represent them? Some may be afraid to join the union because the employer is opposed. Or some may be afraid not to join because of pressure by fellow employees. The difficulty is solved by having a secret election conducted by the national labor relations board to determine the free choice of the employees.

Unit for Bargaining. Establishing the unit appropriate for collective bargaining corresponds, in its field, to determining in political life what classes of persons are eligible to vote in an election. The process, however, is frequently much more complicated. Bargaining units fall principally into one of the following types:

1. *Craft unit*, which consists of those employees of a firm who follow one craft or occupation, such as carpenters, molders, or machinists.

2. *Plant unit*, which consists of all employees working in one plant. In practice, clerical, supervisory, and other special kinds of workers may be excluded.

3. *Employer unit*, which consists usually of all those working for one employer, who has a number of plants. The term is sometimes extended to include all persons working for members of an association of employers, which is authorized by its members to bargain for them.

The term *industrial unit* is sometimes applied to cover plant and employer units. It is used to point a contrast with craft unit, since the industrial unit takes in all workers without distinction of special skills.

There is a corresponding distinction between industrial and craft unions, the industrial union accepting as members all workers in an industry irrespective of their special skills. The craft union restricts membership to workers following a specific craft or skilled occupation.

Craft unions ordinarily seek to have craft units established, while industrial unions prefer plant or employer units. In practice, however, a number of craft unions may act together through a joint council in a form very similar to an industrial union. Industrial unions, on the other hand, may make special contracts for special classifications of their members, with a result similar to that secured by cooperating craft unions.

Determination of Units. In establishing units for bargaining, the labor board first excludes all persons whose interests are held to lie with the employer rather than with the other employees. These ordinarily include executives, supervisors, foremen, secretaries, and personnel directors. The rule is that those who have power to hire and fire or whose recommendations on employment are given weight are considered to be on the side of management. Supervisory employees are excluded from bargaining units because the law excludes them from the definition of "employee."

The law also provides that plant guards may not be in the same unit with other employees, nor may they be represented by a union which is affiliated in any way with a union representing the other employees in the plant. Professional employees must be given the option of inclusion with other employees or constituting a unit of their own. Craft employees also are usually given a choice of bargaining in a separate unit.

Within these limits, the labor board usually decides the question of unit by the test of effectiveness in bargaining. This test has been interpreted to mean:

1. Where bargaining has been effectively carried on in the past, the unit used should not be disturbed. This is sometimes known as the history-of-bargaining rule.

2. When a union and an employer differ as to the proper unit, the union's preference is usually given the greater weight, provided it does not do violence to the way the employer's business is organized.

Employee Elections. An election to choose a bargaining agent will usually be held if a union can show

that it has a following of 30 per cent of the employees concerned. An employer may ask for an election if one or more unions claim to represent the majority of employees. Individual employees also, with support of 30 per cent of their unit, may secure elections. If there is no legal obstacle to an election, such as the existence of a valid contract or a prior election less than a year before, the board sets up a polling booth and the election is on.

Where only one *bona fide* union is seeking to be certified as agent for employees, the ballots present a choice for the union or against it. If two or more unions compete, the employee is permitted to vote for either or for no union. If no one choice receives more than 50 per cent of the votes, the choice obtaining the lowest number is eliminated and a runoff election is held.

If a union wins an election which the board directs, it is "certified" as bargaining agent. If no union is selected, collective bargaining need not take place.

A union once certified remains the bargaining agent until displaced by another in a subsequent election or until it is "decertified." Decertification by the board takes place only after a decertification election, which may be asked for by 30 per cent of the employees or by another union. If the challenge fails, the union is recertified.

Disqualification of Unions. The Taft-Hartley act imposes two conditions on unions which they must meet or else be barred from the principal benefits of the law. They are barred from bringing charges of unfair labor practices and from any opportunity of being certified as bargaining agents unless they do these two things.

1. Certify that their officers have filed affidavits declaring that they are not Communists. Both the local and national organization must so certify.

2. Register with the department of labor, giving specified data about the organization, including detailed financial statements, and show that the financial statements have been made available to all the members. The registration must be kept current each year.

National Labor Relations Board. This is the agency which makes the National Labor Relations act work as soon as an employer, a union, or an employee brings before it a situation which calls for action.

One branch of the board investigates charges of violations and, if they appear to have merit, issues a "complaint" and prosecutes the action. This branch is known as the office of the general counsel. The prosecution is before a trial examiner appointed by the board, which consists of five members. When the trial examiner makes his decision, it becomes final after 20 days unless appealed to the board within that time. The board's decision, in turn, may be appealed to a United States circuit court of appeals and the supreme court.

The general counsel's office also conducts elections and issues certifications, but its rulings in the matter may be appealed to the board as the final tribunal. There is no appeal to the courts.

When the board finds that an employer or a union has committed an unfair labor practice, an order is issued designed to restore the status quo existing prior to the commission of the act.

The following are typical requirements in orders issued by the board:

Cease discouraging membership in union;

Cease supporting, financially or otherwise, association of employees or recognizing it for bargaining purposes;

Reinstate employees discharged because of their union activity and pay them back wages from date of discharge;

Bargain on request with union which has been chosen by majority of employees;

Post notices that the order will be complied with.

The board's orders are enforceable only by the courts, which are required on petition to review them on points of law. The courts may enforce the orders, modify them, or set them aside.

Injunctions to Stop Unfair Labor Practices. As stated above, the labor board gets its orders enforced by securing a decree from a United States circuit court of appeals. Disobedience to such orders may be penalized by fine or imprisonment. But the board has recourse also to United States district courts to secure speedier action.

The general counsel of board is authorized to seek injunctions to stop any unfair labor practice after he has issued a "complaint," that is, after he has begun formal action in prosecuting a violation. An injunction is sought at this stage only when the alleged violation is of an important character.

In respect of one group of unfair practices, however, the board is directed to seek an injunction as soon as it is determined that a complaint should be issued. This group comprises the practices listed above under unfair labor practices of unions, paragraph (d). They may be roughly identified as secondary boycotts, organizational picketing, striking to displace a lawful bargaining agent, and striking over a work-jurisdiction dispute.

These practices are singled out for special attention also in a separate section of the law by being designated as "unlawful." Persons suffering loss from such practices are given the right to sue for damages in the Federal courts without regard to the usual limitations on actions in these courts.

Suits for breach of collective bargaining contracts are given similarly privileged status in the Federal courts.

National-Emergency Disputes. The Taft-Hartley act lays down special procedures for postponing or halting national-emergency strikes, that is, strikes affecting all or a large part of an industry and imperiling the national health or safety. If the president so identifies a dispute, he may appoint a board of inquiry to report on the issues. The government may then go into court for an injunction to stop or postpone the strike until these three steps are taken: (1) The parties negotiate with governmental assistance through mediation; (2) if no agreement is reached in 60 days, the board of inquiry reports the position of the parties, which is made public by the president; and (3) the national labor relations board in the next 15 days polls employees on acceptance of the employer's last offer. If the offer is rejected, the injunction is dissolved, and the parties are left to the arbitrament of economic weapons. Settlement of the dispute, of course, at any time in this period would also lead to dissolution of the injunction.

COLLECTIVE BARGAINING CONTRACTS

The purpose of collective bargaining is to arrive at a contract between employer and union which will govern relations between the parties for a definite period of time—usually a year. Among the points which collective bargaining contracts typically cover are these:

1. Union recognition, with a description of the unit of employees represented by the union.

2. Wage rates, possibly with provision for renegotiation after a certain time.

3. Hours of work, with provision for premium rates of pay for hours in excess of the standard day or week.

4. Holidays, with the rate of pay when work is performed on holidays.

5. Vacations, showing eligibility and length, with the amount of vacation pay to be given.

6. Seniority and other ground for promotions and for the selection of those to be laid off and rehired in business fluctuations.

7. Employee benefits, such as sick leave or pension plans.

8. Guarantees of various kinds, such as (1) an employer's undertaking not to discriminate among employees on specified grounds or (2) a union's promise not to strike.

9. Grievances, with procedures for settlement. The procedures frequently culminate in arbitration of unsettled grievances arising out of disputed points in the contract or even of all disputes.

10. Union security, which might include the union shop or checkoff.

11. Termination, often with a provision for automatic renewal if neither party gives notice before a certain date that it desires a change in terms.

Limitations on Contracts. The Taft-Hartley act, as noted above, forbids closed-shop clauses and permits the union shop and membership maintenance only when an authorization referendum among the employees favors such an agreement. Other contract terms limited by the law are those providing for the checkoff and employee welfare funds.

Checkoff.—This is an arrangement whereby the employer holds back from the employees' pay envelopes the amount of union dues and pays the proceeds over to the union's treasurer. The law permits the checkoff only if the employee authorizes the employer in writing to make such deductions from his pay. The authorization may not be made irrevocable for longer than one year.

Welfare Funds.—The law permits the setting up of trust funds under contracts, but, if the employer contributes to such a fund, the money must be used only for genuine welfare purposes of employees and their families. Management must be given an equal voice in control of the fund, disputes to be resolved by having a third, neutral member on the governing committee.

AVOIDANCE OF DISPUTES

In advance of the acceptance of collective bargaining, a large number of employers put into practice arrangements designed to give employees a sense of unity with the enterprise, thus mitigating or obscuring any division of interest which might lead to disputes. Under collective bargaining, the approach toward elimination of controversy takes typically the form of methods for disposing of grievances. In some instances, a more positive step has been taken through mutual arrangements to increase efficiency or expand markets on the understanding that wages are to be increased, or not decreased, if the efforts are successful.

Methods adopted on employer initiative are usually considered as part of personnel management. Undertaken as a long-range means of increasing efficiency, this form of management aims to keep employees satisfied, loyal to the company, and disposed to give their best services. Methods include wage incentive systems, and granting of special benefits, such as insurance and profit sharing. Labor leaders frequently oppose their use on the ground that they detract from loyalty to the labor movement on which employees in general, it is stated, must depend for safeguarding of their interests.

Settlement of Grievances. Nearly all collective bargaining contracts prescribe steps to be taken for settlement of disputes arising under their terms. A considerable proportion provide that no strike or lockout is to take place during the life of the contract until such steps have been taken. Some contracts go still further and prohibit all work stoppages. Under such contracts the final step in settlement of disputes is arbitration, both sides binding themselves in the contract to abide by whatever award is made.

The following generalized description illustrates the manner in which a dispute arising under a contract may be settled.

Workman Smith complains that, having been told to report for work, he did so, found no work available, and yet was not paid for four hours as required under terms of the contract applying to this situation. The foreman giving no satisfaction, Smith carries the complaint to the shop steward. The shop steward is a union member elected by the "local" for the purpose of taking up grievances of employees with supervisors. The status of shop steward is recognized by the company under the contract.

The steward is told by the foreman that he had not notified Smith to report. The dispute thus hinges on a question of fact, which must be decided on the basis of evidence, if any.

At the next meeting of the union's grievance committee, the status of which also is recognized under the contract, the steward reports the complaint, the statements of Smith and the foreman, and the evidence which each is able to adduce. If the committee, possibly after discussion with both parties, thinks Smith was mistaken, the complaint is dismissed. If it disbelieves the foreman, the chairman of the grievance committee takes up the matter with the supervisor or other superior official. Failing settlement here, an officer of the national union may be called in to speak with the highest executive officer of the company. This completes the grievance procedure where there is no absolute prohibition of strikes or arbitration clause.

Arbitration. This term applies to the settlement of a dispute by the decision of an umpire or impartial committee, both sides agreeing in advance, or being required by law, to accept the award. If acceptance is required by law, the arbitration is said to be compulsory; if by agreement, the arbitration is called voluntary.

There are two different kinds of situations to which arbitration of labor disputes is applied. One is a dispute over rights arising under a contract, such as the dispute outlined above. Arbitration in such a situation is sometimes known as arbitration of rights. This is the most usual type of arbitration.

Railway Labor Disputes. The Railway Labor act of 1926 set up a special procedure for avoiding strikes which was the precedent for the Taft-Hartley act's provision respecting national-emergency disputes described above. If a strike is threatened, the president may appoint an "emergency board" to investigate the dispute and make recommendations within 30 days. For that period and an additional 30 days the parties are forbidden to make any change in conditions, but no penalties are prescribed for violating the prohibition.

The act also provides that the national mediation board is to mediate disputes and to conduct elections to determine bargaining agents. A body known as the national railroad adjustment board is set up to settle disputes growing out of the terms of contracts. The board consists of an equal number of representatives of railroads and unions. If these members, acting in panels, fail to settle the dispute, the national mediation board appoints a chairman with power to make the decision.

Wartime Settlement of Disputes. During World War II, labor and employer representatives agreed not to resort to strikes or lockouts while the war lasted but to leave all disputes for final settlement to a newly created national war labor board. Representing both groups and the government, this body became a species of labor court, settling matters of union status, wages, and other questions usually the subject of collective bargaining. Its decisions typically took the form of contracts which the parties were required to sign.

Its authority was based on the war powers of the

president. Disobedience to its orders might entail seizure of plants where employers were involved or cancellation of draft deferments and blacklisting for employment where employees defied the board.

This board was given statutory authority to regulate wages under the Economic Stabilization act of 1942. The War Labor Disputes act of 1943 confirmed its powers to settle disputes. The latter act also forbade strikes in war industries except after 30 days' notice, authorized governmental seizure of plants where strikes occurred, and prohibited under criminal penalties incitement to strikes in government operated plants.

LABOR UNIONS

Labor unions are groups of employees organized to promote their common interests, primarily economic betterment. To achieve this, they may also engage in political activity. The Taft-Hartley act forbids unions to spend money in connection with Federal elections or primaries.

Types of Unions. Organizationally, unions may be divided into craft unions and industrial unions.

A *craft union* embraces workers in a single craft, irrespective of industry, plant, or employer. Thus all carpenters are eligible in one union whether hired by a building firm, a mining company, or a ship builder. Craft unions frequently provide insurance and unemployment benefits for members.

An *industrial union* embraces workers in a single plant or industry regardless of the type of work done by members. In mass-production industries, this type of union has advantages over craft unions, since modern factory production breaks down the older classifications of skill and craft and opens the way for enrollment of all workers.

The existence of these two types of labor organization has given rise to numerous disputes since a given craft employee may be claimed by both types.

Jurisdictional Disputes. These are controversies between two unions as to which one is entitled to enroll a certain type of worker. The term is sometimes applied to conflicts between craft and industrial unions, but it more typically describes a conflict between craft unions. Some long-standing jurisdictional disputes include one over drivers of beer trucks as to whether they belong to the brewery workers (industrial union) or to the truck drivers (craft or class union). Another involves two crafts—carpenters and machinists—and concerns work on a considerable number of jobs which had not been envisioned when the unions were chartered, such as installation of metal-frame windows.

Strikes over work-jurisdiction disputes are forbidden as unfair practices by the Taft-Hartley act, which authorizes the labor board to settle the question at issue unless the parties work out some other acceptable method of settlement.

National Labor Unions. The earlier unions in the United States adopted the craft form of organization. The Knights of Labor championed the industrial type, but the ascendency of the American Federation of Labor, representing the craft type predominantly, gave this type the advantage until the formation of a rival group in 1935, which later became the Congress of Industrial Organization. The latter body and the Federation embrace the great majority of organized workers.

The American Federation of Labor (A. F. of L.). This organization is an association of trade unions in the United States and its dependencies. Some unions, however, known as international unions, have local units in Canada also.

The basic unit in the Federation is the local union. Most local unions belong to national or international unions, which are associated in the A. F. of L. as more or less autonomous bodies. They are chartered by the A. F. of L., and the charters may be revoked for non-payment of dues or assessments.

Other local unions are directly affiliated with the A. F. of L. and are known as federal unions. They belong to crafts or industries for which no national union has been chartered.

All local unions, whether federal or belonging to national unions, are required to belong also to regional organizations known as state federations of labor, or, for smaller regions, as city central unions or trades councils. These regional bodies also are chartered by the A. F. of L.

Congress of Industrial Organizations (C.I.O.). Formally organized on November 16, 1938, this rival labor group stems from the Committee for Industrial Organization, a committee of the A. F. of L. formed for the purpose of promoting the industrial type of union. Its members were A. F. of L. unions of the industrial type. In 1936, these unions were suspended and later expelled. Meanwhile, many new unions were chartered by the C. I. O. before it had adopted a constitution.

The formation of the C. I. O. was in protest against the failure of the A. F. of L. to organize mass production industries, this failure being attributed to a desire to protect the jurisdictions of craft unions over skilled workers within these industries. The first fruits of the C. I. O.'s efforts were the organization of most of the steel and automobile industries.

In many other industries the C. I. O. and A. F. of L. directly competed for members, the A. F. of L. frequently opening membership to all employees irrespective of craft and thus competing on an industrial union basis.

The C. I. O.'s organization follows the same pattern as the A. F. of L. in regard to national and directly affiliated unions and to regional bodies. The state and city bodies chartered by the C. I. O. are known as state and city industrial councils.

AFL—CIO Merger. On December 5, 1955, these two great unions were merged in a single federation, The American Federation of Labor and Congress of Industrial Organizations.

Railway Brotherhoods. Unaffiliated with the national organization are other unions of railway employees. These are the Brotherhood of Locomotive Engineers, Brotherhood of Locomotive Firemen and Enginemen, Brotherhood of Railroad Trainmen, Order of Railway Conductors and Brakemen, and the Yardmasters of North America. The Switchmen's Union of North America is affiliated with the A. F. of L.

These are sometimes referred to as operating brotherhoods to distinguish them from unions of other railroad employees who do not actually operate trains. Most of the unions of non-operating railroad employees are affiliated with the A. F. of L. Nevertheless for purposes of negotiations these unions and the operating brotherhoods frequently act through a joint body known as the Railway Labor Executives' Association.

In addition to the above there are a number of independent unions, most of them being plant or local organizations. A considerable proportion of them are successors of company-supported unions, reorganized after withdrawal of employer support.

EMPLOYER ASSOCIATIONS

When unions become strong, employers frequently form their own organizations to bargain on behalf of their members with the unions and to take concerted action if necessary in resisting union demands or pressing their own. Such associations may be formed on an industry basis, as among coal mine owners, or on a regional basis, taking in employers in a given area, as is done in San Francisco.

When collective bargaining has reached this stage, individual employers no longer negotiate with unions but accept the terms reached in conversations between the association and the union. Disputes become fewer. The magnitude of a possible strike or

lockout tends to impress a sense of caution on both sides. Well defined procedures are usually established for handling disagreements under the contracts negotiated. Not infrequently a permanent arbitrator is appointed whose duty is to settle such disagreements, building up a body of precedents into an accepted code of labor practices. Unions and associations in some instances work out programs of joint action to aid the industry.

Collective bargaining in some countries, notably Great Britain and Sweden, takes typically the form of negotiations between employer associations and unions, this development being carried much further than in the United States. In Sweden, for instance, most employer associations are integrated into one organization while most of the unions form a counter organization, each having its own defense fund for use in the event that negotiations for a contract break down. Members of each organization are penalized for failure to obey the mandates of the organization. A labor court imposes penalties for breach of the collective contracts, which are periodically renewed.

WAGE AND HOUR REGULATION

While, in general, employment conditions are a matter of free arrangement between employers and employees, there are several segments of economic life in the United States in which such freedom of contract is rigidly limited by law.

Industrial employment of children is limited by all states and is prohibited for interstate enterprises by the Federal government.

Hours which women may be permitted to work are restricted in a majority of the states.

A lower limit is placed on the wages for which women may be permitted to sell their labor in approximately half the states.

Both hours and wages of industrial workers in interstate commerce, men and women, are regulated by the Federal government under the Fair Labor Standards Act of 1938.

Hour legislation is of two kinds. An absolute minimum may be imposed beyond which it is unlawful to employ a person. Or a standard may be set beyond which work must be paid for at a premium. Some state laws follow the first type. Federal legislation is of the second type, requiring that every hour worked in excess of a weekly standard must be paid for at a rate 50 per cent above the regular rate of pay.

Child Labor. The first child labor law in the United States was adopted by Massachusetts in 1836. It required that children under 15 years of age employed in manufacturing establishments should be required to attend school at least three months in the year.

In 1842, the hours of children under 12 were limited to ten a day in Massachusetts; in Connecticut this provision was applied to children under 14. Rhode Island in 1853 restricted hours of labor for children under 12 to eleven a day and set an educational requirement.

In the decade of 1850-60, a number of states prohibited altogether the employment of children under certain ages in manufacturing industries. Other states limited their employment with varying requirements as to age and hours, and with varying methods of enforcement.

In 1907 the Federal government took cognizance of the problem in a comprehensive investigation into the condition of women and child wage earners. The findings of this report, added to years of effort to secure a Federal child-labor law, culminated in the passage of the Keating-Owen bill by Congress in September 1916. This act was declared unconstitutional in a 5-to-4 decision by the supreme court on June 3, 1918 (247 U. S. 251). An attempt was next made to achieve the same purpose by levying a tax of 10 per cent on the annual net profits of any establishment employing child labor in violation of the standards it set. But on May 15, 1922, this act was declared unconstitutional by an 8-to-1 decision of the supreme court (259 U. S. 20).

In 1924, Congress approved a resolution for submitting to the states a proposed amendment to the Federal constitution giving Congress the power to "limit, regulate, and prohibit the labor of persons under 18 years of age." By 1938, only 28 out of the requisite 36 states had ratified the proposed amendment. In that year the United States supreme court upheld a wage regulation law of the State of Washington in terms which led to the belief that the earlier child labor decisions would be reversed. The same year Congress passed the Fair Labor Standards act, which forbids interstate shipment of goods made at a plant where, within the previous 60 days, minors below 16 years of age (18 in hazardous occupations) were employed. The constitutionality of this provision was upheld.

Regulation of Hours by States. The earliest law in America regulating hours of work for women was passed by New Hampshire in 1847. This measure became a dead letter through the practice of employers in requiring employees to contract away their rights under the act as a condition of employment. The next such law was passed by Massachusetts in 1874. It limited hours worked by women in manufacturing to 10 daily and 60 weekly.

All such state laws until recent years applied to women and children only. Then men in certain occupational groups began to be given similar protection. Pennsylvania in 1937 passed a law applying to both men and women in all occupations. It was declared unconstitutional on technical grounds.

Regulation of Wages by States. The pioneer in legislation setting minimum wages was Massachusetts, which passed the first law of this type in 1912. It covered only women and children with provision for gradual application from industry to industry. The first such law to be applied also to men was passed by Oklahoma in 1938. It was held unconstitutional on technical grounds but upheld in other respects. Connecticut in 1939 became the first state to extend the coverage of its minimum-wage law to men. Many state wage laws apply only to certain occupations.

The prevailing pattern of state wage laws of general application calls for appointment of committees to study the need for wage minima in different industries. The recommendations of such committees, if accepted by a designated official, become effective as wage orders. In some cases the wage order is "directory" for a period, during which violation incurs the penalty of publicity only. It later becomes "mandatory," and violations then are punishable by criminal penalties.

Fair Labor Standards Act. Effective October 24, 1938, this law established in general a 44-hour week, hours worked in excess of the standard calling for pay at the rate of time and one-half. After one year, the standard week was to be reduced to 42 hours and a year later was to reach the permanent form of 40 hours.

A "floor" was placed beneath wages, it being unlawful to pay an employee engaged on work for interstate commerce a wage less than 25 cents an hour. This figure was to be raised to 30 cents after the first year and to 40 cents by the end of the seventh year. Provision was made for increasing the minimum wage in individual industries to the 40-cent level in less than the seven years. The method used revolves about the term "industry committee."

Industry Committees. These are committees appointed by the administrator of the wage and hour division of the department of labor. Their function is, after studying the wage structure of a particular

industry, to recommend for that industry the highest minimum wage which will not substantially curtail opportunities for employment. The upper limit that may be recommended is 40 cents an hour. If a wage order is issued, the minimum wage named in it becomes mandatory on the industry. The minimum in all industries had been raised to 40 cents an hour by 1944, more than a year earlier than the date set for the general increase from 30 cents to 40 cents. In Puerto Rico and the Virgin Islands, rates below 40 cents may be set as exceptions to the 40-cent general rate.

Exemptions. The terms of the act do not apply to agriculture or to semi-agricultural industry. Classes of workers exempt include executives and professional employees. Exemption from the hour provisions is granted for defined periods to seasonal industries. Special permits may be granted for employment, at wages below the minimum, of learners, apprentices, and handicapped workers.

Enforcement. For violation of the law, fines may be levied and second offenders may be imprisoned. Injunctions also may be issued against such practices in violation of the law as failure to pay the minimum wages or pay for overtime work, failure to keep records or falsification of records, employment of minors without permits, and shipment in interstate commerce of goods produced in violation of the law. Employees also who believe they have been underpaid on the basis of the law may sue to recover wages allegedly due. If successful, they are entitled to collect double the amount due as wages and reasonable legal expenses in addition.

Public Contracts. Another way in which the government influences wages and hours is through the power of its purse. By requiring that all enterprises doing business with it should stipulate that, in carrying out the contract, they will observe specified standards, the government is able to extend these standards at least as widely as work done under such contracts. In practice, the influence extends much further, since a firm filling contracts both for the government and other customers frequently finds it impossible to separate the work and maintain one standard for government work and a lower standard for other work.

This form of leverage was applied by the Public Contracts act passed in 1935. Under its terms, persons bidding on government contracts are required to undertake that hours worked above eight per day or 40 per week will be paid for at time and one-half. The contractor must agree also to pay wages not below the prevailing minimum found to exist in the industry. The determination of this prevailing minimum is the duty of the secretary of labor, who bases it upon studies by a public contracts board.

Portal-to-Portal Act. This act, amending the Fair Labor Standards act and Public Contracts act, was passed in 1947 to limit liability of employers for wages of employees. Primarily it was to mitigate the effect of a decision by the United States supreme court in *Anderson v. Mt. Clemens Pottery Co.* The court held that time spent by employees in subsidiary activities outside their principal jobs, such as traveling from entrance to job and back, must be paid for as time worked. The law forbids courts to treat such time as working time unless it has been so treated by contract, custom, or practice in the plant.

Wage Stabilization. During World War II, a somewhat flexible ceiling was placed over wages as a means of controlling inflation. Employers were forbidden by the Economic Stabilization Act of 1942 to increase or decrease compensation except by permission of designated government agencies. Criminal penalties for violations were prescribed, but the chief deterrent was disallowance for income tax purposes of all compensation to an employee in connection with which a violation had occurred.

Wartime Job Control. Attempts to stabilize wages would have failed without a coordinate authority to limit shopping for more highly paid jobs on the part of employees and enticing of workers with offer of higher pay on the part of employers. Accordingly, manpower regulations were set up employing a species of job permit, or "statement of availability," without which employers subject to regulation might not hire a new employee.

UNEMPLOYMENT

The failure of the economic system to absorb in its productive processes all persons willing to work is one of the most serious problems confronting society.

Defenses against Unemployment. In seasonal employments, the laborer has tried to prolong his job by curtailing daily production until the piecework system has been substituted for the day wage. Similarly, low employment periods have been met by union men through restriction of days of work so as to make available work go around among the existing number of trained workers in the craft. Monopoly of labor supply through restricted apprenticeship and membership is another means used to prevent unemployment.

Labor-saving Machinery. There is an increasing realization among labor leaders that machinery, by increasing possible production per hour, increases possible earnings per hour. On the other hand, not only may the impact of rapid mechanization on a society geared to private profit be disastrous to those whose skill is rendered useless, but it is believed by many to be a functional cause in recurrent depressions.

Technological Unemployment. This is a term used to describe unemployment which results from the introduction of labor-saving machinery. In some favorably situated industries, those displaced through machinery may be equalled in number by those absorbed again into employment by the industries as mechanization brings enlarged demand through lower prices. But this is the exception.

Seasonal Unemployment. To a certain extent, unemployment of this type is inevitable, as for instance in farming, where the chief demand for labor is at seeding or harvest time. In other cases, buying habits of the public are responsible. Here marketing methods may tend to level out the peaks and dips of demand.

Cyclical Unemployment. The use of this term is based on the expression "business cycle," referring to the cycle, or recurrent sequence, of booms and depressions. Loss of work opportunities is the most serious feature of depressions. Not only does it fall with cruel force on those who are denied the opportunity of earning a living, but, by drastically cutting the productivity of all industry, it decreases the wealth available for distribution.

Employment Act of 1946. Consideration of the losses occasioned by cyclical unemployment was behind the declaration of congressional policy contained in the Employment act of 1946. The declaration states that it is the responsibility of the Federal government to use all practicable means, consistent with other aspects of national policy, to coordinate its efforts with those of industry, agriculture, labor, and state governments to promote maximum employment, production, and purchasing power. This is to be done in a manner calculated to promote free competitive enterprise and is to be accomplished by creating conditions affording useful employment opportunities, including self-employment, for those able and willing to work.

A council of economic advisers to the president was created for the purpose of advising both the president and a joint committee of Congress on steps advisable under conditions existing at the time.

ADVERTISING

It is estimated that more than one billion dollars is spent annually in the United States for advertising. In this estimate the term "Advertising" is understood to cover all forms of printed and painted public announcements that help in the sale of goods and services. Signs on stores and wagons, labels on bottles and cartons, catalogues, circulars enclosed in packages or sent by mail, calendars, novelties, and even house organs are included in this definition, although there is some doubt about the propriety of classifying all these as advertising.

THE ECONOMIC VALUES OF ADVERTISING

To understand what work must be done by advertising, we need to know something of the process of marketing and its economic justification. A century or so ago there was a feeling that farmers and manufacturers were the only true producers; that those employed in the exchange of goods were largely parasites. To a certain extent this traditional view still persists, but thoughtful people generally recognize that, to possess utility for consumers, goods must be made available; that is, they must be brought to the place where they are needed, at the time when they are needed, and be made exchangeable. Thus all the facilities for physical distribution, including transportation, storage, and storekeeping, are economically justified.

Knowledge of Goods Essential. It is not so easily perceived, but it is equally true, that, to have value, goods must be *known* to the consumer. He must know what they are and what they will do and how they will perform certain services for him better than something else he might use. He must know where he can get them and on what conditions, including price. In other words, information about goods is a necessary part of their utility to the consumer. The work of marketing includes not only the physical distribution of the goods, but also the mental distribution of ideas about the goods.

There are several reasons why this important truth is so generally overlooked. Many articles used in the household we know from earliest childhood, and the process of acquiring knowledge of others is so gradual as to pass unnoticed. Nevertheless a community in which the people use only articles that their fathers used before them and with which they have always been familiar is not a progressive civilization. In this country every one of us enjoys comforts and luxuries that previous generations scarcely dreamed of, and our knowledge of them has been gained comparatively recently. The manufacturer, for his part, sometimes fails to perceive the need of spreading knowledge of his products. This is because all those with whom he comes in contact know these products, and he mistakenly assumes that this knowledge is universal. In most cases, the public needs to be informed.

Channels. The average business man must transmit information about his goods by channels which he can control. The chief of these are personal salesmen and advertising. Personal salesmen are powerful, but they are costly and of limited range. They are the hand labor method as compared to the machine method of advertising. The salesman can usually speak to only one person at a time, whereas advertising can be used to reach millions of people at once. This is not meant to imply that advertising can always be used to take the place of salesmen. The personal touch of the salesman is often necessary to adapt the message to the prospective buyer, and his physical presence as an order-taker is often needed. Advertising should attempt to do simply that part of the work of salesmen which it can do more cheaply and efficiently, and, except in the case of mail-order selling, it must work in conjunction with personal salesmanship.

As a practical matter, advertising is largely used by the manufacturer in one of the following ways:

(a) *To pave the way for salesmen.* Advertising may draw inquiries from people who are interested and thus give the salesman a chance to know who his best prospects are, so as to avoid fruitless calls on those who cannot be interested. Or the advertising may give such introductory knowledge of the company and its products that the salesmen will be able to complete the task of selling more quickly, and at smaller expense. Again, the advertising may point out that the salesmen of a company are really business or technical advisers, or in other ways it may help to assure the salesmen of a friendly and receptive audience.

(b) *To supplement the work of salesmen.* The printed word has a power of conviction that the spoken word does not always have. People more readily believe the statements of a salesman if they also see them in print. Moreover, knowledge is always a step in the direction of friendship, and goods that are well known are readily salable.

(c) *To control salesmen.* No crew of salesmen is 100 per cent honest and truthful. In some instances, a salesman might misrepresent the house if left entirely to his own devices. This danger is lessened when the printed advertising of the company puts on record its policy.

By using advertising in these ways, some manufacturers have been able to cut the cost of personal salesmanship sufficiently to more than offset the advertising expense. In other words, the cost of advertising plus that of salesmanship is sometimes less than the cost of salesmanship alone. Statistics compiled some years ago showed that, among the clothing manufacturers, the most extensive advertiser was the one who had the lowest percentage of selling cost for each dollar's worth of goods sold.

How the Dealer Benefits. Advertising may also cut marketing cost by inducing the dealer to handle the article at a smaller margin of profit. This might not appear to be a benefit to the dealer. The smaller profit is justified, however, because less personal salesmanship on his part is required to sell the well-known advertised article. His stock-keeping problems are simplified and often his own prestige is increased by his handling of goods that are well and favorably known. Because of the increased turnover of the advertised articles, his gross profit will be larger. Here, too, it may be said that advertising does work that otherwise would have to be done by personal salesmen—the dealer and his clerks—at greater cost. The dealer in turn uses advertising to inform people about his store, his stock, and his service, and thus lessens the amount of personal salesmanship required to do the same volume of business.

From this brief summary, it is evident that the cost of advertising is not altogether a burden upon the consumer. Frequently a large part of the cost is saved by the economies which advertising effects in personal salesmanship. In addition it frequently effects indirect savings by making larger quantity production possible, with consequent savings in manufacturing costs. Because of this factor many articles—canned soup, for instance—are made available at a lower price than the cost of making the same thing at home.

The Consumer. Advertising may sometimes result in added expense to the consumer, but there are advantages which make it worth its cost to him. Among these advantages are the following:

(a) It gives the public information about new articles and improvements which make life healthier and happier;

(b) It shows people how they can benefit through the wider use of articles and services which they have previously used only to a limited extent;

(c) It simplifies the task of buying;

(d) It enables people to secure articles of standard quality (standardization of a product is a necessary preliminary to advertising it);

(e) It gives people, in advance of the actual use of an article, a certainty of its satisfactory performance;

(f) It gives, in certain cases, the psychological satisfaction of having and using an article which is well and favorably known by others.

Truth in Advertising. During the rapid growth of advertising that has occurred in the past half century, there were naturally many instances of its fraudulent and illegitimate use. Frequently its function was to *misinform* people regarding an article which would have been purchased by few if the truth about it has been known.

Misinforming the public through advertising became an offense punishable by civil and criminal penalties when Congress in 1938 amended the Federal Trade Commission act, passed in 1914. The law now makes unlawful "unfair or deceptive acts or practices in commerce." The Federal trade commission is in charge of enforcement, which is accomplished by the issuance of cease and desist orders issued against persons found in violation of the act.

The chief evil that remains in advertising is its uneconomic use, mainly by those who have considered it only as a means of increasing their sales volume, and have ignored its public service functions. The law of "survival of the fittest" tends to eliminate many of these short-sighted advertisers, and in the future we shall probably see more general conformity to the standards of economic value that have been outlined in this discussion.

THE FUNCTIONS AND METHODS OF ADVERTISING

From the advertiser's viewpoint, advertising is a method of selling; from the consumer's viewpoint, it is a method of gaining information that helps him in buying. This latter view should govern. Unless advertising does have educational value, it is likely also to fail of its selling purpose. It is true that some advertising is educational only in the degree that a picture of a cat accompanied by the letters C A T on a page in a child's primer is educational. Advertising of this class is not highly efficient, but, in teaching consumers to recognize a brand and to become familiar with it, it accomplishes something. It is also true that some advertising is largely emotional, with the message presented in pictures and in color; nevertheless, even a picture of a charming girl made more charming by lustrous silk hosiery has in it a lesson that many women gladly accept. If we interpret *educational* as including training of the memory and emotions as well as informing the mind, we shall find few cases of successful advertisers whose message is not educational.

Inviting and Readable. Information that is of service to the consumer is the basis of good advertising—but only the basis. The information must be delivered. Every teacher can testify that "the human mind has an almost infinite capacity to resist the introduction of knowledge." And the teacher has the great advantage that his audience cannot easily get away from him. The advertiser, on the other hand, has to deal with a public that does not particularly care to listen and has many competing attractions to draw its attention away. A high degree of artistic and literary skill is required to build an advertisement so attractive and interesting that it will attract and hold the attention of the public until its message is delivered. Usually the message must be repeated many times and in a variety of ways before it can accomplish all the purposes of the advertiser.

Kinds of Responses. Nor is the task of the advertiser ended when his message is impressed upon the mind of the reader. His object is to secure a profitable response from the reader. There are two main kinds of response, and on the basis of these we may classify advertisements as "action advertisements" and "good-will advertisements." An action advertisement has the object of securing a direct response from the reader in the form of an order or inquiry, either by mail or at the store. In the good-will advertisement, the object is to induce a friendly feeling which will make the reader receptive to other selling efforts. Often the advertisement tries both to get action and to induce good will; but one object should be dominant, since the very things that tend strongly to stimulate action are most likely to lose good will, and vice versa.

A new advertiser whose capital is small and who cannot afford to wait long for returns from his investment is likely to prefer action advertisements. In their extreme form they are packed with facts, and often offer a book or a sample as an incentive for replies. A coupon may be at the bottom to make action easy. Later in his history, when his goods are more widely distributed and his sales force is large enough to cover the territory adequately, the same advertiser may turn to good-will advertisements, in the belief that the friendly feeling of hundreds of thousands of people is more valuable than the active response of a few thousand. It is harder to stimulate a "consumer demand" than to stimulate a state of "consumer acceptance," and the latter is all that is necessary for many advertisers. Mail-order houses, however, and manufacturers, as well as many retailers, of short-lived novelties and specialties, depend chiefly on action advertisements from one year's end to another.

Both action advertisements and good-will advertisements can be further classified in four groups, depending on the kind of information they contain. These four groups are:

(a) Pioneering
(b) Competitive
(c) Institutional
(d) Reminder

Pioneering Advertisements. Pioneering advertisements try to introduce the article or service to people who have not been in the habit of using this type of article at all, and who frequently have not realized their need for it. The advertisements show them how they will benefit by adopting it. They rarely *create* demand—it is doubtful if any advertising can do more than arouse a latent demand—but they are the most nearly creative of all forms of advertisements.

Competitive Advertisements. Competitive advertisements try to direct existing demand toward the advertised product, in preference to any other product of the same class. They point out distinctive merits and advantages, and usually back up their claims with proof.

Institutional Advertisements. Institutional advertisements try to build the prestige of a name or brand, usually one that embraces an extensive line or "family" of articles. These advertisements are always of the good-will type, and often make no attempt either to show the consumer his need or to demonstrate the merits of any particular product. Nevertheless, they may give information of real service to the buyer in the form of bits of history, advice about investments, or the like. This type of advertisement is hardly suited to any house that is not already recognized as a leader in its field.

Reminder Advertisements. Reminder advertisements, as their name implies, try to refresh in the public mind its previous knowledge or belief regarding the advertised product or company. To some extent, they attempt also to stimulate action, choosing such media as will reach prospective buyers at a favorable time. Display cards in stores, and to a considerable extent street car cards and billboards, are suitable for reminder advertising. Few manufacturers can depend upon it exclusively; its chief

value is to supplement and to re-enforce other forms of advertising and selling. Used alone, it is likely to be inefficient and wasteful.

Types in Series. The history of an advertiser may include all of these types of advertising. When the talking machine was a new invention, pioneering advertisements were needed to convert the public to the idea of possessing such an instrument. Later, as it became a stock item of the household furnishings, competitive advertisements taught the public to discriminate among the various brands offered. Institutional advertisements associated one brand with the names and faces of great opera singers and other musicians. Reminder advertisements warned the prospective buyer to look for the trade-mark so as to be sure of securing the genuine. While the majority of these advertisements were of the good-will class, action advertisements were used at the psychological moment, just before Christmas.

Pioneering versus Competitive. Although the great majority of manufacturers are in fields where competition is keen, it does not necessarily follow that competitive advertising is most suitable for their use. In the case of some articles, like automobile tires, where the increase in the market depends almost entirely upon conditions outside the control of the tire manufacturer and where car owners must necessarily buy some brand of tires, competitive advertising is the logical method. Frequently it happens, however, that a manufacturer, instead of trying to convert a larger percentage of the present users to his brand, may seek to develop new markets. The talking-machine manufacturer may develop a new field in business houses or among those learning languages, or even among people who want to reduce weight by pleasant and painless methods. Raisins are a staple food, but advertising of the pioneering sort has greatly developed the consumption of raisins by converting people to raisin bread, to raisin pie, and to the eating of raisins between meals. Practically every article likewise has some opportunity of developing new markets through the use of pioneering advertising. This is often a wiser policy than that of fighting for a larger share of existing business.

THE BASIS OF ADVERTISING PLANS

Because of the relation of advertising to salesmanship and other marketing forces, an advertising campaign is a complex matter and cannot be safely undertaken without a thorough analysis of many different factors. The most important are the market, the product, the trade channels, and the media. The analysis of these may be made by the advertiser, but more frequently it is intrusted to a group of outside experts called an "advertising agency." Their services are valuable, not only because they can approach the question in a comparatively unbiased frame of mind, but also because they bring to it a valuable background of experience gained through contact with problems of other advertisers. Moreover, they are experts in the execution of advertising plans.

Analysis of the Product. The analysis of the product is of two kinds: analysis of the class to which it belongs and analysis of the particular article in comparison with other members. Under the first head, one needs to consider the following questions: "Is it (1) a luxury for the few or (2) a necessity for the many?" "Is it (3) a staple, in constant demand and bought habitually; or, is it (4) a specialty for which demand is yet to be created?" "Is it (5) a convenience article, bought without much deliberation, and at the handiest place; or, is it (6) a shopping article, for which people will go out of their way and which they will buy only after careful comparison?" "Is it purchased (7) frequently or (8) only rarely?" "Does its possession lead to the purchase of (9) other 'contingent' articles made by the same manufacturer?" "Is it (10) affected by style changes?" "Is it subject to (11) territorial or (12) seasonal limitations?"

Examples of such products are: (1) steam yacht; (2) salt; (3) stockings; (4) self hair-cutter; (5) chewing gum; (6) automobile; (7) soap; (8) silver polish; (9) safety razor blades; (10) millinery; (11) ice skates; (12) straw hats.

Further questions are necessary in the analysis of the particular product, and to answer them it is usually necessary to examine competitors. How does this article differ in design, in materials, in workmanship, in cost? Has it any exclusive features protected by patent or copyright? Who are the people responsible for it? What is the life history of the company? The analyst needs the reporter's "nose for news" in his search through the factory, the office, and the laboratory, for the distinguishing superiorities in which the public may be interested. It should be remembered, however, that the most valuable facts about a product are those which relate to its performance in the hands of users. This brings us to the analysis of the market.

Analyzing the Market. The analysis of the market should discover who the present buyers are, how many they are, where they are, and what are their reasons for buying. It should discover what characteristics they have in common, such as age, sex, wealth, education, vocation, and the like. It should discover their buying habits and the basis for their discrimination between different brands of the same type of product, if they discriminate at all between brands. It should discover their attitude toward the particular product in question—why they prefer it, why they object to it.

Adaptability. Through this analysis of the market, it sometimes becomes apparent that the product is not ideally suited to the needs of the majority of consumers. Sometimes improvements either in the article itself or in the size and the design of the package have to be made before advertising can be undertaken with much prospect of success. Sometimes the price, the name, or some other element is a hindrance and must be changed. In any event, the analysis will reveal the kind of information that must be given and the points that must be emphasized in order to secure larger sales. Often it is far more important to know what an article is in the public mind than to know what it is in reality.

Trade Channels. It is then necessary to analyze the trade channels through which the goods flow to the consumer and also to study the other possible channels which might be employed. Sometimes before advertising can be made effective it is necessary to change from the method of selling through jobber and dealer to the method of selling direct to dealer or even direct to consumer. Or, a change in the opposite direction may be advisable; for, when advertising is undertaken to reach the general public over a wide territory, it would obviously be wasteful to have goods on sale at such a small number of points that many of the interested prospects would be unable to find a dealer handling them. The question of territory is important in this connection. The manufacturer whose goods can be profitably sold only in limited territory would obviously waste his money if he advertised in publications covering the whole country.

Analysis of Media. After the manufacturer has discovered where his market lies, what selling points his product has, and what kind of distribution is most expedient, his next task is to analyze the media which are valuable for reaching the prospective consumers. He finds a bewildering variety, including magazines, newspapers, and various periodicals, such as farm papers, women's publications, trade and technical publications, going to selected groups of people. There are also radio broadcasts, street car cards, billboards, direct mail, and many other avenues of reaching the public. In choosing his media, his ideal is to find those which cover his

market with a minimum of waste and at a minimum cost. The difficulty of comparing different classes of media makes selection a task for the expert.

Factors which Influence Media. Each class of medium has its peculiar advantages. The newspaper appeals to people of all kinds within a limited territory. The magazine has a more carefully selected audience in a wider territory, and has a longer life. Radio broadcasts, if popular, reach an enormous audience. Street car cards are of local influence, and, as they are all of the same size, they permit the small advertiser to make as good a showing as his biggest competitor. Billboards offer the advantage of size. "Class" publications appeal to a group, selected on the basis of their wealth, vocation, or other known interests, and this group may happen to contain the advertiser's best prospects. Within any class of media, there are differences in value, depending upon the quality of the circulation, the methods by which it was secured, and the confidence the readers have in the publication. The advertiser who buys the privilege of talking to an audience is interested not only in the size and in the buying power of the audience but also in its receptivity to his message.

A very practical consideration that affects the choice of media and the size of space to be used in them, as well as other elements in the advertising campaign, is the amount of money available. Theoretically, the appropriation should depend upon the selling work to be done and upon the means required to do it. Actually, it is often an arbitrary matter, and, unless the previous advertising history of the company has given a sound basis of estimating, the sum they spend on advertising may be far less or far more than is economically justifiable. Some advertisers determine their appropriations by observing the policy of competitors. This method is generally wasteful, and in some instances it has led to battles for advertising supremacy in which the prize was not worth the cost.

Problems of Space. Two advertisers using the same amount of space in a given publication may have radically different methods of apportioning it. One may use small space frequently, while the other uses large space—perhaps full pages—at longer intervals. Both may be right. Generally speaking, the advertiser who depends on direct returns and hence uses action advertisements will find small or moderate-sized space most profitable, whereas the good-will advertiser benefits from the prestige value of dominant space. The tendency in recent years has been away from the pretentious double-page spreads and multi-page advertisements. There are probably few cases where anything larger than a full page is needed to uphold an advertiser's prestige in his field.

PSYCHOLOGICAL ASPECTS OF ADVERTISING

As the whole selling process is mental, the advertiser is deeply concerned with psychology, the science of the mind's behavior. Every decision to buy is preceded by certain mental stages or steps, usually classified as attention, interest, desire, and conviction, or confidence. Although the individual advertisement rarely attempts to lead the prospect through all these stages, it does usually try to attract attention, to interest, and to inspire confidence. The first of these functions is of paramount importance. Many psychological investigations have been made to discover the relative attention-value of different sizes and shapes, of different positions in the publication, and of different devices, such as color, borders, amount of white space, typography, and the like, for winning and holding attention.

Value of Research. Other functions of the advertisement have also been studied and analyzed. Laboratory tests are sometimes made to discover the relative strength of different appeals and of different selling points for the same product, before choosing one for the campaign. It is unlikely that the process of influencing human beings by advertising can ever be made an exact science; but many of the most serious errors of early advertisers are now avoided by practically every one, and the percentage of mistakes is likely to be reduced further by scientific research and experiment.

Favorable Attention. One prevalent error of the past was the assumption that anything that attracted the *eye* was necessarily good at the beginning of an advertisement. This idea was responsible for the use of irrelevant "attention-getters," such as pictures of pretty girls, comic cartoons, eccentric borders, misleading headlines like "Don't read this" or "For Women Only," and other bizarre and sometimes disgusting stunts. It is now recognized that the advertisement should attract the *mind* as well as the eye, and attract it not merely to the advertisement, but also to the subject of the advertisement. In other words, the attention must be *relevant* and *favorable*.

Avoiding Negatives. Another generally accepted principle is that, in order to hold attention and interest, an advertisement should be pleasing, both in form and in substance. A rectangle of the proportions of the "Golden section" (about 3 x 5) is the most pleasing shape, and is preferable to the square, which is monotonous and ugly. A promise of benefits to be derived from an article is more pleasing than is a warning of the dangers of not having it. Attacks on competitors are psychologically bad, not only because they are unpleasant, but also because such attention as they do receive is focused upon the competitor, whereas it should be directed toward the advertiser's own article.

Intellectual versus Emotional Appeals. Some purchases are made upon impulse or are inspired by the senses or by the emotions; others are the result of deliberately reasoned choice. Advertising appeals are therefore emotional (human-interest) or intellectual (reason-why). There is no sharp dividing line between the two, and many advertisements combine both elements. Competitive advertisements usually contain a reason-why argument, but of late years there has been an increasing tendency to make this more readable by introducing the human-interest touch. Pioneering advertisements usually appeal to some fundamental instinct or emotion, such as ambition, fear, pride, and the like, and hence are more likely to be human-interest.

Rationalized Appeals. It may happen that the appeal which is really most powerful in producing sales is not the one which the advertiser should use. This most commonly happens in the case of articles that are bought on the basis of emotions which the average buyer would not care to acknowledge even to himself. If questioned regarding his reasons for buying a silver pencil, he would not say, "because it satisfied my craving for ornament" or "because I want people to consider me a big business executive." More likely he would mention the convenience of having a pencil that never needs sharpening, or he would mention the economy of a pencil that writes 50,000 words for ten cents. The advertiser, therefore, is likely to use advertising with one of these reason-why appeals; in other words, he uses a "rationalized appeal."

The advertising campaign is usually planned by the principals or account executives of an advertising agency in co-operation with the sales executives of the manufacturer. They are likely to consult with various expert specialists, including research men and psychologists. The plans cover the choice of media, the general policy and objects of the advertising, and the chief appeals to be used. The actual preparation of the advertisements, however, is generally intrusted to writers and to artists. Upon their skill in delivering the message depends the success of the carefully laid plans.

PREPARATION OF ADVERTISING COPY

The message in words, called the "copy," is in most cases the backbone of the advertisement. It must not be forgotten, however, that the display elements—color, illustrations, type, and ornament—are also forms of language and sometimes tell the advertiser's story more plainly than it can be told in words. They always have the power to help or to hinder the effectiveness of the impression made by the copy. To secure good teamwork between copy and display, it is advisable to have one person supervise the entire construction of the advertisement and be responsible for every element that enters it. For convenience, however, we shall discuss copy separately.

Sales Letters versus Advertisements. Writing a piece of advertising copy is much like writing a sales letter. If the copy is for some mailing piece or for some periodical of selected circulation, the similarity is very close. Copy for a general magazine or a newspaper differs from the sales letter in some vital respects. The most important of these are the following:

(a) The advertisement must automatically select its audience, whereas the sales letter goes to a carefully picked list of prospects who are presumed to be interested. Few articles advertised in general magazines are of universal appeal. Some are for men, some for women, some for people who live in city apartments, some for automobile owners, and so on. To be effective, the advertisement must attract and interest the prospective buyers, out of the great public who turn the pages of the publication. A crude way is to use a salutation, such as "Ford owners, attention!" The better way is to have in the headline some key word that flashes to the prospective buyer the message, *This Is For You*; for example, "Does Your *Ford* Start Easily on Cold Mornings?"

(b) The advertisement is public, not private. It may be intended for a certain selected group, but many other people will see it and read it. It should not contain anything that will offend these uninvited readers or forfeit their good will. Many things that can be said in sales talks and in sales letters cannot safely be said in advertising copy. Slang, coarse humor, sex allusions, and references to nationality, religion, or politics are all dangerous and rarely permissible.

(c) The advertisement is necessarily more impersonal than the sales letter. Usually it is anonymous. The writer is simply the interpreter of his subject and must not come between it and the reader. Moreover, each reader is conscious of the fact that the advertiser's message is not directed at him alone, but it is also intended for many others. Advertising copy can sometimes be made more personal by having a statement or testimonial from some well-known person, or a monologue from some pictured typical user, but at best its personal touch is less than that of the sales letter. Printed matter has some advantages over the typewritten letter, but it can never secure the same degree of personal intimacy.

(d) Advertising copy must compete with the editorial contents of the publication. It competes at a disadvantage, because the publication is bought for the amusement or instruction contained in its news, stories, and articles. The subscriber reads these willingly; advertising copy, on the other hand, he reads unwillingly, if at all. Hence it must be so interesting and serviceable to him that he cannot pass over it indifferently. In recent years, there has been a tendency away from the straight sales argument and other forms of preachments and exhortations. Instead, copy has been put in stories, dramas, and in almost every other literary form. It is often possible to harmonize the copy with the reader's temporary mood and interests by casting it in the form that prevails in the editorial columns. Thus, timely or newsy copy is appropriate in newspapers, story copy in a fiction magazine, and household recipes and advice about home decoration in a woman's publication. Advertising copy should be literature as well as salesmanship.

(e) Advertising copy usually requires a more terse, condensed style than does a sales letter. This does not always mean greater brevity, but it does mean speedier movement. Advertising copy may be long if it is sufficiently interesting. Some of the most successful campaigns have employed lengthy copy, and advertisements that try to secure direct action are nearly always long.

Avoid "Manufacturer's Copy." Advertising copy should be written from the reader's viewpoint. Since its justification as a public utility depends on its furnishing information of value, it should bring out the truths regarding the product in a way that renders real service. Too often the manufacturer regards his advertising as an opportunity for self-glorification, or he assumes that the facts about it that interest him will also interest others. So-called "manufacturer's copy" is characterized by rather boastful claims of superiority, and the lavish use of the pronouns "I" and "we." Such copy very seldom appeals to the consumer.

The Service Viewpoint. It is true that often the claims of superiority are justified, and the distinctive merits set forth in the copy are real ones. But these selling points should be presented from the service viewpoint; for example, a rubber water bottle of seamless construction may be meritorious, but the word "seamless" does not show its service. The service viewpoint is in the words, "It can't leak." This assertion of service may then be backed up by the reason, "because it's made in one piece." Every good selling point is really a "buying point" and should be so presented.

Finding a Point of Contact. At the beginning of the copy especially, the consumer's viewpoint is vitally important. Rarely is he considering the purchase of anything, still less the particular article we have to offer. His mind is moving along its accustomed path, absorbed in the various interests, large and small, that make up his life. Our task is not so much to draw him away from these things as it is to relate our message to them. In other words, we try to find a "point of contact" in the reader's present interests. Thus, in theater programs, the reader's central interest is the play, and one notably successful advertiser invariably begins his copy with some reference to the title or story of the play. When some news event, like the discovery of Tutankhamen's tomb, occupies the attention of the public, advertisers may begin with some reference to it. At various seasons, such as Christmas and Easter, there are obvious points of contact for many advertisers.

Not only temporary interests, but also permanent interests and the fundamental instincts and emotions, provide points of contact. Every housewife is compelled to plan meals for the family, every young man and every young woman has some hope of being a social success, every car owner is interested in getting greater mileage, every mother is interested in her children's growth and health. The copy writer should try to find an interest that is common to most of the audience he wishes to reach, and, having found it, he should tie his message to it. Of course the point of contact should not be far-fetched or only distantly related to his product.

Good-will Copy. In good-will advertising, the copy often says very little about the merits of the product. The watch manufacturer may use a historical series showing "Time throughout the ages." Musical instruments may be advertised by telling the stories of famous musicians. A printing house may give valuable information regarding the various processes of typesetting. In such cases,

the advertiser apparently subordinates his own interests entirely, in order to present something that the public will read with pleasure and with profit. His benefit comes partly from the fact that he is recognized as an authority in his field, and partly from his association with something the consumer admires. In some cases, the consumer may realize that those who give free service can be depended upon to give service when they are paid for it.

Copy Easy to Read. In style as well as in substance, advertising copy should be adapted to the reader, always keeping in mind the axiom, "He doesn't want to read it." The general construction and the little details of diction and of sentence structure should all help to make the copy *easy to read.* No matter how interesting the message may be or how valuable the information it contains, if the message taxes the brain and tires the patience of the reader, it will be ineffective. It must be clear, correct, and concise. Examination of the copy of successful advertisers who appeal to a wide audience will show a general tendency toward short sentences and paragraphs, and simple Anglo-Saxon language.

Adaptation of Style. Where the advertiser is addressing a selected audience, composed, let us say, of society women, engineers, or sportsmen, his style may have closer adaptation to his readers. With the intellectual or sophisticated audience, his sentences may be longer and his vocabulary of wider range, but his language should never be pretentious or florid. Society women may be favorably impressed by the dignified formal style of a wedding invitation, in which the pronouns "you" and "we" never appear. Technical men respond to information expressed in their own peculiar lingo, and sportsmen welcome the slang of their favorite diversion.

Copy Should Concentrate. A piece of copy should always be concentrated upon one main idea. This is usually the big idea or keynote of the entire campaign. A series may continue for months to inform the public that a certain varnish won't turn white in water, that a tooth paste counteracts acid-mouth, that a coffee is good to the last drop. A common fault of copy writers is that of trying to tell too much. This is sometimes caused by over-enthusiasm for the product, and the desire to show the world its superiorities in all respects. More often it is because of timidity or inability to discover what is really the most effective talking point. While it is easier to hit a target with bird shot than with a rifle bullet, the latter makes the deeper and more lasting impression. An equally serious fault is the long-winded introduction that beats about the bush for several paragraphs before coming to the real point of the advertisement. The advertisement should be well aimed, and it should then strike home swiftly and surely.

Slogans. The keynote idea is often crystallized into a catchy statement called a "slogan," and this slogan is included in every piece of copy. Such slogans as "The Flavor Lasts," "Chases Dirt," "Hammer the Hammer," "Keep that School Girl Complexion," by constant repetition, have become impressed on the minds of millions of people. There is some question as to the value of slogans for articles that are bought only rarely and after deliberation; certainly they have more advertising effect in copy for low-priced convenience articles like chewing gum and soap. In any case the slogan should not be a general abstract claim that could have been made equally well by any competitor if he had happened to think of it. It should bring out a distinctive point and should be brief, concrete, and easily remembered. Reminder advertisements often contain no copy except the slogan and the name of the product.

Helping the Reader's Progress. In copy of any considerable length, the writer must grapple with the problem of holding the reader's attention until he reaches the end. This is relatively easy in human-interest advertising, where the story or some other intrinsically interesting form may be used, but it is somewhat harder in reason-why copy, where an explanation or an argument must be presented. The basis of such copy must be facts, and facts are sometimes dry and dull. Testimonials may be interesting because of the prominence of the signer, but they are a weak form of evidence. Records of the performance of a product are stronger proof, and tests that the reader is invited to perform for himself are the most convincing of all. If the evidence in itself is interesting, it may be given first, and it may be followed by the advertiser's general claim which it establishes. Otherwise it is better to begin the copy with a statement of the service the product will render, and to back this up with the concrete facts that prove its truth.

The reader's progress through the copy may also be helped by the rhetorical device of parallelism, which means casting similar ideas in similar form. The construction of sentences should not be so uniform as to be monotonous, but unnecessary changes in subject, in tense, and in viewpoint should be avoided.

Emphasizing the Copy. To emphasize his points, the copy writer sometimes depends upon the use of italics, capitals, and other display methods, but these lose their effect if used too lavishly. Structural methods of emphasis, moreover, are of greater value. Important words, so far as possible, should be placed at the beginnings and ends of sentences. The present tense is the most emphatic. "This hat is becoming to any face" is stronger than "This hat will be becoming to any face." Verbs in the active voice are always stronger than those in the passive voice. The imperative "Do this" is more dynamic than the subjective "You should do this." Toward the end of the copy, where action is most desired, the imperative may be used freely. At the beginning, it is sometimes too strong and may antagonize. It is well to remember that verbs are the lifeblood of expression. Wisely selected, they will do a great deal of work, provided they are not overloaded with qualifying adverbs and phrases.

DISPLAY OF THE ADVERTISEMENT

The copy in all advertisements is presumably intended to be read. In many kinds of advertisements, especially those that attempt to secure action, the copy *must* be read; otherwise the advertisement fails. In such cases, the function of the display is merely to assist by making the reading matter more inviting and more emphatic. Sometimes the only display element is the type. This should be chosen for its readability; fancy letters and the extensive use of capitals or italics should be avoided. Two or three ideas, rarely more, may be emphasized by setting them in larger size or in bolder type. Pictures, if used, should illustrate some idea in the copy and they should lead the eye into the copy. Color and ornament should be used with discretion, or they may suggest that the advertisement is merely to be looked at, not to be read.

Importance of Display. There are some conditions, however, which may demand that the display rather than the copy undertake the task of carrying the advertiser's message. Among these conditions are the following: (a) Human-interest appeals to the senses and to the emotions, especially to the sense of sight and to the emotion of vanity. (b) Good-will and general publicity advertisements, especially those which depend upon atmosphere to build prestige. (c) Street car cards, billboards, and other forms of advertising that must flash their message almost instantaneously. (d) Advertisements that are intended to appeal to all classes of people including the illiterate and the unintelligent. (e) Advertisements of products that have artistic qualities, such as furniture, silverware, and jewelry.

Suggestion of Type. In all these conditions, when display is of dominant importance and copy is secondary, the type may be selected for its decorative value rather than for its readability, although readability should not be entirely sacrificed. The type founders have produced types that suggest such qualities as dignity, antiquity, delicacy, strength, and the feeling of the type selected should be in harmony with the idea of the advertisement. If a suitable type is not available, hand lettering may be used. Borders and other ornaments should likewise be selected for their appropriateness. Frivolous French borders may be suitable for the advertising of cosmetics and lingerie, but they are not appropriate for tractors or Portland cement.

Headlines. A headline in bold-faced type is a common feature of advertisements, whether the copy or the display is the chief element. But the function of the headline differs in the two cases. Where the copy *must* be read, the headline should be like the title of a fiction story; it should reveal the character of the advertisement but it should not attempt to summarize its main idea. It should select the right audience and pique their curiosity sufficiently to make them want to read more. "Eleanor Finds a Way" is intended to attract women, but the phrase tells them nothing about the merits of the advertised article. Where the display is dominant and the copy is a subordinate element, the headline is like the headline of a news article. Read either alone or in combination with the other display type, it tells the main idea of the advertisement. Those who are interested enough can obtain more detailed information from the text matter. "Right over the Old Shingles—Blank Asbestos Shingles" tells the main fact and those who read no further have at least some information about the product.

The Language of Color. Color speaks a language of its own and this language should be mastered before attempting to use it. The wise advertiser chooses color not merely for its attention-getting power but also for its atmosphere. Red and orange catch the eye more quickly than do other colors, but they are too hot and violent for the advertising of electric fans and cooling drinks. Purple is distinctive, but its suggestion of mourning makes it inappropriate for most advertising. Color is useful also for the more realistic representation of various articles of merchandise and for the identification of packages.

Illustrations. Pictures may, in some instances, tell almost the whole of the advertiser's story. They are particularly useful where the appeal is of a kind that might be offensive in words. A woman would probably not respond favorably to the advertisement of a cosmetic if the advertiser said baldly, "It will help you attract the men," but a picture which illustrates this result may subtly implant the idea in her mind.

To have a popular appeal, pictures should contain some suggestion of action, preferably with human characters. "Still life" illustrations are less dynamic, and are usually warranted only in advertisements that demand extreme dignity. High class period furniture may stand alone, but a convertible davenport bed is helped by the representation of people or by the suggestion of their presence. Action in the pictures should direct attention down and into the advertisement, rather than up and out.

Photographs versus Drawings. The choice between photographs and drawings depends upon several considerations. The photograph has the advantage of genuineness and reality. It is therefore preferable for illustrations of evidence and reason-why copy. The tire that has run 15,846 miles, or the battery that has been in service 4 years and 8 months, is most effectively shown by a photograph. On the other hand, a photograph may not be able to emphasize the important points. Moreover, in advertising articles like hosiery, it is often difficult to find a professional model whose type will appeal to people of the class the advertiser wishes to reach. The drawings of an artist who has created a popular type of man or woman may, in such cases, be a good investment.

Layout and Visualization. The advertisement-builder need not be an artist, but he should have artistic appreciation sufficient to know how his advertisement ought to look, and sketching ability sufficient to put on paper a rough approximation of it. Those who are experts in this work of "visualization," as it is called, are able to give the artist and the printer a guide that often prevents costly mistakes. Those who lack this sketching ability may produce an adequate substitute by pasting up pictures, borders, specimen blocks of type, and other display material in a "layout." Such a layout is invaluable to the copy man in showing the amount of material that can be put in the space without crowding and without using unreadably small type.

The style of the display and the copy should be suitable to the subject and should be adapted to the audience.

SOME FINAL CONSIDERATIONS

Because of the brevity of this discussion, it has dealt mainly with the manufacturer's advertising in its relation to prospective consumers. This is most important, not only because there is often no other way by which he can speak directly to this audience, but also because all other effects are dependent upon consumer effect. These other effects, however, should not be disregarded entirely. With articles like automobiles, that have a useful life covering several years, advertising may tend to increase the pride of ownership in the minds of present users, and thus keep them "sold." In fact, it may be truly said that an article is not sold at all, until it has been used with satisfaction. Again, advertising may have a valuable reaction on the workmen who produced the article by stimulating their pride of craftsmanship and by increasing their *esprit de corps.*

Relations with the Dealer. The dealer-effects of general advertising have lately received much attention. Advertisements addressed to the consumer may influence new dealers to stock the article in anticipation of the demand, and may stimulate present dealers to devote their efforts more enthusiastically and whole-heartedly to its sale. Quite frequently a part of the appropriation is used to "merchandise" the advertising; that is, to inform the dealer of the extent and the quality of the consumer advertising that is planned, and thus convince him that the article has salability sufficient to warrant him in putting it on his shelves. It must be remembered that the element of chief importance to the merchant is the salability of the goods. Some of the advertising appropriation may likewise be put into "dealer-helps," such as window and store display, demonstration, distribution of samples, and local advertising in newspapers and street cars. All these are welcomed by the dealer because their effect is concentrated in his neighborhood and he is in a position to benefit, especially if he has an exclusive agency, or is one of the few dealers permitted to carry the advertised goods.

Retail Advertising. The dealer's own advertising problem differs from the manufacturer's, but the fundamental principles are much the same. Less harm is done if the retailer uses only a reminder card to "keep his name before the public"; for his personal contact with his clientele may do much of the sales work, especially in a small town. If he can put that personal element in his advertising, so much the better. Too much reliance upon bargain sales, and upon other appeals that try to lure people into the store, is an unwise policy for the retailer who wishes to build a substantial and permanent business. The retailer, like the manu-

facturer, should aim to give serviceable information, and to give it in such form that it will be seen, read, and believed.

The bulk of retail advertising consists of offers of timely merchandise, usually competitive in character. Since the buyer's choice is likely to be based upon quality and price, both elements should be included. *Bargain* advertisements usually make the price seem low in comparison with quality; *style* advertisements describe the article so alluringly that quality seems high in comparison with price. Some retailers try to gain and hold their customers upon the basis of service or prestige, and hence use some institutional advertising. The average retailer, however, wants advertisements that will lead to direct and immediate sales.

ADVERTISING MEDIA
Expenditures by Selected Facilities, 1955*

Medium	Amounts Millions	Per Cent of Total
Newspapers		
National	$750	34.0
Local	2320	8.3
Radio		
National	90	1.0
Local	320	3.5
Television		
National	520	5.8
Local	220	2.4
Magazines		
General	130	1.4
Farm	39	0.4

*Source: U. S. Department of Commerce.

Advertising of Ideas. Besides the commercial uses of advertising in the marketing of goods and services, there is an increasing tendency to use advertising in selling ideas. Political beliefs, religious creeds, and economic doctrines have been taught through advertising. It has aided in settling industrial disputes by putting before the public the cases of the two disputing parties and thus enlisting the force of public opinion. The government used it during the late war to encourage saving rather than spending, producing rather than consuming, self-denial rather than self-indulgence.

RADIO ADVERTISING

By 1931 radio was accepted in America as a staple channel for commercial publicity: In 1948 over 1320 radio stations received more than $100,000,000 annually from advertisers.

Regulated by the Federal Communications Commission, radio advertising, limited to about 10% of an hour's broadcast, has flourished in America. The Commission uses the following index for broadcasts:

Music	News
Drama	Religious and Devotional
Variety	Special Events
Talks and Dialogues	Miscellaneous

POPULAR AMERICAN MAGAZINES—1956

Magazine	Regular Circulation
Reader's Digest	10,361,531
Life	5,552,276
Ladies' Home Journal	4,969,930
Saturday Evening Post	4,764,879
McCall's Magazine	4,641,518
Better Homes and Gardens	4,179,996
Look	4,061,572
Good Housekeeping	3,621,288
Woman's Day	3,410,345
Coronet	2,768,374
True Story	2,671,117
National Geographic	2,135,387
Time	1,951,039
Popular Mechanics	1,332,606
Newsweek	1,070,736
Seventeen	957,321
Field and Stream	891,131
Holiday	843,311
New Yorker	396,309
Harper's Bazaar	352,825

RADIO STATIONS AND NETWORKS IN THE UNITED STATES—1956

Major Networks	Stations		
	Owned and Operated	Affiliated	Total
ABC, American Broadcasting Company	5	334	339
CBS, Columbia Broadcasting System	6	212	218
MBS, Mutual Broadcasting System	0	557	557
NBC, National Broadcasting Company	5	207	212

Type	Operating	Permits for Construction	Total
Standard Broadcast	2824	111	2935
Television	482	108	590
FM, Frequency Modulation	540	17	557

The National Association of Broadcasters has established the following code of ethics for broadcasters so that all radio programs may conform to accepted standards of good taste:

That member stations shall not accept for advertising

(1) Any spirituous or "hard" liquor.
(2) Any remedy or other product the sale of which or the method of sale of which constitutes a violation of law.
(3) Any fortune-telling, mind-reading, or character-reading, by handwriting, numerology, palm-reading, or astrology, or advertising related thereto.
(4) Schools that offer questionable or untrue promises of employment or inducements for enrollment.
(5) Matrimonial agencies.
(6) Offers of "homework" except by firms of unquestioned responsibility.
(7) Any "dopester," tip-sheet or race track publications.
(8) All forms of speculative finance. Before member stations may accept any financial advertising, it shall be fully ascertained that such advertising and such advertised services comply with all pertinent federal, state, and local laws.
(9) Cures and products claiming to cure.
(10) Advertising statements or claims member stations know to be false, deceptive, or grossly exaggerated.
(11) Misleading statements of price or value, or comparisons of price or value.

TELEVISION ADVERTISING

With the rapid advance of television, radio has suffered a severe decline in advertising revenue. While local stations can still make a satisfactory profit, the radio networks are finding it increasingly difficult to do so, and lately some have been operating at a loss. As an advertising medium on the national level, television has forged far ahead of radio, despite the much higher costs for station time and for program production. For some of the longer TV programs, the sponsors pay over $100,000.

That the new visual medium presented a growing threat to radio became apparent as early as 1951, when a Hooper rating of radio network programs in New York showed that Jack Benny with a rating in 1948 of 26.5 had slumped to 4.8; while Bob Hope dropped from 16 to 3.2; Groucho Marx from 12 to 5; Bing Crosby from 18 to 3.2, and Amos and Andy from 13.6 to 5.

From the advertising viewpoint, the family aspect of television is most important. Whatever else it may do, it is compelled to appeal to the social unit rather than to the shapeless mob.

SALESMANSHIP

SALESMANSHIP in a broad sense may be defined as the art of convincing people. As the word indicates, it is ordinarily applied in the selling of merchandise. It implies a definite effort in persuading the buyer to adopt the seller's point of view; it aims to create in the buyer's mind a sense of value equal to, or greater than, the money price of the article for sale.

Marketing and Salesmanship. Selling is almost as old as civilization. Prior to the industrial revolution, however, it was relatively a simple operation. But with the increasing centralization of industry in factories, a radical change took place in selling practice. A manufacturing plant today represents a large invested capital. Usually the plant can be operated at a profit only if the output is relatively large. Markets therefore must be expanded. The result has been a heavy pressure to increase sales. The strategy of increasing sales is usually known as marketing. Salesmanship is an essential factor in this strategy.

Two Chief Requisites. Effective salesmanship depends on two principal factors.

The first is that it should be exercised in marketing a product which satisfies a need or desire at a price which the public is willing to pay. This requirement obviously devolves upon the manufacturer to meet. Where the product is subject to changes in style, the problem of forecasting the public's preferences is one of the most serious which confronts industry. With practically all kinds of products, however, market investigations are of paramount importance in determining the type of article which will sell. The public, by its preferences and patronage, thus exercises a controlling influence over industry.

The second factor in effective salesmanship is the presentation of the product in such a way as to call forth the buying motives of the customer. It depends primarily on the individual salesman and on the sales organization employing him.

By calling forth buying motives, salesmanship *creates the demand* for goods. By showing a customer, for example, how many hours of laborious work can be saved by using a mower instead of a scythe, an electric washer instead of a washboard, or an automobile instead of "leg work," a salesman creates a demand for the newer articles. If he can show further that the new article will actually save the buyer money in addition to making life more enjoyable, the need created is still more pronounced.

Salesmanship likewise *creates value* in goods. Articles which cannot be sold are of little value. By creating a demand for them, the salesman makes them valuable. Unless value can be created in this way for new and better products, such products cannot be manufactured.

Selling Points. Every person who has goods to sell, either as manufacturer, wholesaler, retail merchant, or personal salesman, is confronted constantly with the questions, "What are the selling points of my product?" "What are the arguments and ways of presentation which are most effective in promoting its sale?" The answers to these questions involve first an analysis of the product from the standpoint of the user and, secondly, a determination of the consumers' buying motives to which appeal should be made. Of the two, the second is more fundamental, since the terms in which the article is described must be such as will make it appeal to buying motives.

In the first place, the manufacturer should determine what motives actually do influence the public to buy his goods. The sales force should be taught how to appeal to these motives.

In the second place, the individual salesman should select, with all the shrewdness he can muster, the motive or motives likely to actuate his customer and should direct the selling appeal to these motives.

Herein lies one advantage of salesmanship over advertising. Advertising inevitably consists of a generalized appeal; but the salesman may modify his appeal according to the interests and predominant motives of each individual customer. His ability in doing so usually marks the degree of his effectiveness.

Analyzing the Product. A thorough knowledge of the product sold is essential for several reasons. It creates self-confidence in the salesman, providing the basis for enthusiasm with which the customer may also be inspired. It enables the salesman to answer the customer's questions in a convincing way. Finally, it furnishes the salesman with material for an organized sales talk. In this connection it is important to remember that people seldom see features to which their attention is not called. Specific facts about an article build up a consciousness of the article in the customer's mind. The most important question that can be asked about any article is "What will it do to benefit the purchaser?" The answering of this question gives unlimited scope for creative selling ideas.

Studying the Customer. It is no less important to know human nature in buying than to know one's product. The first necessity is to recognize what are the principal buying motives. If an article cannot be made to appeal to these motives, a sale is impossible. Scarcely less essential is a realization of the way in which people react to different kinds of treatment.

Types of Customers. Customers may be divided, from the salesman's standpoint, into seven chief classes: impulsive; deliberate; indecisive; decisive; talkative; silent; suspicious. An individual may be classified in this scale by judging his actions and his words. Most people, of course, are mixtures of these types, sometimes resembling one, sometimes another.

The *impulsive* person is known by quick, jerky actions and manner of speech. He wishes any buying transaction over quickly. The sales talk should be short and to the point.

The *deliberate* person exhibits slow, poised action and manner of speech. In interviewing people of this type, the selling points should be covered in detail before an attempt to close the sale. To hurry a decision brings resentment.

The *indecisive* customer has an apprehensive expression and vacillating actions. He lacks the power of decision. The successful salesman helps such a person decide by positive suggestion, such as talking of deliveries or styles, which assumes that the question of the purchase has already been determined. For the decisive person, however, this procedure is an error.

The *decisive* customer is known by his confident expression and bearing. It is helpful to ask his opinion on all important points, being careful, however, to put the questions in such a way that the answers will lead toward the sale.

The *talkative* person is friendly and communicative in actions and expression. The salesman should get the lead through tactful interruptions and so interest him that he will forget his own trend of thought.

The *silent* customer is morose or fearful in actions and expression. The salesman should ignore anything unusual in his attitude and proceed with a full sales talk.

The *suspicious* person is cynical, sly, and cautious in actions and expression. The successful salesmen win the confidence of such customers by agreeing with some of their doubts and fears and then demonstrating the truth of his own statements.

Friendliness. The salesman should be cautioned, however, against a cold-blooded analysis of his customer. It is far more important that the salesman show a friendly attitude based on an appreciation of the fact that to every prospect the whole world centers in his own consciousness. He is of supreme importance to himself. Admiration for the prospect's better points, friendliness, helpfulness, and respect arouse good will in the prospect, irrespective of his type or temperament, and in the absence of good will the most skillful sales talk avails nothing. This attitude on the part of the salesman must be sincere and based on a conviction that most people are honest and well meaning.

Buying Motives. These form the psychological foundation of every sale. If the salesman can discover what main motives prompt a customer to buy, he has his hand on levers which control the customer's decision. The following include the most important buying motives.

Social Recognition. This is the desire to maintain leadership or to rival others in property, appearance, or achievement. It shows itself frequently in an insistence on up-to-dateness and modernness or in the possession of articles which are different or unique. The customer should be made to realize that a failure to purchase will result in impairing his position in the minds of others.

Possession. In order to enlist on his side the natural desire to retain what one possesses, the salesman should put the merchandise in the customer's possession. It will be more difficult to give it up than if he had never possessed it. This is the psychological basis for the practice of letting prospective customers drive new cars, for displaying retail goods so they can be handled, and for selling "on approval."

Companionship. By picturing the customer's friends enjoying the merchandise, the salesman may employ on his side the customer's desire to make friends. It is important to make clear how others will be eager for the opportunity to enjoy it.

Pride. This important motive is appealed to by calling the customer by name and title and through expressing appreciation of his decisions and his possessions. It is advisable also to refer frequently to his remarks.

Imitation. All people experience to a certain extent an involuntary compulsion to do what other people do. This characteristic may be used by throwing into the sales talk at frequent intervals the opinion of others, but without too much emphasis on each opinion, lest the customer's desire to be different be offended. It is a sound axiom that a satisfied customer is the best advertisement.

Curiosity. This almost universal trait is utilized by creating in the customer's mind a picture of what he wants and getting him to agree to it. Then the salesman is in a position to produce the merchandise which meets this want, with a strong prospect of making the sale.

Parental Care. The salesman should analyze the needs of children and show the relation of his product to their welfare.

Other buying motives include satisfaction of the appetite, securing personal comfort through saving of labor, security from danger, pleasure of recreation and entertainment, and the romantic instinct. Of a more intellectual type are the rational appeals of economy in purchase or in use, efficiency or usableness, dependability, handiness, and reliability of auxiliary service. The strongest of the rational appeals is economy, often utilized in the form of a demonstration that the customer cannot afford to be without the article in question.

Four Steps in a Sale. In the process of purchasing, the customer's decision is not made in any haphazard fashion, but as a result of a certain feeling or reasoning. Analysis reveals four definite stages in the process. These are usually designated by the terms: attention—interest—desire—action.

Attracting Favorable Attention. This is accomplished by what the salesman says, by what the customer reads, or by a display of goods.

In circumstances where the customer comes to the salesman, as in retail stores, it is important that the salesman should be prompt, indicating that he is pleased to see the customer. He should be confident of himself, energetic, and expectant. Of especial value is attentiveness to the customer, shown by being certain always to catch the customer's first words or, at times, in rendering a small unexpected service. The salesman's speech should be courteous and suited to his customer, who, if possible, should be called by name. The voice should be clear and distinct, sincere, and modulated so that it is pleasant to hear.

When the salesman has to call on his customer, his problem is different. The most successful salesmen learn important facts about their customers before attempting an interview. In winning the interview persistency is the master key. Discouragement is the arch enemy of success. When an interview is refused, it is desirable to find out, if possible, the reason. This may lead to an interview later; it may be a reason, such as "not interested" or "too busy," which implies merely that the customer's interest has not been aroused. The essential duty of the salesman is then to use some phrase or statement which will arouse interest and possibly prompt a question.

Arousing Interest. An effective way of doing this is to refer to the article for sale in terms of what it will do for the customer, such as (for a vacuum sweeper) "something that means a clean house without a tired back."

In order to arouse interest the salesman should give definite, specific information. Demonstration should be used. The customer should, if possible, be allowed to handle the article. The salesman himself should handle it in a manner showing his appreciation of its value. His expressions should be positive. He should aim to get the customer to agree to favorable statements. The article should always be displayed to the best advantage and without any objectionable features.

Creating Desire. It is obvious that the sales talk should be adapted to the customer, particularly in appealing to buying motives whose potential existence may be inferred from the customer's words and actions. In making such appeals, the salesman should make his talk definite and vital. Vivid figures of speech and analogies from common experience should be used in order to paint a clear word picture of the article *with the customer in the picture.* Possible objections should be forestalled by statements which answer them in advance.

Closing the Sale. In order to impel action in closing a sale it is necessary to eliminate any reasons for delay. These usually take the form of objections. In meeting any objection, the salesman should first agree with it by taking the customer's point of view and then proceed to turn it to advantage as an argument for buying—a process requiring considerable study and skill. The chief sales points should then be summarized. The points to which the customer agreed should be referred to by the salesman, who should then suggest a decision and get the customer to agree.

Most customers, even when convinced of the desirability of buying, need help in making up their minds. This trait of human nature makes it necessary for the salesman to assist the customer toward a favorable decision. He must act with tact, however, and in no case appear to be forcing a decision. But his attitude should always be one of confident expectation. One form of positive suggestion is to begin filling out the order blank. Another effective

method is to take advantage of a favorable question asked by the customer, which can reasonably be assumed to be a favorable decision. Or the salesman may ask a question, such as "Do you prefer style A or style B?" A preference for either may rightly be interpreted as a decision to buy. It is a prerequisite to the effective use of such closing steps that the customer has already been convinced by the sales talk.

Salesmen. Whether they be clerks in a retail store or traveling salesmen of a manufacturer, salesmen are the representatives of their firm to its customers. They are the men and women on the firing line; by their actions, words, and manner, the firm gains good will and success or the reverse. The selection of salesmen, therefore, is a matter of prime importance to the firm.

The type of salesmen most likely to be successful in a given organization differs according to the needs of individual firms. If the sales appeal for a product is merely economy in purchase, order takers are adequate salesmen; if the product is highly technical, trained engineers must be chosen. Certain qualities, however, are desirable in the salesman of practically every organization.

These qualities can, for the most part, be consciously acquired. In the aggregate, they constitute what is sometimes known as "personality." From the standpoint of the salesman, it is important to recognize that the acquisition of "personality" is a matter of definite technique. The rules must be learned and the necessary effort must be spent to master and apply them.

Qualifications for Salesmanship. The primary qualification for salesmanship is *health*. Its value is not only negative, in avoiding loss of time, but positive in heightening vigor and imparting a spirit of accomplishment. Customers prefer dealing with healthy, energetic people.

Clothing should be suitable. That is, it should not attract attention away from the salesman or from his product. Scrupulous care should be taken that one's person is unobjectionable from the standpoint of hygiene and cleanliness.

Confidence in Product. If health is the primary qualification for salesmanship, the *fundamental* qualification is the salesman's belief in the superiority of his product. Upon his conviction that he is giving the maximum value for the customer's money rests his power of convincing the prospective buyer. It is, therefore, of the utmost importance that the salesman's employer should take all necessary steps in advance to convince the salesman of the sterling value in the product which he will offer for sale.

With this purpose many firms train their salesmen, giving them a detailed knowledge of their product before permitting them to interview customers. This training involves an analysis of the product, as already explained, and a thorough inculcation of the advantages of the product from the point of view of the user. When the salesman is genuinely inspired with confidence in his product, he will instinctively avoid making his statements in a negative fashion. Confidence begets a straightforward, positive manner of speaking, which contributes powerfully toward building up the customer's confidence in the salesman and in his product.

Self-Confidence. The greatest foe of success in salesmanship is an apologetic attitude. In securing an interview and in the first few minutes of talk, such an "inferiority complex" is an almost fatal handicap. In every stage of the sales process, it militates against his success. The salesman's attitude should be one of confident expectation. He should look and act like the kind of person who ought to talk with the prospect. In fact, a large part of developing sales ability is the developing of one's character, caliber, and personality. These appear in a dignified and courteous manner, but their root and foundation is self-confidence and a proper appreciation, on the salesman's part, of his own worth and the importance of his service.

Enthusiasm is one of the prime requisites in a salesman. It may be defined as an intensity of feeling based on confidence in the goods sold and a thorough appreciation of their value to the public. Of the impulsive type of enthusiasm and that which takes the form of quiet but earnest conviction, the latter is in general much more effective.

Sincerity and Honesty are also basic requirements of permanent success in salesmanship. The customer, if he is to buy, must be inspired with confidence in the salesman, in the firm he represents, and in the product offered. In no case should a customer be misled. If it is necessary to admit a fact which will not promote the sale, this should be done, but the customer's attention should immediately be drawn to other features—the merits for which the product sells.

Tact and Courtesy are among the most powerful means of controlling other people. A tactful person never acts merely as he feels; he adapts his actions to the point of view of those with whom he deals. This requires imagination and self-control, but it is one of the surest means of influencing a customer in the direction of a sale. Mistakes by customers offer frequent opportunities for tact, since people do not like to be told directly that they are wrong. A tactful salesman never contradicts the customer but differs with him in a way that does not antagonize. It is the part of tact also to leave a customer in a friendly mood whether a sale has been made or not.

Cheerfulness is an asset of great value in salesmanship. It communicates itself infectiously to the customer, who is thus in a frame of mind more favorable for purchase. Cheerlessness, on the other hand, is a sign of indifference. It indicates a lack of pleasure in the customer's presence, and operates as a direct deterrent to a sale.

Memory, properly cultivated and used by the salesman, is a valuable factor in establishing confidence and good will in the mind of the customer. It enables the salesman to exhibit an impressive familiarity with every aspect of his product. In calling his customers correctly by name, also, he makes a telling appeal to their self-esteem. Concentration, effort, and practice are the price of a good memory.

Courage, as applied to salesmanship, is mainly the ability to resist the psychological effects of failure. The correct attitude for the salesman to adopt toward failure is a determination to learn what lessons each failure has to teach in order that he may be successful under similar conditions in the future. To preserve this attitude calls for no small amount of courage, and, in the beginner, for a freedom from self-consciousness. The time when it is most urgently needed is at the outset of one's selling experience. Among its finest rewards is a heightened confidence of the salesman in himself.

Mental Alertness. This is the quality which chiefly distinguishes a good salesman from an indifferent salesman. It is the power to grasp the essential elements of sales problems. It includes the ability to sense the potential motives of customers, to meet objections before they arise, and to turn seeming objections to practical advantage. The mentally alert salesman is able to learn, to recognize and analyze new situations, and to note new ideas which can be passed on to his employer. He is ever on the lookout for fresh, vivid ways of making his points, painting, as it were, a picture in the minds of his customers which will impel their favorable action. He is a student of advertisements and of the most effective business practices. Through mental alertness the salesman achieves his greatest triumphs and attains to an importance in his business which forces recognition.

MASS PRODUCTION

This term, although apparently signifying mere quantity production, is used to designate a method of manufacture by which the principles of power, economy, accuracy, system, continuity, and speed are co-ordinated in large-scale production of a commodity. A necessary condition for its employment is actual or potential mass consumption, and this in turn implies a well-organized system of distribution, based on advertising and salesmanship. A still more basic condition for the employment of mass production is a high state of technological development in transportation, manufacture, automatic control, and many other fields. This condition was lacking prior to the 20th century. Hence mass production, in its special modern sense, was unknown until recent years.

Rise. In the sense of quantity production, of course, mass production dates back to mass enterprises, such as the building of the pyramids. Quantity production by machinery occurred with the introduction of nail-making machinery in the latter part of the 18th century. The efficiency studies of Frederick W. Taylor, carried on from 1885 to 1900, prepared the way for modern mass production, the possibilities of which were first demonstrated by an industry which grew up since 1900—the manufacture of motor cars. The automobile built by earlier processes of manufacture necessarily sold at a price beyond the reach of all but a very few. A sensed potential demand for individual transportation induced early makers to develop a system by which, through the production of a large number of units, sufficient economies could be effected to lower the price radically. By lowering the price, they vastly increased the number of possible purchasers, thereby preparing the way for still further economies, lower prices, and wider markets.

Essential Elements. The keynote of mass production is simplicity in the operations performed by each worker. This involves the breaking up of operations into their simplest constituent parts, each of which is performed by one man or one machine. Each worker has his work and materials delivered to him, usually by a conveyor belt. He is thereby enabled to employ his entire time in the repeated performance of one simple operation.

In accomplishing this result, the most careful planning is necessary in order to insure the orderly progression of the commodity through the shop. This may be illustrated by the process of making an automobile spring, as summarized from an account by Henry Ford in the *Encyclopædia Britannica*.

Typical Operation. (1) A strip of rolled steel is placed in a punch press for cutting and piercing. The cut and pierced piece is dropped on a belt conveyor to a series of heat-treating ovens. (2) It is transferred to another conveyor which carries it through the ovens, kept automatically at the required temperature. (3) It is transferred by tongs to a bending machine, which gives it the requisite curve and plunges it into an oil bath, kept automatically at the correct temperature. (4) It is taken out to air cool. (5) The leaf is drawn through molten nitrate, kept automatically at the right temperature. (6) It is inspected. (7) At this point other production lines converge, each of which produces a spring leaf of a single size and shape. One of each kind is then taken, and they are assembled into one spring by the insertion of a bolt. (8) Another workman puts the nut on the bolt and tightens it. (9) The right- and left-hand clips are put on, and the burrs are ground off. (10) The spring is inspected. (11) It is placed on a conveyor. (12) It is sprayed with paint and carried back over the heat-treating ovens to be "force dried." (13) The conveyor carries it to a loading dock, where it is removed, and ready to be fed into the assembly line from which a completed automobile eventually emerges.

From this example it may be seen how the fabrication of a very simple article, which under earlier systems could be made by one man, requires a considerable number of men and expensive machinery, including highly accurate measuring devices and heat control instruments. In addition to the specific operations mentioned, supplies in the correct quantities and at the right times must be forthcoming—steel at stage (1), heat at (2), power and oil at (3), molten nitrate at (5), bolts at (7), nuts at (8), clips at (9), and paint at (12). But each finished article is an almost exact duplicate of all others, having a standard quality, and the number produced is huge in relation to the number of workers engaged. The machinery may be used continuously without periods of idleness, and there are also obvious economies in the use of materials.

This example has been chosen from the automobile industry because it was here that the system was first developed. But the manufacture of most products has not been modified by these principles.

Effects. Apart from its economies and the establishment of standard quality in articles, mass production may be credited with having multiplied manyfold the potential productivity of the world's manufacturing industry. In many instances productive capacity far exceeds visible consumer demand. The result has been to shift the emphasis of economic effort from the building up of productive capacity to the stimulation of consuming capacity. It has therefore become to the advantage of industry collectively that labor should receive as high wages as are economically feasible in order that its purchasing power may be increased. A further outgrowth of the need for increasing consumer demand is the large-scale growth of consumer credit, enabling those on small incomes to buy more expensive goods on small payments.

The effect of mass production on the workers is to decrease the mechanical skill required of the average operator and increase the demand for skill in management, planning, designing, and marketing. Since far fewer workers are required for a given amount of production, the extension of the system creates so-called technological unemployment.

Technological unemployment is offset, however, by the creation of new types of employment, as society adapts itself to the new conditions. Cheaper automobile production, for instance, led to a need of better roads, thereby creating a demand for labor in their building and upkeep. Low-priced trucks made transportation by trucks feasible, and produced a large demand for truck drivers much greater in number than would be required for hauling the same tonnage of freight on the railroads.

The pressure for markets to absorb the products of mass production has created employment for a larger number of salesmen, advertising specialists, commercial artists, business analysts, economists, style experts, merchandisers, and numerous other workers charged with co-ordinating production and consumption. Consequently, the actual cost of manufacture usually represents a very small fraction of the retail price of any article.

Some critics maintain that the spread between the manufacturing cost and the retail cost is an unjustifiable waste in the economic system. Others point out that it is largely inevitable, since the cost of manufacture could not be lowered without the services of those who create extensive markets for the manufactured goods. Whatever the merits of these arguments, the fact remains that, between 1920 and 1930, employment in service industries increased much more rapidly than total employment. Total employment in the United States increased by about 17 per cent. The increase of employment in manufacturing was small, about 11 per cent, but in services of all kinds, employment rose by more than 40 per cent.

POWER

The satisfaction of human needs rests fundamentally on labor. Consequently, the more labor procurable at the least cost in human energy, the greater is the human energy set free for other purposes—for the enjoyment of leisure, for progress, for civilization. Past civilizations were built up and supported largely on the labor of slaves maintained at a subsistence level. Modern civilization rests on the utilization of mechanical power, which, in an ever increasing degree, is made to do work formerly done by human beings. Revolutionary changes in the development and use of power have done more than any other factor to raise the standard of well-being in the 20th century.

The application of mechanical power to human productivity multiplies the amount and the value of goods which each individual worker can produce. The following table, showing the estimated daily output of various kinds of workmen in the year 1800 and in 1925, brings home vividly the advantages created largely by the use of power-driven appliances.

ESTIMATED DAILY PRODUCTIVITY PER WORKMAN IN 1800 AND 1925

Product	1800	1925
Iron	500 lbs.	5000 lbs.
Lumber	100 bd. ft.	750 bd. ft.
Nails	5 lbs.	500 lbs.
Shoes	¼ prs.	10 prs.
Coal	½ ton	10 tons
Paper	20 sq. ft.	200 sq. ft.
Bricks laid	500	3600*

*By electric brick layer.

No degree of finality is to be expected of such figures as the above. They depend first on the degree to which various labor saving devices, available to an industry, are actually adopted by the industry. They depend also on the continued discovery of still newer devices, a process which, while going on constantly, is nevertheless very unequal and largely unpredictable. An example is the mechanical blowing of glass bottles, which almost overnight multiplied many-fold the output per man. The flour milling and automobile industries represent continuous and progressive advances over decades. The figures given are regarded as conservative. Their value is chiefly in illustrating the most fundamental fact in the evolution of our economic system—the multiplication of productive capacity by the development of mechanical power.

Early Sources of Power. The adoption of draft animals as a substitute for human labor was an extraordinary advance in the economy of primitive man. This change dates from prehistoric times. Draft animals performed heavy work on the farms, as well as providing power for transportation throughout the world during the entire period of recorded history. They were also employed by the Romans and later peoples in turning mills for grinding grain. Comparatively little additional progress in the utilization of non-human power was made until the invention of steam-driven appliances for pumping water in the late 17th century. The Romans, however, are credited with the first use of the water wheel to turn grinding mills. The wheel was connected with the mill stone by a horizontal spindle through the intervention of bevel gearing.

The water wheel of the Romans was introduced into various parts of Europe and into Britain. At the time of the Norman Conquest of England, 1066 A. D., two counties alone, Norfolk and Suffolk, had 500 mills driven by water power. Windmills were introduced from the East by the Crusaders.

Steam Engines and the Industrial Revolution. The 18th century is notable for the invention of the steam engine and for the beginnings of its application to industries, notably mining, textile and steel manufacture, and flour milling. This development occurred first in England, where, in the 19th century, an industrial society first began to take shape. Urban population increased rapidly. Despite recurrent crises of overproduction, unemployment, booms, and panics, British wealth grew rapidly, due to the fact that machines driven by steam multiplied the productive power of each laborer. Steam power at the same time was vastly increasing the facilities for transportation on land and sea. By the close of the century, Germany and Belgium had been largely industrialized, but the most striking transformation of all was under way in the United States.

The Early Twentieth Century. In 1900, the United States contained two-fifths of the steam railway mileage of the world—about 198,000 miles of track. The country's installed power, not used for transportation, was about 15,278,000 horse power, of which nearly two-thirds was used for manufacturing, the balance being divided almost equally between public utility plants and mineral production. For about 88 per cent of the power the prime mover was steam, that for the balance being practically all water power.

The beginning of the 20th century was notable for two developments in the utilization of power which were of fundamental importance.

The first was the adaptation to wide practical use of the internal combustion engine. The world is most largely indebted for this device to Nicholas Otto, who in 1877 developed the first successful engine of this type, and to Gottlieb Daimler, who in 1884 adapted this engine for use in road vehicles. In 1900, Rudolf Diesel exhibited at Paris the Diesel engine, a much more economical type, particularly for heavy uses. In the following quarter-century the internal combustion engine made possible the universal employment of the automobile for transportation and travel; it also led to the solution of the problem of air travel. In marine transportation, the Diesel engine made rapid inroads on the use of steam. By 1927, the tonnage of ships constructed with oil-burning motors exceeded the year's construction of ships equipped for steam propulsion. Petroleum, the chief source of the motive power for these engines, took its place with coal as one of the most indispensable of raw materials.

The second epochal development of the 20th century in the use of power was the wide utilization of electricity as a means of distributing energy and of making it flexible in application.

Dynamos and electric motors respectively are the instruments by which power is made to take the form of electricity and by which electricity is reconverted to mechanical energy. The principle governing these machines was discovered by Michael Faraday in 1831. Important improvements were made by Werner Siemens in 1854 and by H. Wilde in 1863. In the period from 1880 to 1900, electric railways were constructed in most of the principal cities. It was not until the 20th century, however, that the importance of electricity as a form of power was adequately realized.

Technical improvements in the steam engine, the internal combustion engine, and electrical machinery were largely responsible for the phenomenal growth of power used in the 20th century. Between 1900 and 1930, the total installation of horse power in the United States increased from 15 million to more than 68 million—over 350 per cent. These figures exclude the power used in transportation, yet in 1930 the horse power of automobiles and trucks was approximately equal to the total installed capacity of power used for industrial purposes.

The use of power and machines, however, is not the only cause of increased productivity. The morale of the worker, his interest in his job, has been a factor. Improved working conditions, better pay, etc. have increased his efficiency.

PRODUCTION OF ELECTRIC ENERGY IN THE U. S.*

Source: The Federal Power Commission

Year	Electric Energy Produced				Fuel Consumed in the Year		
	Total	Hydro	Steam	Internal Comb't'n	Coal	Oil	Gas
	1,000 Kw. hrs.	1,000 Kw. hrs.	1,000 Kw. hrs.	1,000 Kw. hrs.	Short tons	42 Gal. Barrels	1,000 Cu.ft.
1930	91,111,548	31,189,554	59,293,363	628,631	40,277,989	8,804,530	119,552,711
1935	95,287,390	38,372,154	56,144,412	770,824	32,714,761	11,256,565	124,117,769
1940	141,837,010	47,321,278	93,001,735	1,531,997	51,473,881	16,325,122	180,096,185
1942	185,979,476	63,870,575	120,478,951	1,629,950	66,256,667	15,235,851	235,208,023
1943	217,758,831	73,632,223	142,380,595	1,746,013	77,300,574	17,985,593	301,936,871
1944	228,188,844	73,945,184	152,327,495	1,916,165	80,083,539	20,862,171	358,783,574
1945	222,486,283	79,970,312	140,435,268	2,080,703	74,724,956	20,228,215	326,211,969
1946	223,177,783	78,405,973	142,412,240	2,359,570	72,196,730	36,315,871	306,941,565
1947	255,738,984	78,425,492	174,500,274	2,813,218	89,530,590	45,308,932	373,053,905
1948	282,698,214	82,469,742	196,928,034	3,300,438	99,586,341	42,644,869	478,097,093
1949	291,099,543	89,748,246	197,878,185	3,473,112	83,963,420	66,301,241	550,121,090
1950	329,141,343	95,938,317	229,543,366	3,659,660	91,870,770	75,420,490	628,918,834
1951	370,672,814	99,750,579	267,251,680	3,670,555	105,768,006	63,944,724	763,898,241
1952	399,223,620	105,102,458	290,384,847	3,736,315	107,071,241	67,218,426	910,116,741
1953	442,664,515	105,233,348	333,541,535	3,889,632	115,897,204	82,237,712	1,034,272,333
1954	471,686,354	107,068,508	360,834,386	3,783,460	118,384,671	66,744,754	1,165,498,360
1955	546,404,320	112,720,796	429,739,703	3,943,821	143,659,759	75,258,476	1,151,833,574

*These amounts, except as noted, relate to electric utility operations only, including both the privately-owned and publicly-owned utilities.

Electrification. Electricity is not a primary source of power, like steam, waterfalls, and gas engines. It is a means of making prime movers more useful. Through the generation of electricity by prime movers and the subsequent reconversion of this electricity into power through electric motors, primary energy can be used with greater flexibility in time and space. Power through electricity can be used *when* and *where* it is wanted far more readily than power delivered directly from steam engine or water wheel.

Not only may factories using electricity for power be located at points more advantageous for utilizing raw materials, markets, and labor, but electricity enables power to be used in private homes and on farms. This results in two chief developments of great social significance. First, labor in homes and on farms for the first time in the world's history may be largely freed from drudgery, thereby releasing an incalculable amount of human time and energy for other purposes. Secondly, factories need no longer be located in centers of congested population. New centers of industry may be semi-rural in character, with marked improvement in living conditions. Individual factories need not, as a rule, have their own power plants. Expensive and dangerous beltings and shaftings may be dispensed with. The control of machine processes is more exact and is effected with less labor.

Electricity has the further merit of being instrumental in turning power into other useful forms of service. The most obvious of these is light. The first electric lighting plant was established by Thomas Edison in Brooklyn, beginning operation on September 4, 1882. By November 1883, only 508 premises were wired for 12,732 lamps, none being in private homes. By 1937, about 21,500,000 homes in the United States were served with electricity, in addition to more than 4,000,000 commercial or industrial establishments. Since then, of course, millions of other homes and business establishments have been provided with electrical energy. Lighting now takes a variety of forms developed from the incandescent carbon lamp and the tungsten. Fluorescent lighting and neon lights have become quite common, the latter used especially for advertising purposes.

In addition to light, electric power is essential for the operation of telephones, telegraphs, and radio, where it results in the production of sound. As heat, it performs essential work in electric ranges, furnaces, irons, toasters, grills, and numerous other devices. As an agent of chemical change through electrolysis, it plays a necessary part in the chemical industry. Another important use is for the precipitation of dust from the air in factories. It is essential to the production of talking motion pictures. By facilitating automatic control of numerous processes, it releases an enormous amount

DIVISIONS OF INDUSTRY

Industry	Male	Female	Total 1950	Total 1940
Employed persons	40,510,000	15,715,000	56,225,000	44,888,000*
Agriculture, forestry, and fisheries	6,407,000	590,000	6,996,000	8,496,000
Mining	906,000	23,000	929,000	914,000
Construction	3,342,000	98,000	3,441,000	2,075,000
Manufacturing	10,930,000	3,641,000	14,571,000	10,568,000
Transportation, communication, and other public utilities	3,688,000	681,000	4,369,000	3,108,000
Wholesale and retail trade	6,999,000	3,551,000	10,550,000	7,546,000
Finance, insurance, and real estate	1,135,000	780,000	1,915,000	1,472,000
Business and repair services	1,230,000	183,000	1,413,000	891,000
Personal services	1,159,000	2,329,000	3,488,000	3,975,000
Entertainment and recreation services	412,000	141,000	553,000	420,000
Professional and related services	1,955,000	2,717,000	4,671,000	3,290,000
Public administration	1,837,000	652,000	2,489,000	1,406,000
Industry not reported	512,000	329,000	841,000	728,000

* Adjusted to exclude estimated number in armed forces living in continental U. S., originally included among employed persons in 1940 published figures.

of human labor. A remarkable instance of such control is found in three water reservoirs at Washington, D. C. These were equipped in 1928 with automata which would report by telephone the depth of the water on receipt of a telephone inquiry from the War Department. Finally, electricity has given the world automatic refrigeration and the control of atmospheric humidity through air conditioning.

Growth of Electric Power in American Industry. The first quarter of the 20th century witnessed the electrification of over three-fourths of American industry. The following summary presents the factual basis for this statement:

In 1899, the total horse power in electric motors was 492,936 out of a total of 10,097,893 primary horse power—4 per cent of the total.

In 1927, the total horse power in electric motors was 30,361,106 out of a total of 39,040,563 of primary horse power—78 per cent of the total.

In other words, electrification in American industry rose from 4 per cent in 1899 to 78 per cent in 1927.

In the same period the amount of power developed in factories and used directly without being transformed into electricity showed only a moderate increase, reaching a high point in 1909 (13,734,597) and steadily declining thereafter. On the other hand, electricity developed in individual factories increased from 310,374 horse power in 1899 to 11,216,111 in 1927—36-fold. Electricity used in the factory but developed in central stations increased from 182,562 horse power in 1899 to 19,144,995 in 1927—105-fold.

In the succeeding ten years the amount of electric power used by industry increased by 56 per cent while power in other forms dropped to an insignificant proportion of the total.

Electric Power in Other Countries. The output of light and power in the United States is more than half that of all the rest of the world combined. Norway rates first in per capita output of electric power, followed by Canada, Switzerland, and Sweden.

Chief Sources of Electricity. In presenting the available information on this subject, it must be remembered that for a substantial part of the electricity generated there are no authentic records. Every gasoline automobile, for instance, generates electricity for setting off the cylinder explosions and for other purposes. Motor ships generate electricity which in turn drives the propelling machinery.

Most electricity, however, is generated in central plants or by individual industrial concerns which report their production. Data based on these sources indicate that electricity in the United States is generated to the extent of about 35 per cent from water power and 65 per cent from fuels, mainly through the operation of steam. The principal fuels used are coal, oil, and gas. In 1950, approximately 23 per cent of the coal, 8 per cent of the oil, practically all the water power, and 11 per cent of the natural gas were consumed in the production of electric energy. In Canada most of the electric energy is produced by water power.

Conservation of fuel is a long-range motive for preferring water power to coal or oil as a source of electricity, yet immediate economic factors are necessarily the ones which determine the development of the electric industry. Chief among these factors are the location of mineral fuels and of water-power sites in relation to the centers of population. The cost of transmission of current rises rapidly with increase of distance, not only on account of the cost of transmission lines but through losses of energy in transmission.

In the United States, over 70 per cent of the hydroelectric resources are west of the Mississippi river, while the greatest industrial demand is in the East. On the other hand, coal is plentiful in the Eastern states. This situation, together with the plentiful supply of oil, is largely responsible for the greater use of fuel for developing electric power in the United States. In Canada, however, fuel is relatively expensive, and water power is available nearer the centers of population. Consequently, electric power in Canada is almost synonymous with hydroelectric power.

Electricity Generated by Fuel. Electric generating plants operated by steam are normally located in or near industrial centers, in order to be close to their customers and in order to have available a water supply for use in condensing steam as required by the turbine type of steam engine.

Unlike hydroelectric power, the output of steam-driven generators can be counted on at all times irrespective of season. Installations may be added, unit by unit, as the market requirements demand. On the other hand, operating costs are much higher than those of hydroelectric plants. More labor is needed, and fuel must be purchased. These items, however, admit of diminution through operating and other economies. Increased firing and boiler efficiency accounted largely for a reduction, throughout the United States, of over 75 per cent in coal required per horse power as of the years 1902 and 1940. Moreover, fuel oil and gas are often found to be still more economical than coal.

Hydroelectric Power. By this term is meant electricity developed by water power, usually through the medium of water turbine generators.

The first hydroelectric plant began operation at Appleton, Wisconsin, in 1882, a few weeks after the opening of Edison's electric lighting plant in Brooklyn. The Appleton plant had a capacity of 250 sixteen candle power lights. The largest hydroelectric generators include those at Niagara Falls, N. Y., where the units in operation include three 70,000 horse power turbines.

The economic advantages of hydroelectric power include the low cost of operation, since no fuel is required and very few men are needed to operate the plant. On the other hand, hydroelectric plants require a large initial investment, since complete installation for all requirements must be made at the outset, even though much of it may be usable only for a brief flood season or may not be required for years. It is often necessary also to construct dams and artificial water channels, and the power houses themselves must be more substantially built in order to withstand the surge of the water.

Tennessee Valley Authority. A new emphasis was placed on these and subsequent developments by the Tennessee Valley Authority act, approved May 18, 1933. Under this act, a government corporation, the Tennessee Valley Authority, was created not only for the purpose of improving navigation and controlling floods, but to generate and sell power with a view to determining the relative cost of public and private power operations. For this reason, the corporation (TVA) was designated by President Roosevelt as a "yardstick of power costs." The private utility industry bitterly contested the validity of the "yardstick," maintaining that the two costs were not on a comparable basis.

Another part of the TVA's purpose was declared to be the maximum utilization of electricity within its territory, this to be brought about partly by low promotional rates and partly by education of residents in the advantages of greater use.

The TVA operates in 40,600 square miles of territory drained by the Tennessee river. It comprises parts of seven states—Alabama, Georgia, Kentucky, Mississippi, Tennessee, and the Carolinas—and embraces an area inhabited by two million people, with an additional four million in territory within transmission range of its electric power. The corporation took over Wilson dam and proceeded to build many other dams in providing a 750-mile waterway, nine feet deep, between Knoxville, Tenn., and Paducah, Ky., where the Tennessee river joins the Ohio.

It develops electrical energy by both water power and steam. While much of its energy has been delivered to the Atomic Energy Commission, it has

also supplied 148 municipal and rural co-operative systems which have distributed billions of kwh to business industries and farms.

The TVA has been of great benefit to the state for flood control, cheap electric power, increased navigation and artificial lakes for recreation. In fiscal 1954, the TVA's power revenues were $133,948,000.

Municipal Power Systems. Prior to 1933, about 1750 municipalities operated their own electric systems as compared with 13,665 communities which were served by privately operated systems. Most of these municipal plants were small, however, and they generated little more than 4.5 per cent of total power produced. The largest included those in Los Angeles, Seattle, Cleveland, and Springfield, Ill.

With the establishment of the TVA and the building of large governmental dams in the Columbia basin and elsewhere, a powerful impulse was given to municipal power distribution. Numerous Federal loans and grants were made to local bodies for building or buying the necessary facilities, this being a means of finding a market for power developed at the dams.

In 1951, of a total of 370,673 electric power plants in the United States for public use, 301,845 were privately owned and 68,828, or almost 23 per cent, were publicly owned. Of the 68,828 publicly owned plants, 17,617 were municipally owned, 44,120 federally owned, and 6,204 were cooperatives. According to the U. S. Census, out of 94 cities with a population of 100,000 or over in 1945, 79 cities report revenues from municipal water works, 13 from electric power and light systems, 72 from gas supply systems, and 8 from transit systems.

The greatest publicly owned electrical system in the New World is that of the province of Ontario, Canada. The Hydroelectric Power Commission of Ontario generates electricity, which it sells to municipalities, these in turn retailing it. Wholesale and retail rates are set by the commission so as gradually to retire all capital costs and to vest ownership in the municipalities on a co-operative basis. The retail rates found sufficient for this purpose are among the lowest in the world, while per capita use of electricity under the system is among the highest in the world.

Transmission of Electricity. One of the chief advantages of electricity as a form of power is its ability to be transmitted long distances. In 1889, seven years after the construction of the first electric plant, it was a notable achievement to transmit electricity 13 miles at a pressure of 4000 volts. Today currents of 220,000 volts are frequently sent upwards of 250 miles by straightaway transmission.

High voltage transmission systems usually employ overhead conductors. These ordinarily consist of twisted strands of copper or of aluminum wire with steel cores, supported either by poles or steel towers with arms, to which the wires are attached through the medium of insulating porcelain plates.

High voltages used for long distance transmission are transformed to lower voltages at distributing stations and substations until the current is of the proper character for the ultimate user.

Interconnection of Electric Systems. This is frequently referred to as superpower, which may be defined as a system of hydroelectric and steam generating plants within a given territory interconnected into a power pool, which draws on the various generating stations according to their capacities, subject to the dictates of economy, and dispenses electricity to various communities according to their needs. The policy of interconnecting power systems took shape in the period 1917-1919.

The advantages of such interconnection may be seen from the fact that water power is subject to wide fluctuations. During the late spring and early summer, when the rivers are full, the requirements for power are reduced by the contributing factors of daylight, temperature, and the tendency of industry to relax. During the early fall, when these requirements are at their height, the rivers are at their lowest.

By the provision of supplementary steam plants, which may operate only when water power is deficient, a great reduction is effected in the need of reserve equipment. There is greater security against an interruption of service, and the system can use economically sources of power that might otherwise go to waste, such as gases from steel plants.

The Electrical Power Industry. By 1937, the electrical power industry in the United States represented a capital investment of about 12 billion dollars. Annual revenue exceeded 2600 million dollars. Municipalities also had invested more than 700 million dollars in electrical properties.

Operating companies in the United States which produce electric power are required by law to be local monopolies under the control of a state regulating commission. The standard method is to place each local monopoly under the regulation of a state commission charged with the duty of seeing that the service is adequate and that the prices are just and reasonable.

In the third decade of the 20th century, the control of electric companies was rapidly integrated into a comparatively few groups. This result was effected through holding companies, which acquired control through stock ownership. Such financial control was used to facilitate interconnection of systems, to raise capital for the operating companies, and to provide engineering and management services for them.

Critics charged that this control was responsible also for circumventing state regulation of rates, the criticism being based on findings in a six-year inquiry by the Federal Trade Commission. An attempt was made by Congress in 1935 to regulate holding company systems through enactment of the Utility Holding Company act. This measure places in the hands of the securities and exchange commission supervision over financial practices of interstate utility holding companies and their subsidiaries.

Electric Industry in Canada. The potential hydroelectric power in Canada is estimated at 33,617,200 horse power at ordinary six-month flow or 20,347,400 horse power at the minimum flow. Installations totaled in 1942 approximately 8,845,000 horse power. Capital invested in the industry represented about 1,564 million dollars, the annual gross revenue being approximately 152 million dollars. Over 70 per cent of all industrial and domestic power used is in the form of electricity.

The electrical industry of Canada presents two noteworthy features. One is its close association with the pulp and paper industry. Many pulp companies, having developed electricity in excess of their own requirements, found the sale of surplus current an increasingly important part of their business. The other noteworthy feature is the large part played by municipal and governmental bodies in the generation of electricity. More than one-third the electric power in Canada is generated by governmental units.

Power on Farms. The power available on farms in the United States is approximately equal to that available in the combined factories, public utility plants, and mines of the country—upwards of 60 million horse power. The horse power per capita at the service of those engaged in agriculture has exceeded that at the service of each wage earner in industry since 1870, with the exception of the period 1904-1914, when agriculture lagged behind industry in the adoption of mechanical aids to production.

In 1870 practically the entire non-human power on farms was in the form of farm animals. Even in 1900, they represented about 80 per cent of the available power, the remainder being steam engines, gas engines, and windmills. By 1923, however, according to estimates by the United States Department of Agriculture, mechanical power exceeded animal power.

INSURANCE

Few appreciate the enormous proportions attained by the insurance business. During 1940 the people of the United States paid in excess of $6,390,000,000 in premiums for insurance protection. At the close of that year various companies and institutions writing insurance in the United States held assets of about $36,000,000,000.

The real function of all insurance is the elimination of risk from our economic activities. Where such risk contemplates loss arising out of premature death, or out of injury or ill health to the person, the insurance may be regarded as belonging to the so-called "personal forms of insurance," that is, insurance pertaining to the person. This group contemplates life, accident and health, employers' liability, and workmen's compensation insurance, and in the aggregate represents about one-half of the premiums and eight-tenths of the assets referred to above.

Where the risk relates to loss of or damage to property, as distinguished from the person, the insurance may be classified conveniently under the heading of "Property Insurance." This group, representing approximately one-half of the total premium income from all forms of insurance, comprises fire, marine, fidelity and surety, title, and credit insurance, as well as a large variety of miscellaneous forms of insurance protection.

LIFE INSURANCE

Life insurance may be defined as being a "contractual arrangement, whereby, for a stipulated compensation called the premium, one party (the insurer) agrees to pay the other (the insured), or his beneficiary, a fixed sum upon the happening of death or some other specified event." With few exceptions, its real purpose is to indemnify the beneficiary for the financial loss suffered through the premature death of the insured.

Purpose and Extent. In the vast majority of instances, life insurance is taken for the purpose of protecting the family against the loss of the earning capacity of the breadwinner through an untimely death. But, in recent years, the business uses of life insurance have also shown a marvelous growth. Recourse is had mainly to the use of life insurance as a means of indemnifying business enterprises against loss arising out of the death of managers, business partners, or expert employees. In the average business enterprise such individuals are strategically important, and the removal of their managerial or technical skill through death may cause loss of the invested capital or serious impairment of credit.

To an increasing extent, also, business concerns are using the group form of life insurance, whereby large groups of employees are protected under a single policy for a stated amount for each employee, usually the equivalent of one or two years' wages.

An examination of the figures in the table entitled "Life Insurance in the United States" will make clear the extraordinary growth of life insurance in this country. Even as late as 1880, ordinary life policies numbered only 685,531 with a face value of $1,581,481,706, and industrial policies only 236,674 with a face value of $20,533,469. By the close of 1940 the number of ordinary life policies totaled over 38 million, representing more than 81 billion dollars, while industrial policies numbered about 87 million with a face value of about 21 billion dollars.

Within the last six decades, therefore, ordinary life insurance increased nearly 55 fold in the number of policies and over 51 times in the amount of insurance outstanding. Industrial insurance, as indicated by the foregoing figures, has enjoyed practically all of its growth in this limited period, the number of policies having increased from less than a quarter of a million to nearly 90 millions, and the amount of insurance from less than 21 millions to over 21 billions.

Group insurance originated within this period and grew to a total amount of over 15 billions.

From the standpoint of invested assets, life insurance has developed also to the very forefront of financial institutions. In 1880 the total assets of American companies amounted to less then $453,000,000. At the close of 1940, however, the admitted assets of these companies totaled nearly $30,000,000,000, an increase of some 68 fold.

To these enormous totals it is necessary to add the business of the numerous fraternal orders which write life insurance. At the close of 1940, according to best estimates, the amount of this type of insurance was about $6,282,000,000. It would seem, therefore, that the total life insurance then outstanding in the United States, combining the ordinary, industrial, group, and fraternal plans, was approximately $139,000,000,000. To this should be added some $3,000,000,000 more carried by the government for World War veterans. This total was equal to fully one-third of our aggregate national wealth, real and personal combined. These figures testify convincingly to the wide appreciation of the value of life insurance.

Basic Principles. Life insurance differs from other forms of insurance in one very vital respect. In other forms of insurance the contingency insured against may never happen, and, as regards the great majority of policies written, does not happen. Life insurance, however, protects against the event of death, which, under a whole-life policy, is a "hazard converging into certainty." It is, therefore, necessary to provide not only against the risk of death each year, but also "to accumulate a fund sufficient not only to meet a claim whenever occurring, but also to provide at the ultimate limit of human life an absolutely certain claim if one has up to that time been escaped."

To accomplish this purpose it is necessary to have life insurance companies base their premium charges upon a so-called mortality table, which indicates the yearly probability of death at various ages.

MORTALITY TABLE

Age	Number Living at Beginning of Designated Year	Number Dying During Designated Year	Yearly Probability of Dying	Expectation of Life
1	1,000,000	5,770	.00577	62.76
2	994,230	4,116	.00414	62.12
3	990,114	3,347	.00338	61.37
4	986,767	2,950	.00299	60.58
5	983,817	2,715	.00276	59.76
6	981,102	2,561	.00261	58.92
7	978,541	2,417	.00247	58.08
8	976,124	2,255	.00231	57.22
9	973,869	2,065	.00212	56.35
10	971,804	1,914	.00197	55.47
11	969,890	1,852	.00191	54.58
12	968,038	1,859	.00192	53.68
13	966,179	1,913	.00198	52.78
14	964,266	1,996	.00207	51.89
15	962,270	2,069	.00215	50.99
16	960,201	2,103	.00219	50.10
17	958,098	2,156	.00225	49.21
18	955,942	2,199	.00230	48.32
19	953,743	2,260	.00237	47.43
20	951,483	2,312	.00243	46.54
21	949,171	2,382	.00251	45.66
22	946,789	2,452	.00259	44.77
23	944,337	2,531	.00268	43.88
24	941,806	2,609	.00277	43.00
25	939,197	2,705	.00288	42.12
26	936,492	2,800	.00299	41.24
27	933,692	2,904	.00311	40.36
28	930,788	3,025	.00325	39.49
29	927,763	3,154	.00340	38.61
30	924,609	3,292	.00356	37.74
31	921,317	3,437	.00373	36.88

MORTALITY TABLE—Con.

Age	Number Living at Beginning of Designated Year	Number Dying During Designated Year	Yearly Probability of Dying	Expectation of Life
32	917,880	3,598	.00392	36.01
33	914,282	3,767	.00412	35.15
34	910,515	3,961	.00435	34.29
35	906,554	4,161	.00459	33.44
36	902,393	4,386	.00486	32.59
37	898,007	4,625	.00515	31.75
38	893,382	4,878	.00546	30.91
39	888,504	5,162	.00581	30.08
40	883,342	5,459	.00618	29.25
41	877,883	5,785	.00659	28.43
42	872,098	6,131	.00703	27.62
43	865,967	6,503	.00751	26.81
44	859,464	6,910	.00804	26.01
45	852,554	7,340	.00861	25.21
46	845,214	7,801	.00923	24.43
47	837,413	8,299	.00991	23.65
48	829,114	8,822	.01064	22.88
49	820,292	9,392	.01145	22.12
50	810,900	9,990	.01232	21.37
51	800,910	10,628	.01327	20.64
52	790,282	11,301	.01430	19.91
53	778,981	12,020	.01543	19.19
54	766,961	12,770	.01665	18.48
55	754,191	13,560	.01798	17.78
56	740,631	14,390	.01943	17.10
57	726,241	15,251	.02100	16.43
58	710,990	16,147	.02271	15.77
59	694,843	17,072	.02457	15.13
60	677,771	18,022	.02659	14.50
61	659,749	18,988	.02878	13.88
62	640,761	19,979	.03118	13.27
63	620,782	20,958	.03376	12.69
64	599,824	21,942	.03658	12.11
65	577,882	22,907	.03964	11.55
66	554,975	23,842	.04296	11.01
67	531,133	24,730	.04656	10.48
68	506,403	25,553	.05046	9.97
69	480,850	26,302	.05470	9.47
70	454,548	26,955	.05930	8.99
71	427,593	27,481	.06427	8.52
72	400,112	27,872	.06966	8.08
73	372,240	28,104	.07550	7.64
74	344,136	28,154	.08181	7.23
75	315,982	28,009	.08864	6.82
76	287,973	27,651	.09602	6.44
77	260,322	27,071	.10399	6.07
78	233,251	26,262	.11259	5.72
79	206,989	25,224	.12186	5.38
80	181,765	23,966	.13185	5.06
81	157,799	22,502	.14260	4.75
82	135,297	20,857	.15416	4.46
83	114,440	19,062	.16657	4.18
84	95,378	17,157	.17988	3.91
85	78,221	15,185	.19413	3.66
86	63,036	13,198	.20937	3.42
87	49,838	11,245	.22563	3.19
88	38,593	9,378	.24300	2.98
89	29,215	7,638	.26144	2.77
90	21,577	6,063	.28099	2.58
91	15,514	4,681	.30173	2.39
92	10,833	3,506	.32364	2.21
93	7,327	2,540	.34666	2.03
94	4,787	1,776	.37100	1.84
95	3,011	1,193	.39621	1.63
96	1,818	813	.44719	1.37
97	1,005	551	.54826	1.08
98	454	329	.72467	.78
99	125	125	1.00000	.50

The assumption is that the death rate of the future will be approximately that demonstrated by the past. Being given the age of the insured, the kind and amount of the policy desired, and the maximum rate of interest which the company will guarantee on its funds, it is possible to compute a premium based on the particular mortality table in use. That premium is known as the "net premium," and is intended to cover only the actual mortality cost of the company. To this "net premium" the company must add a percentage to cover expenses of operation and contingencies, thus giving the so-called "gross premium." This is the premium that is actually charged the policyholder.

Should the premium be found to be too large, owing to a more favorable death rate than was indicated by the mortality table, or because expenses are smaller and interest earnings larger than anticipated, the company may have agreed to return to the policyholder all or a portion of such gains in the form of a "dividend." When this is done, the insurance is known as "participating." When the insurance is "nonparticipating," the premium charged the policyholder is usually considerably smaller. This is due to the fact that the company, as distinguished from the policyholder, remains entitled to all the gains which may accrue.

While the premium may be increased from year to year as the age of the insured increases, this is seldom done. Experience has shown that life insurance, in order to be practicable, must be based on a uniform annual premium during the premium-paying period. Such a plan requires the company, during the early years of the policy, to charge a premium more than sufficient to pay the current cost of insurance. The excess portions of the annual premiums are thus accumulated in a fund, known as the "reserve." This will be drawn upon in later years when, owing to the increasing hazard connected with increasing age, the uniform annual premium becomes insufficient to meet the current cost.

When considering a large number of policies, the reserve (the overcharge or unearned premium) may be defined as representing that "sum which, together with future premiums paid by policyholders, will just enable the company to meet its claims according to the mortality table in use." Accumulation of such a reserve fund is fundamental to any sound plan of life insurance. Its absence in the past has been the cause of failure of many insurance institutions. Even today, it is the one great distinguishing feature between the sound and the unsound. It is for this reason that all regular life insurance companies are required by law to operate on the so-called "legal reserve basis."

Who Can Be Insured. Unlike the various kinds of property insurance, life insurance has not been construed by the courts as furnishing contracts of indemnity for loss suffered. It is well settled in the law that an individual possesses an insurable interest in his own life to an unlimited extent. Likewise, the insured may make his life insurance payable to his own estate, or to any beneficiary he may choose to name.

In view of the above ruling, it is necessary for insurance companies to protect themselves against the acceptance of risks which are either substandard in quality or which involve amounts of insurance greatly out of line with the earning capacity of the applicants. The protection needed is secured in several ways. A medical examination of the prospect is invariably required in the case of individual applicants. This precaution may be dispensed with when employers insure a sufficiently large number of employees under a single "group policy." The prospect is required also to give true answers to numerous questions, relating to his health, family history, habits, and other points, contained in the application for his insurance. Where the insurance applied for is apparently too large, inquiry will also be made into the financial status of the applicant.

The problem of providing insurance for substandard applicants is receiving careful study in insurance circles. It is recognized that applicants for insurance are by no means equal in the quality of the risk involved. Numerous features, involving occupation, state of health, nationality, stature, weight, family history, and various other points, need to be considered if due allowance is to be made for the actual merits of the case. It is now felt that substandard lives should be given the benefits of life

insurance, although at premiums sufficiently increased to meet the additional hazard associated with the substandard character of the applicant.

Who May Be a Beneficiary. As already noted the insured has an insurable interest in his own life to any extent. Further, in the absence of policy conditions to the contrary, he may name his own estate, or any individual he chooses, as beneficiary. But what is the situation when the insurance is taken out by a person other than the one insured?

Here we unfortunately meet with a great variety of judicial decisions. With respect to ties of affection, blood, or marriage, the courts have generally held that certain of such ties create an insurable interest even though the element of financial dependence is not present. The weight of authority holds that a parent has an insurable interest in the life of a child. Husband and wife are conclusively presumed to have an insurable interest in each other's life.

As regards all other relations, however, the courts have generally taken the position that the interest of the beneficiary, when taking out the insurance, must be based upon a reasonable expectation of deriving pecuniary benefit from the continuance of the insured's life. The weight of legal opinion is to the effect that the insurable interest of a beneficiary taking out insurance "must exist at the time the contract is made and that a policy valid at its inception will not, therefore, be voided if it should happen that the interest ceases before the maturity of the contract, unless the provisions of the policy are such as to bring about that result."

A creditor has an insurable interest in the life of a debtor. This interest has been held even to survive a discharge of a debtor in bankruptcy. The only question about which there is variance relates to the amount of insurance, as compared with the amount of the debt, which the creditor may obtain on the life of the debtor.

Three important lines of judicial decisions relate to this matter. One (exemplified by Pennsylvania) limits the creditor's right to insure the life of the debtor to "an amount equal to the debt plus all premiums payable during the life expectancy of the insured according to the Carlyle Table, together with interest on the debt and premiums." Another (adopted by the United States Supreme Court and by New York) indefinitely limits the insurable interest of the creditor by providing that "the relationship between the amount of insurance and the amount of the debt must not be so disproportionate as to make the policy take on the appearance of a wagering contract as distinguished from its legitimate purpose."

Still another line of decision (exemplified by Texas) allows the creditor to secure all the insurance he may wish to take on the debtor's life, but limits his recovery, in case of the debtor's death, "to the amount of the debt and the premiums plus interest thereon, the balance, if any, passing to the debtor."

What Type of Policy to Select. When considering the leading types of policies—term, ordinary life, limited-payment life, and endowment—the average applicant unfortunately gives too little thought to the importance of making the proper selection. No one type of contract serves all persons equally well. In every case the applicant's special circumstances should be considered by the salesman, and the insurance recommended should be such as will meet the needs of the prospect.

The size of the premium varies greatly with the kind of policy, depending mainly on the extent to which a savings fund is provided for in addition to the current cost of protection. When a term policy grants protection only, and contains no savings fund accumulation, the premium outlay is small. The company's promise is limited to $1000 in the event of death during the term, nothing being paid in case of survival. The whole life policy, on the contrary, promises, not only $1000 upon death at any time, but also the same amount upon survival at age 96. As compared with short term policies, it represents a gradually increasing savings fund, thus requiring a higher premium to be paid throughout life.

The limited-payment whole life policy resembles the ordinary whole-life contract in every respect, except that premium payments are limited to a term of years, like 20 years, instead of being continued throughout life. Since the liability is the same under the two contracts, the insurance company must collect the same amount, considering an assumed rate of interest. If all payments are, therefore, completed within 20 years, as under a 20-payment life policy, the premium rate must necessarily be higher than when the payments continue indefinitely for life. As distinguished from the above, endowment insurance—using a 20-year endowment for illustrative purposes—promises $1000 upon death during the 20-year term as well as an equal amount upon survival at the end of the term. Since this policy involves, in addition to the term insurance, a rapidly increasing savings fund (amounting to $1000 in 20 years), the premium must be correspondingly large. The difference in cost between the aforementioned types of policies may be illustrated at age 25 with the following rates charged by a certain company per $1000 of insurance: 10-year term, $11.34; whole-life, $19.00; 20-payment life, $24.16; and 20-year endowment, $44.82.

Owing to the low premium, term insurance gives the largest protection for the smallest possible outlay. It, therefore, meets the insurance needs of the young man with a small income and with a family on his hands. Here no surplus earnings exist to pay for the accumulating savings fund under other types of policies. Even where there is some small surplus, it may probably be used to better advantage in the profession or business, as yet in the formative stage. Moreover, in the average man's family there is a peculiarly hazardous period, the child-raising period, when the death of the income producer proves a calamity. Accordingly, many who carry a substantial line of higher premium insurance supplement the same with additional 10- or 20-year term insurance to cover the period mentioned. The total insurance is thus substantially increased without undue strain.

The essential purpose of term insurance is to protect a *known temporary hazard*, under conditions when no other form of policy can be purchased in adequate amount. Its great disadvantage lies in the fact that the temporary nature of the hazard may be misjudged. At the expiration of the term policy, insurance protection may still be needed, and yet be unobtainable because of inability to meet the medical standard. For this reason term policies usually contain a convertible privilege, allowing the policy to be converted into a higher premium form within a designated number of years. Holders of term policies should make every effort to thus

LIFE INSURANCE IN CANADA

Millions of Canadian Dollars

	1948	1949	1950
Insurance in Force:			
Ordinary	$ 9,847	$10,770	$11,625
Group	1,814	2,150	2,583
Industrial	1,444	1,489	1,538
Total	$13,105	$14,409	$15,746
Benefit Payments:			
Death Benefits	$ 76	$ 82	$ 85
Matured Endowments	32	34	34
Disability Payments	4	4	4
Annuity Payments	6	7	7
Surrender Values	43	48	60
Policy Dividends	35	38	41
Total	$ 196	$ 213	$ 231
Income:			
Premium Income	$ 373	$ 402	$ 429

LIFE INSURANCE IN THE UNITED STATES

Insurance in Force, 1900–1950 (000 Omitted)

Year	Ordinary		Industrial		Total* *	
	Number of Policies	Amount	Number of Policies	Amount	Number of Policies*	Amount
1900	3,176	$ 7,093,212	11,219	$1,468,928	14,395	$ 8,562,140
1910	6,964	13,227,213	23,034	3,177,048	29,998	16,404,261
1920	16,700	33,454,814	49,805	7,189,852	68,205	42,281,391
1930	32,739	79,774,841	89,436	18,287,408	128,132	107,948,278
1935	33,374	71,963,295	83,971	18,297,543	123,924	100,730,415
1940	38,436	81,069,215	87,332	21,343,634	136,772	117,794,384
1942	42,159	87,125,338	91,977	33,345,412	147,362	130,332,848
1943	44,425	91,776,904	96,224	25,571,118	154,616	140,308,683
1944	47,134	97,577,462	100,365	27,047,643	161,849	149,071,406
1945	50,172	104,456,034	104,098	28,496,958	167,338	155,722,778
1946	54,849	116,109,948	107,737	30,246,934	178,129	174,553,352
1947	58,586	126,205,585	109,506	31,493,252	187,064	191,263,881
1948	62,166	135,669,442	107,811	31,816,150	191,489	206,715,301
1949	65,316	144,457,931	110,249	32,982,432	199,866	220,515,545
1950	68,485	155,037,699	110,938	34,373,000	210,170	241,980,929

*Includes Certificates. Sources: Spectator Year Book and Institute of Life Insurance.
**Totals from 1920 include Group Insurance, which increased from 11,004,000 policies amounting to $15,381,535,000 in 1940, to 30,747,000 policies amounting to $52,570,230,000 in 1950.

Income, Payments, Assets, Liabilities, and Surplus, 1900–1950 (000 Omitted)

Year	Total Income †	Total Payments to Policyholders	Assets	Liabilities	Surplus††
1900	$ 400,603	$ 168,688	$ 1,742,414	$ 1,493,379	$ 249,035
1910	781,011	387,302	3,875,877	3,665,436	210,441
1920	1,764,213	744,649	7,319,997	6,989,309	330,688
1930	4,593,973	2,246,776	18,879,611	17,862,142	1,017,469
1935	5,072,095	2,535,113	23,216,496	22,219,729	996,767
1940	5,657,842	2,680,665	30,802,155	29,404,610	1,397,545
1944	7,010,715	2,527,928	41,053,974	38,318,020	2,735,954
1945	7,673,987	2,718,796	44,797,041	41,555,657	3,241,384
1946	8,067,772	2,848,256	48,190,796	44,885,131	3,305,665
1947	9,113,815	3,279,894	51,742,987	48,306,683	3,436,304
1948	9,751,215	3,602,100	55,511,882	51,802,925	3,708,957
1949	10,376,074	3,865,527	59,629,541	55,471,987	4,157,554
1950	11,250,000	4,150,000	63,984,000	N.A.	N.A.

N.A. — Not available. †Before 1947 the business of accident and health departments of life companies was not included. ††Special surplus funds, unassigned funds and capital funds. Sources: Spectator Year Book and Institute of Life Insurance.

convert their contracts within the indicated time. Moreover, term policies, since they contain no savings feature, do not inculcate the habit of systematic thrift. In the overwhelming number of cases, holders of such policies manifest great displeasure at not receiving something when the contract matures.

The shortcomings just noted with respect to term insurance are obviated by the whole-life policy. This represents *permanent* protection at a very moderate cost. It also combines protection with reasonable saving. Whenever possible, this type of insurance should be preferred to the term plan. Many who take term insurance could, through a little additional effort, pay the extra premium on an equal amount of whole-life insurance. Very many argue that they prefer to place the difference in premium in building and loan association accounts, or some other type of investment. Yet this seems inadvisable, even assuming the resolution is carried out, owing to the absolute security of the life insurance investment and the approximate return of 5 to 5½ per cent.

When the prospect's income permits, and when there is a temptation not to save or to lose the savings through foolish investment, limited-payment and endowment policies may be recommended. They represent compulsory saving with a vengeance, absolutely safe and at a fair return. Moreover, the limited-payment principle often enables the policyholder to meet his premium payments during the years of greatest income producing capacity. Even should a 20-year endowment policy not appeal, emphasis should be given to long term endowments, maturing at about age 65, or the age of retirement. This type of policy will mature for its full face value at that time, thus yielding a substantial sum for old age support. It may be questioned if the same amount would have been realized otherwise, owing to the general habit of human beings not to save systematically and to lose that which they may have succeeded in saving.

Methods of Paying the Proceeds at Maturity of the Policy. The proceeds of life policies may be paid either in a lump sum or in installments. In the latter case, commonly known as life income insurance, monthly installments are usually paid for ten or twenty years, irrespective of the life of the beneficiary and, therefore, as much longer as the beneficiary may survive the 10- or 20-year period.

The lump sum payment plan has little to commend it where the purpose of the insurance is to give an income to dependents. The fairness of giving 20 or 50 thousand dollars in one lump sum to a widow may well be questioned in these days of stock-selling ventures and the vast army of gold-brick specialists. The underlying purpose of life insurance is to *assure an income* to dependents *as long as needed*. This the lump sum payment method does not guarantee. The life income plan, on the contrary, "insures the insurance," and is just as necessary a form of protection to the beneficiary as the original insurance itself. It is insurance against foolish investment and reckless expenditure.

Under the life income plan the policy proceeds constitute an "insurance estate" administered by the insurance company. It relieves the beneficiary of all expenses of reinvestment, and of all exercise of judgment in the placing of investments and of their supervision thereafter. Administration of the insurance estate by the insurance company also compares very favorably with the administration of an estate through other channels. There are no legal contests between heirs, no legal expenses of administration, no income taxation, and no fluctuation in either the value of or the income obtained

from the estate. Moreover, there is no danger of loss of the principal. Other trustees can only be held for failure to exercise due diligence and care. The insurance estate, however, is not a segregated trust, and in the event of unfortunate investment the insurance company assumes full responsibility.

Disposal of Policy before Maturity. In very many instances, however, life insurance policies terminate by lapse or surrender instead of by death. Various circumstances may be responsible for this, such as inability to pay premiums, death of the named beneficiary without leaving other dependents to be protected, or impairment of the insured's health to such an extent as to make further payments of premiums inadvisable in view of the "extended insurance option" granted by the policy.

Cash or Loan Value.—When a policy terminates by surrender, the insured has the option of selecting any one of a number of "guaranteed values," set forth in the contract. One of these values is called the "cash" or "loan value." This value represents the amount of the reserve value of the policy which may be borrowed, if it is intended to keep the policy alive, or which may be taken in cash, if the policy is to be terminated. Usually, such a value is granted after the third annual premium has been paid. The amount, however, will not represent the full reserve value, in most cases, until a considerable number of years have elapsed. Usually, the full reserve value is given or loaned after the payment of ten annual premiums.

Paid-up and Extended Insurance.—Instead of the cash value of the policy, the insured may, upon terminating his policy, take either "paid-up insurance" or "extended insurance." The "paid-up insurance" represents that amount of insurance which may be purchased with a net single premium equal to the amount of the cash value of the policy. "Extended insurance," on the contrary, means insurance of the same kind on a term basis and for the original amount for as long a period as may be purchased with a net single premium equal to the cash value at the attained age.

In a typical case, the cash value of a $10,000 20-payment life policy at age 35 amounts to $682 at the end of the third year. Instead of taking the $682 in cash, the policyholder may obtain $1540 of paid-up whole-life insurance, or $10,000 of extended term insurance for a period of 7 years and 334 days. In other words, all three of these options are mathematically equivalent, assuming a given mortality table and a stipulated interest rate. Aside from these options, many companies give the insured, upon termination of his policy, the privilege of utilizing the cash value to purchase an annuity, or some other type of life insurance contract.

Industrial Insurance. As its name implies, industrial insurance is a form of life insurance especially adapted for wage-earners. Its purpose is to enable the large industrial portion of our population to have the funds necessary to meet the expenses connected with medical attendance during their last illness and to assure a decent burial. But, while these are its special purposes, industrial insurance has proved a great educator to the masses in that it has conveyed a proper appreciation of the value of ordinary life insurance.

The remarkable development of this special form of life insurance has already been indicated. Owing to the comparative poverty and to the lack of thrift among this type of policyholders, small premiums of 5 cents or multiples thereof up to 70 cents are collected weekly through personal calls at the homes of the insured. The amount of insurance is "adjusted to the unit of premium." We thus refer in industrial insurance to 5-, 10-, or 15-cent policies. The amount of insurance obtainable for such units of premium, however, will vary according to the age of the insured. Unlike ordinary life insurance, industrial policies attach to every member of the family, including children.

With the exceptions just noted, industrial insurance is based on the same general principles that serve as the foundation for ordinary life insurance. The legal reserve basis is used and the contracts contain practically all of the leading provisions found in regular policies. Premiums are calculated upon an actuarial basis, although a different mortality table is necessary to indicate the higher death rate that prevails among this type of policyholders.

Group Insurance. This form of insurance was introduced in 1911. It is designed to enable an employer to insure employees under one policy. The employer holds a master policy, which covers the employees insured, and each of the employees so insured holds an individual policy. The premium may be paid entirely by the employer or its cost may be shared between employer and employee. A minimum of 50 employees must be covered in a group policy, although so-called wholesale policies are written covering from 10 to 49 employees. All group insurance policies are for term insurance. No medical examination is necessary. Consequently this is the only form of insurance which some people can obtain. For employees advanced in years, the cost is much less than for equivalent insurance in any other form. In case of the termination of employment, the holder of an individual policy ordinarily has the privilege of converting his insurance into some other type, on which, of course, he pays the premiums.

The employer ordinarily receives whatever dividends are paid on group policies. These may in some cases equal the amount the employer has contributed toward meeting the premium. If the dividends are less than the amount paid by the employer, the difference may be regarded as an increased wage payment or an investment in employee good will.

Fraternal Insurance. A very considerable proportion of the total life insurance of the country is carried by fraternal orders. These societies usually observe some ritual, and their government is purely democratic. With respect to insurance, their chief purpose has been to enable the members to secure protection at the smallest possible cost.

Owing to this desire, many of the societies ignored the "reserve basis" of life insurance and charged premiums wholly inadequate to meet the necessities of the situation as demonstrated by a mortality table. Numerous failures therefore occurred. This situation led to the adoption in many states of laws making it compulsory for the orders to employ the legal reserve basis. In case of such adoption new policyholders should no longer be confronted with the fear of insecure insurance. It is due in large part to the unhappy experiences of many people with fraternal policies that this form of insurance has not shared in the rapid growth which has characterized life insurance as a whole. Nearly 9 million persons owned life insurance policies in the fraternal insurance societies of the United States and Canada at the end of 1950. Their total protection in these policies was $8.8 billion, which was less than the aggregate 25 years.

Whereas an ordinary life policy is a definite promise to pay a stated sum in return for a fixed annual premium, the benefit certificate of a fraternal society has, in the past, merely recognized the holder's rights as a member in the society to share in its benefits if the same can be paid out of the assessments levied on the membership. With the adoption of actuarial methods, however, a fraternal benefit certificate can be made as definite a promise as an ordinary life policy.

Usually, the holder of a certificate can name as beneficiary only some member of his family, or other dependent recognized by the society, and for an amount not to exceed a limited sum like two or three thousand dollars. Many societies also extend to their members sickness and accident benefits.

HEALTH AND ACCIDENT INSURANCE

Just as life insurance serves to protect dependents against financial need through the death of the insured, so health and accident insurance are intended to protect dependents against a similar need arising out of the incapacitation of the insured through sickness or accident. For the average family this form of protection is indispensable. Industrial accidents are covered today in most states by Employers' Compensation Insurance. But the largest number of accidents do not occur in industry and must be covered by private insurance. Moreover, loss due to sickness is equal to many times the loss resulting from accidents of all kinds. It is estimated that about 250,000,000 working days are lost annually in the United States through sickness.

Various methods of granting protection against sickness and accident have been adopted by private insurance companies. Most life insurance companies grant protection, in the form of a monthly income for life, in the event of the total and permanent disability of the insured. But fully 97 per cent of all sickness and accident claims are for temporary disability. Many accident and health companies also issue "limited policies" at comparatively small premiums since the coverage is confined to a limited number of diseases or accidents and the compensation to a comparatively short period.

Much more adequate are the health and accident policies which are "general" in their coverage. These cover against disability from every variety of sickness or accident. They may be issued either separately or in combination, that is, be either health or accident policies or both.

Under accident policies a certain principal sum, like $5000, is paid in the event of death, the loss of sight, both hands, both feet, or one hand and one foot. Smaller sums are paid for the loss of one eye, or one hand, or one foot. Weekly or monthly compensation is also provided either for a definite period or for life, in the event of permanent disability, and a smaller compensation when the disability is only partial. Almost invariably all indemnities are doubled if the accident occurs on a public conveyance.

In health insurance no principal sum is paid in case of death, and the payments are limited to a weekly compensation for a stipulated period. Often, both health and accident policies provide for extra payments covering hospital and surgical expenses. Until recently all health and accident policies were subject to cancellation by the company. But recently various companies have undertaken to issue so-called "non-cancellable policies," which may be renewed from year to year at the option of the insured until a stipulated age is reached.

AUTOMOBILE INSURANCE

There are five different types of insurance which come under this head: liability, property damage, collision, fire, and theft.

Liability insurance is for the purpose of protection against legal claims arising from personal injuries or death caused by the use of a motor vehicle. The policy covers the person or corporation responsible for the operation of the car. It usually covers also any person whom the policyholder or the adult members of his family may permit to drive the car, provided the driver is legally licensed. The usual protection afforded by the policy covers the defense of all claims and suits for injury and the payment of any costs assessed against the insured, up to the limit of the policy, which is ordinarily $5,000 or $10,000. It covers also the repayment of money spent in providing immediate and necessary relief to the injured person at the time of the accident. In some states, liability insurance is compulsory.

Property damage insurance protects against losses incurred through damage done by use of the car to the property of other people. In case the damaged property cannot be used and its withdrawal from use imposes additional losses to its owner, these losses, assessed against the insured, are also covered by the policy. But the policy does not cover damage done to the car of the policyholder.

Collision insurance covers damage to the policyholder's car caused by collision with any other object, either moving or stationary. If the driver strikes a tree, the policy protects him no less than if he collides with another car. The amount which he can collect, however, is limited to the actual cost of suitable repairs or the actual value of the car at the time of the accident. Moreover, the accident must have taken place within certain specified geographical areas. Under many policies, no indemnity can be collected unless the damages are over a certain minimum amount.

Fire insurance on motor vehicles covers loss through fire or lightning on the body, machinery, and equipment of the car while anywhere in the United States or Canada. Rates depend on the car's use, construction, age, motive power, and protective devices.

Theft insurance is governed by the same conditions as fire insurance. The theft must be committed by some one other than a member of the policyholder's household or an employee. Rates are higher for lower priced cars.

EMPLOYERS' LIABILITY AND WORKMEN'S COMPENSATION INSURANCE

Although both relate to industrial accidents, the distinction between these two kinds of insurance must be kept clearly in mind. Employers' liability insurance has been defined as "indemnity to the insured and not insurance for the injured." This means that, with the exception of expenses incurred with respect to the handling of notices of accident, claims, and lawsuits, the insurance company is under no further obligation until the insured (the employer) has actually been obliged to pay money to the injured party by virtue of a legal judgment obtained in a court of competent jurisdiction.

Employers' Liability Insurance. The employers' liability policy covers "against loss from liability imposed by law upon the insured," and expressly excludes any workmen's compensation allowance, as hereinafter defined. Ordinarily, the face of the policy consists of two limits—so-called "first" and "second" limits—the first amounting to a maximum of $5000 in case of injury to one person as the result of a single accident, and the second to a maximum of $10,000 in case of injury to two or more persons as the result of one accident. The policy usually continues to run for a year and therefore covers succeeding accidents, each to the extent indicated above. The limits, moreover, may be arranged to suit the convenience of the employer, upon a proper adjustment of the premium charged for the regular limits just mentioned.

In most instances, the rate of premium represents a percentage of the employer's entire pay roll, and the aggregate premium payment is based upon an average of previous annual pay rolls for a designated period. At the end of the year, however, when the year's pay roll is definitely known, an adjustment is made. If, owing to poor business and resulting small employment, the annual pay roll happens to be less than the estimated one, the company returns a proportionate share of the premium to the insured. Similarly, if larger, the insured is obligated to the company for the payment of an additional premium, measuring the extent to which the actual pay roll exceeded the estimate.

Laws Formerly Adverse to Employee. Since employers' liability insurance indemnifies "against loss from liability imposed by law upon the insured," it is important to note the nature of the law of the particular jurisdiction under consideration as it governs the liability of employers. Prior to 1837, the common-law relation between employer and

employee was similar to the legal relation between strangers. Following that year, however, a vast mass of special law between employer and employee—so-called judge-made law—developed both in England and in America.

The adverse character of this law from the employee's standpoint is indicated by the following doctrines or practices: (1) the *contributory negligence doctrine*, which held that an employee must show his freedom from negligence, and cannot collect if he has failed to use reasonable care and if that neglect contributed to his injury; (2) the *fellow-servant rule*, which provided that an injured employee could not recover from the employer if the injury was caused by the negligence of a fellow servant; and (3) the *assumption of risk rule*, which was to the effect that "an employee entering employment is held to assume and consent to the ordinary and obvious risks incident to the employment."

With the increasingly harsh application of these rules, various statutes were enacted with a view to increasing the employee's protection. But this tendency was soon counteracted by the development of the "*contracting-out privilege*," according to which the employer could request his employees to contract away their rights under the law, thus relieving the employer of all liability in case of injury.

Under such a system of law it naturally followed that little financial redress was obtainable for injured employees. Criticism of the system was well merited, but should have been directed against the law itself, and not against the form of insurance which merely sought to protect against the law as it existed. The fault was with the system of law. This forced upon the employee the burden of proof and yielded substantial compensation to only a small proportion of injured employees. This system led also to excessive delay owing to the slow operation of court trials. These proved exceedingly wasteful, in time and attorneys' fees, to both employer and employee.

Workmen's Compensation Laws. In view of such shortcomings it was only natural that the public should demand a more definite and rational system of law with respect to employers' liability for industrial accidents. This was accomplished through the passage of so-called workmen's compensation laws. Within the decade 1910–20 practically every industrial state of the Union enacted such legislation.

While lacking uniformity in details, the various laws have a common purpose. All of the objectionable doctrines mentioned in the preceding paragraphs are abrogated. Employers who refuse to come under the act are compelled to take their chances in a court of law without the support of any of the aforementioned legal rules.

All features of administration are clearly defined and are designed to overcome the delay occasioned under the previous system. Specific payments are provided for each of the following: death, total disability, partial disability, or specific injuries. The compensation is based upon the wage of the injured person; and, in addition, in the event of death, upon the number and the degree of consanguinity of the dependents.

All compensation is paid in installments, in the same manner as the wages were payable, unless allowed otherwise by the authorities administering the act. All employers, if choosing to come under the act, are compelled to protect their legal obligation under the law through insurance. In most states, the insurance may be taken either with a state fund or with a stock or mutual company. In most instances self-insurance is permitted only when authorized by the administrative authorities, and may subsequently be revoked at any time. A few states make it compulsory to take the insurance in the state fund. Whatever insurance institution is selected, the policy must be based on the compensation law under consideration, and any provisions to the contrary are declared null and void.

FIRE INSURANCE

Fire insurance easily ranks as the most important form of indemnity in the field of property insurance. Property values in the United States, protected by fire insurance, are estimated as in excess of $150,000,000,000. Total annual fire insurance premiums collected in the United States have been computed as amounting to approximately $1,165,000,000. But, to measure the total cost of the fire hazard in this country, it is necessary to add the heavy cost involved in the equipment and maintenance of fire departments, and of fire-extinguishing and fire-retarding devices.

Purpose of Fire Insurance. Like other forms of insurance, fire insurance has for its fundamental purpose the "substitution of certain for uncertain loss." In this way, as regards a great and ever-present hazard, it serves to stabilize business, to reduce all costs to consumers, and to enhance production by eliminating fear of loss and by increasing initiative.

Fire insurance also serves as the support of commerce and of industry, in so far that it and its companion, marine insurance, are the basis of our whole credit system. The significance of this function becomes apparent when we reflect that fully 90 per cent of the world's business is conducted on credit, and that nearly all transactions involving goods, buildings, and ships, are confronted with the danger of ruinous loss through fire or marine disaster.

As has been elsewhere stated: "It can be shown in a hundred ways that fire and marine insurance have become absolute necessities of trade, without the assuring protection of which the large undertakings of today would be a gigantic gamble and would never be attempted if liable to miscarry through a single fire or marine disaster. As it is, enormous sums are borrowed on stocks and bonds and warehouse receipts; merchants sell their wares on credit; investors furnish millions for the upbuilding of vast industries supporting whole towns; capitalists make loans on buildings worth many times the value of the ground upon which they are built—all being willing to do this because they know that the insurance policy stands as collateral between them and loss."

Personal Character of the Contract. Fire insurance policies are personal contracts, that is, strictly speaking, they do not insure the property but the persons who own the same or have an interest therein. Two buildings may be just alike in all respects, except that one is owned by an honest person whereas, with respect to the other, the owner may be grossly careless or even inclined to profit from a dishonest fire. The importance of this factor cannot be overemphasized. Probably no other type of contract places one party (the insurer) so much at the mercy of the other (the insured). With reference to over-insurance, therefore, as well as the determination of rates, it is highly important that the insurance company should know the character of the owner of the property to be insured.

Nature of the Indemnity. The fire insurance contract is also one of indemnity for actual loss. Irrespective of any value stated in the policy, insurance companies are not liable for more than the "actual value of the property at the time of the fire." Any other rule might work the greatest injustice to companies, and might even result in fraud, owing to the constant and frequently great fluctuations in values as regards both buildings and goods. Should companies be obliged to pay the full face of the policy in the event of total loss, irrespective of an actually lower value, the policyholder would be enabled to profit from a fire. Such a result is contrary to the very idea of "indemnity," which "implies that the insured should be compensated for loss actually incurred, but should never find the insurance contract a source of profit."

Two other concepts, relating to the nature of the indemnity, should be mentioned. Only the loss of material values is indemnified, i. e., the fair cash market value of the property at the time of the fire. Sentimental values, such as those associated with gifts, documents, and objects of art, are not covered unless there is an express agreement to the contrary. In case of inability to reach a fair settlement with the insured as to the fair value of the property damaged or destroyed, the insurer is given the option, under the terms of the policy, of replacing or reconditioning the property. Moreover, in the event of agreement as to the value of all the property, damaged and undamaged, the insurer is given the option of settling at that figure and taking title to the undamaged portion.

Restriction of Liability. The company's liability is also limited to "loss or damage directly traceable to fire." Small fires, working through a chain of circumstances, such as charged wires and explosives, may result in enormous loss for which the insurer becomes liable. In all such cases the question is: "Is fire the real cause, and if so, is the sequence of events between the origin of the fire and the destruction of the property an unbroken one or has some outside force, such as an act of God, intervened to bring about or increase the loss."

Who May Insure. Since fire insurance policies are contracts for indemnity and not for profit, it follows that only those who have a pecuniary interest—an insurable interest—in the property under consideration have a right to insure. Insurable interest, however, has been given a very broad meaning by our courts. Eliott defines it as "every interest in property or in relation thereto, or liability in respect thereof, of such a nature that a contemplated peril may directly damnify the insured."

Such an interest does not necessarily imply ownership or even possession of the property. Thus insurable interest has been held to extend to the following: (1) custodians of property intrusted to their care, to the extent of their interest or liability, such as administrators of estates, agents in property held for the principal, assignees in insolvency, trustees, common-carriers, warehouse men, and commission merchants; (2) creditors or debtors, such as mortgagees, debtors with respect to property seized for debt, pledgees to the value of the property pledged, and those who have by agreement expended money on the property of others; and (3) those possessing contract rights depending upon the preservation of the property, such as consignees and consignors, contractors whose payment is deferred until completion of the contract, patentees possessing a right to royalties, and even insurers in the property they have insured.

The last illustration serves as the basis for the very important practice of reinsurance, whereby an insurance company may reduce its risk by reinsuring all or a part with other insurers, who, in turn, may again pass on a part of their risk to still other insurers.

Use of a Standard Policy. In probably no form of insurance is it so essential to have a uniform or standard policy as in fire insurance. Prior to 1870 there was an utter lack of uniformity, one form of policy prevailing in Boston and others in New York, Philadelphia, and other centers. To make the situation worse, certain companies undertook to enlarge their business by issuing apparently attractive policies. Other companies sought to defraud the insured through skillfully drawn policy clauses.

The first state to attempt a remedy was Massachusetts, which adopted a standard form in 1873, and later, in 1880, made the same mandatory for all companies writing insurance in the state. New York followed in 1887, and the so-called New York Standard Fire Policy, although improved from time to time, has been adopted as the standard in numerous other states. Even where not enacted into law, this policy is generally used by all the companies.

Standard policies, it should be noted, are necessarily drawn to meet a general situation, and cannot be designed to cover the numerous special needs surrounding the many different types of property or the various insurable interests therein. All such exceptional circumstances must be arranged for through so-called "endorsements" attached to the policy.

Coinsurance. With comparatively few exceptions, fire insurance is written subject to coinsurance. This means that the insured will have any claim paid in the proportion that the insurance taken bears to the insurance required. Stated in another way, the insured will have his claim paid in the proportion that he was willing to pay premiums.

For example, with a building valued at $10,000, let us assume that the insurance required is $8000 (80 per cent), that only $4000 of insurance was taken, and that a loss of $2000 occurred. Under the circumstances the $2000 loss is paid only in the proportion that $4000 (the insurance taken) bears to $8000 (the insurance required), or to the extent of only one-half, or $1000.

Usually the amount of insurance required is 80 per cent of the value, this percentage representing the proportion of the property value subject to destruction by fire. Where, however, the property is subject to total destruction, a 100 per cent coinsurance clause may be used. In other cases much lower percentages, as, for instance, 70 or even 50 per cent, are applied.

Where property appreciates materially during the term of the policy, it is highly important that the owner should correspondingly increase his insurance in order to comply with the coinsurance requirement. The purpose of coinsurance is to secure justice between property owners and to enable the companies to derive an adequate premium income. The overwhelming majority of fires result merely in partial losses. In most large cities, probably 80 per cent of the total fire loss results from fires that damage the insured property to only 20 per cent or less.

If the rate of premium is to remain the same, irrespective of the amount of insurance, and all losses are to be paid in full up to the face of the policy, it would follow that many owners, in their desire to evade their just share of the community's fire tax, would venture taking out just enough insurance to cover their probable partial losses. Yet the very factors which induce them to pursue this policy, such as good construction and nearness to a fire department, have already been considered and allowed for in a reduced rate of premium.

Moreover, many business men, owing to the demands of creditors or their own unwillingness to take reduced insurance, would be obliged to pay premiums on a large volume of insurance at an increased rate, because those taking little insurance are deriving in claims, on the average, more than they are paying for. Where it is not desired to scale down claims as the insurance decreases, the companies may agree to pay all claims in full, irrespective of the amount of insurance taken. This can be done by increasing the rate as the insurance decreases. The two plans may be adjusted to a mathematical equivalent. The latter method is usually employed in communities where the application of coinsurance is forbidden by a so-called anti-coinsurance law.

MARINE INSURANCE

This form of insurance represents in the United States approximately $110,000,000 of annual premium income on a total volume of insurance of $65,000,000,000, and has for its purpose the indemnification of interested parties "against loss, damage, or expense occasioned accidentally in connection with vessels, cargoes, and freight charges, through any of the numerous perils incident to transportation by water."

Extent of Field Covered. In recent years the coverage has become so broad as to make the term "marine insurance" virtually synonymous with "transportation insurance." In fact, the so-called "warehouse to warehouse clause," used in insuring cargo, covers goods from the time they leave the shipper's warehouse in the interior—through all the various stages of the journey, rail, truck, dock, steamship, and port of destination,—until they reach the warehouse of the consignee in the foreign country.

Perils Covered. Unlike fire insurance, marine insurance covers a multitude of causes of loss. To quote the policy, they include, among others, perils of the sea, men-of-war, fires, enemies, pirates, rovers, thieves, jettison, and barratry of the master and mariners. By endorsement the policy may also be made to cover loss, in the case of vessels, through explosion, damage to machinery and latent defects, and in the case of cargo, through theft, pilferage, nondelivery, and breakage. Under so-called "builders' risk policies" all hazards connected with the construction, launching, and trial trips of vessels are also covered.

Types of Losses Covered. Policies of marine insurance may vary according to the type of losses they cover. Marine losses are either "total" or "partial." Total losses, in turn, may be either "actual" or "constructive," the latter comprising those cases where the property has not actually been destroyed but where the cost of releasing or reconditioning is so great, as compared with the restored value, as to make the attempt financially inadvisable.

Partial losses may be classified as "general average," "particular average," and "salvage." General average has been defined as comprising "losses and expenditures which result from the sacrifice of any interest voluntarily made by the master of the vessel, in time of real distress, for the common safety of vessel, cargo, and freight, and which must be repaid proportionately by all the parties benefited." Any partial loss which does not meet this definition is regarded as a "particular average loss." "Salvage" represents the remuneration recoverable under maritime law by a salvor for saving property at sea.

"Full-form policies" cover all of the aforementioned types of losses. Often, however, contracts are limited to only "total" or "partial" loss, and sometimes to only certain kinds of partial loss.

CORPORATE BONDING, TITLE AND CREDIT INSURANCE

Among the many other types of property insurance, mention should be made of corporate bonding, title insurance, and credit insurance. A surety bond has been defined as a "written obligation to pay a sum of money under one or more expressed conditions, among which may be found negligence, breach of trust, disobedience of a law, failure to pay a judgment, failure to pay a debt voluntarily assumed, and other conditions under which losses may be sustained by personal acts." Hundreds of kinds of policies are issued by bonding companies today to meet every possible variety of obligation. Broadly speaking, however, these bonds may be classified as falling under fidelity, public official, court, license, franchise, permit, and depository bonds.

Title insurance, as defined elsewhere, "promises to protect the owner of real estate, or the lender of money thereon, against loss or damage, not exceeding the amount stated in the policy, sustained by reason of any defect of title assumed under the policy, or because of the unmarketability of the title or by reason of unknown liens or encumbrances against the property at the time the policy is issued."

Credit insurance has for its purpose "the indemnification of losses, coming within the coverage of the policy and exceeding the normal loss of the business under consideration, suffered by manufacturers and jobbers through the insolvency of their customers."

BUSINESS CRISES

It is a matter of common observation that business activity pursues a distinct course of expansion and contraction, prosperity and depression. This ebb and flow of the business tide has a certain rhythm or regularity. If conditions are prosperous, there is a buoyant demand, which causes prices to rise. This creates at first a larger margin of profit which in turn stimulates further production. New enterprises are undertaken. Old plants are extended and new ones are erected. Employment is good. A spirit of optimism prevails. Money is borrowed extensively to carry the growing business program. The movement seems to accelerate as it grows.

Negative Factors Working. Yet within this time of prosperity there are forces at work which are preparing a change. The price of raw materials rises as the demand grows, until at length it more than compensates for the higher price of the finished products. The rate of interest increases with the demand for capital until it reduces profits and curbs enterprise. The efficiency of labor diminishes as less qualified workers are added to the pay roll, while at the same time the wage rate continues to rise under the competition for new hands. Bank reserves are depleted until considerations of security require a curtailment of loans. Rents and other costs of doing business are augmented. Thus the momentum of business is checked.

The Business Crisis. A moment comes when the wave of prosperity seems to break. This is the *business crisis.* Orders fall off, loans are called, the interest rate rises as banks and other financial institutions protect themselves against prospective losses, employment suffers, wages drop, and the prices of commodities and of securities decline together.

The Panic. If the crisis is violent, it is called a *panic.* In such a case there is a sudden dislocation of business, a complete loss of confidence, and a slump on the exchanges. This abrupt reversal of the business outlook is accompanied by bankruptcies, runs on banks, cancellation of contracts, and other drastic readjustments. These may be accentuated by some striking disturbance such as the failure of a bank, a credit establishment, or some other large concern.

Fortunately, the panic is not a regular or a necessary concomitant of the crisis. But, whether it degenerates into a panic or not, the crisis is always succeeded by a period of depression. This too follows a regular course. During the depression, wholesale prices fall more rapidly than retail prices, prices of raw materials fall more rapidly than those of manufactured goods, while the fall in the value of securities generally precedes the actual decline of trade. New forces now enter in, which first retard and finally check the downward movement. Bank reserves grow larger, the interest rate falls, labor becomes more efficient, the costs of doing business decrease, surplus stocks are exhausted, and a fresh demand springs up. Confidence is thus restored, and trade revival passes once more into prosperity.

The Business Cycle. Here then we have the business cycle, from prosperity to crisis, and from the ensuing depression back again into prosperity. While there are minor fluctuations constantly occurring in business, and while each cycle differs in some respects from every other, they all reveal alike the rhythm and succession which has just been described.

Causes. The crisis is the most striking phenomenon of the business cycle. It is consequently the point on which attention has been focused. Many explanations have been brought forward to account for it, but it has to be noted that the crisis is really bred during the preceding period of prosperity. A great failure, such as the Knickerbocker Trust

affair, or a bad harvest, or a declaration of war, or any other untoward event, may precipitate a crisis, but that event usually determines merely the time and the manner of the crisis. The root cause of the crisis goes deeper. It works imperceptibly during the time of prosperity. If we should sum it up in one word, it is the word "over-speculation."

Modern business is necessarily speculative. In other words, it works always on an estimate or forecast of future conditions. Goods are produced ahead of the market, and the reward of successful anticipation of market conditions is profits. Costs are reimbursed often long after they are undergone. During the period of prosperity the stimulus of present profits leads to the hopeful anticipation of future profits. This anticipation acts on the delicate mechanism of prices, leading to higher values of commodities, higher wages, higher interest rates, higher costs, higher capitalization. This process cannot continue indefinitely. As will appear presently, wise precautions can be applied to modify the crisis—to prevent its more violent and disastrous consequences.

But the crisis itself is inevitable. Wherever speculation enters—and modern business cannot be conducted without it—there must be upward and downward movements. This may be in part attributed to business psychology, the contagious optimism stimulated by success and the contagious pessimism fostered by the failure of enterprise. These attitudes obviously affect the credit mechanism, the demand and supply of the resources which are the raw materials of enterprise. But the crisis has other than psychological causes. It is generated by the stresses and strains which develop within the expanding system. While the panic is a pathological affair, there must be a period of readjustment and repose before business can advance further, and the sign of the commencement of that readjustment is the crisis.

It is possible that there is a rhythm also in the process of nature, in the succession of good and bad harvests; and this has been claimed to be the foundation of the business cycle. One famous theory associated the business cycle with sun spots, the magnitude of these being found to vary according to a somewhat regular course, and this variation in turn being linked with weather changes. But the process of prosperity, crisis, depression, revival, and renewed prosperity, though certainly affected by all such outward changes, is inherent in the very nature of modern business.

Explanatory Table. In the examination of the table which follows, showing the important crises of the modern world, the above statements should be borne in mind. Under the heading "Special Causes," attention is drawn only to particular events which precipitated the crisis, it being unnecessary to mention in each case the general causes of over-speculation and its concomitants. Similarly, in the column headed "Special Consequences," no mention is made of the normal features accompanying and succeeding the crisis,—the fall in prices, slack trade, unemployment, and so forth—unless these features showed some special character worthy of notice.

Possibility of Control. In view of the serious consequences of the business crisis, it is worth considering how far and by what means it is possible to prevent or control these recurrent disturbances of the economic system. The experience of the past three centuries suggests that, under the present form of production, the succession of prosperity, crisis, and readjustment is inevitable. Many economists maintain that the crisis and its necessary sequels are an inescapable part of the price we pay for industrial expansion and an improved standard of living.

It is the view of this school that, while the crisis cannot be prevented, it can be controlled and modified so as to mitigate its more unfortunate results. To this end, governments and central banks are urged to curtail credit whenever signs point to excessive speculation. Then, when a crisis develops, pressure of deflation may be relieved by liberalizing credit and expanding currency issues. It was to facilitate this type of action that the Federal Reserve system was revamped in 1935. See *Federal Reserve System.*

Another prescription is for governments to postpone construction of new projects until business is descending into a trough, and then to expand public works.

A more determined attack was made on the problem in a study by the Brookings Institute, with special reference to the boom which collapsed in 1929. It was the contention of the authors, on the basis of an exhaustive inquiry, that, so far from production being excessive in that year, it was actually 20 per cent below capacity. Moreover, it was held that consumers could easily have absorbed more than capacity production if purchasing power had been used more fully for buying goods.

The reason it was not so used was attributed to the fact that it was concentrated in the hands of those who, by reason of their small number, were not able to use it for consumers' goods and diverted a disproportionately large share to securities and capital investment. Since only a minor portion of this investment money could be soundly used for building productive equipment on the basis of existing levels of consumer demand, the surplus was used to bid up stock prices, and so was wasted.

Starting from this analysis, the study advised that the way to minimize crises was to spread purchasing power as widely as possible, chiefly by keeping prices at the lowest levels compatible with continued solvency of business. How this could be done under a system of free contract was not indicated.

The importance of this view is that it underlies proposals that look toward the equalizing of income. Taxation and government control of industry are the chief agencies envisaged.

The Business Barometer. Finally, what are the signs by which the approach of a crisis can be recognized? There are a number of valuable indices which, taken together, enable us to estimate with reasonable accuracy the trend of business. We may group these as indices of prices and indices of trade. Among the former is the index of wholesale prices, a change in the direction of which marks the beginning or the end of a movement. Such indices are now provided by the United States bureau of labor statistics, Dun and Bradstreet's, Gibson's, and other agencies. The index of security prices provides another important series, since these discount in advance the prospects of business. The rates on commercial paper, both long-term and short-term, throw light on the credit situation. The fall in these rates, especially if accompanied by a rise in the security index, is a phenomenon of trade revival.

Among the indices of trade we must include the figures showing the volume of exports and imports, of operating rates in iron and steel and other fundamental industries, of the production of electric power, coal, pig iron, and other raw materials, of car loadings, of new capital issues, and of bank clearings. In the last mentioned case it is generally assumed that the clearings of the New York City banks form an index of speculation, while the clearings of other banks form an index of general business. Nor must we overlook the crop reports, the earnings of the railroads, the statistics of employment, and the returns of business failures.

It is obvious, therefore, that the business barometer can be fully read only by experts who are able to relate all these various indices. This fact has led to the establishment of regular institutions for the forecasting of trade conditions, such as Babson's, Brookmire's, the Harvard committee on economic research, and the New York national bureau of economic research.

IMPORTANT BUSINESS CRISES

Date	Countries Chiefly Affected	Special Causes	Special Consequences	Period of Depression
1560	Belgium, England . . .	Difficulty of obtaining funds to carry on war.	Panic among creditors of British government at Antwerp.	About 2 years
1563	England .	Plague and bad harvest.	Scarcity of money and credit.	3 years
1569	England . .	Privateering: trouble with Scotland; internal troubles of Flanders prevented renewal of loans to Elizabeth; effect of troubles with Spain on commerce; bad harvest and rebellion.	Failures and embarrassments of English public finances. Parliament summoned: complains of monopolies, usury, and treasury abuses.	5 years
1587	England . .	Spanish reprisals against English privateering; bad harvests; long war with Spain; plague.	Long continued trade depression.	16 years
1620	England . .	Dutch competition. East India Co. & Russia Co. could not pay debts. Gov't interference with cloth trade; bad harvests; bad state of public credit.	Depression in agriculture and cloth trade; much unemployment; high interest; many bankruptcies.	5 years
1630	England . .	War with Spain; dispute about tonnage and poundage.	Depression and unemployment lessened when peace made with Spain.	A few months
1640	England . .	Bankruptcy of government of Charles I; seizure of bullion from the mint.	Political unrest culminating in civil war prevented recovery.	10 years
1659	England . .	War with Spain; losses from privateering; government unable to pay army and navy.	Refusal to pay taxes; demand for setting up of a new government.	About 2 years
1667	England . .	Dutch war; the great plague; great fire of London, Dutch fleet appears in the Thames.	Destruction of commerce, run on banks, deaths from starvation.	About 1 year
1672	England . .	Financial difficulties of Charles II.	Stop of the Exchequer; failure of half the banks in England.	About 2 years
1682	England . .	Run on a bank, engineered by political enemies of lord mayor of London.	Some banks had temporary difficulties.	A few months
1696	England . .	Taxation for French war; scarcity of standard coin.	Run on banks; suspension of Bank of England; this led to recoinage.	1 year
1701	England . .	Fears of war; struggle between rival East India companies.	Several bankers failed; stocks fell 34% to 53%.	Less than 1 year
1704–1708	England, Scotland . . .	Failure of Darien Co.; expectation of long war; tension between England and Scotland; French landing in 1708.	Bank of Scotland suspends payment.	4 years
1710	England . .	Defeat of Whigs; new ministry lacked investors' confidence; collapse of insurance boom; cumulative effect of war.	Some life insurance companies dissolved by Act of Parliament; trade recovery hastened by arrangements to fund debt.	1 year
1720–1721	France, England . . .	Mississippi Bubble, South Sea Bubble, —both outbreaks of speculative mania.	Widespread bankruptcy and collapse of stock markets. In England strict enforcement of Bubble Act, which made it difficult to obtain legal authorization to start new enterprises.	
1745	England . .	Landing of the Pretender.	Panic in London; fall of funds; shops closed; run on Bank of England.	A few weeks
1763	Germany, Holland, England	Speculation connected with Seven Years' war.	Collapse of that speculation.	
1772	England, Holland . . .	Speculative mania following great prosperity.	Panic in England; 525 failures; similar occurrences on continent.	1 year
1783	England . .	Rapid trade expansion and extravagance following War of Independence. Overissue of bank notes.	Note issue checked.	6 months
1793	England . .	Bad harvest; declaration of war against France.	Parliament made loan to merchants to restore confidence.	1 year
1797	England . .	Pitt's excessive war borrowings from Bank of England; efforts of country banks to withdraw coin from London; fear of French invasion; contraction of bank issues.	Bank Restriction act passed. Suspension of cash payments by Bank of England. Bank notes created legal tender.	
1809	England, United States	Speculation connected with Napoleonic war which led to credit and note inflation.	Bullion committee's recommendation for resumption of cash payments not accepted; depreciation of notes continued.	2 years
1815	England . .	Close of Napoleonic wars; vast production of English manufactured goods which European countries were too much impoverished to buy.	Much unemployment, machine-breaking, fall of prices.	About 2 years
1819	United States	Rapid growth of manufactures and trade after War of 1812–15; excessive bank issues; land speculation.		About 2 years
1825	England . .	Overspeculation, particularly in Mexico and South America, led to a "bubble" situation. This collapsed leaving a glut of commodities which could not be disposed of at cost.	Failure of many banks and speculators; much unemployment, misery, and riots.	2 years

IMPORTANT BUSINESS CRISES—Con.

Date	Countries Chiefly Affected	Special Causes	Special Consequences	Period of Depression
1836–1839	England, U. S. A., France, Belgium . .	Railway speculation in England and U. S. A. Land speculation and paper money inflation in U. S. A. Collapse occurred simultaneously in England, Ireland, and U. S. A., in 1836. Bad harvest of 1838 caused another crisis in which Bank of England was threatened with ruin.	Failure of many banks and speculators; much unemployment. Drain of bullion from England was finally checked by raising discount rate and by aid of Bank of France. Bank Act of 1844.	7 years
1847	England, Holland, Germany, France, U. S. A.	Bad harvests; failure of potato crops in Ireland; railway speculation.	Numerous business failures. Starvation in Ireland and extensive emigration. European revolutionary disturbances, 1848.	1 year
1854	United States	Crimean war; tight money; sluggish trade.	Panic on Wall Street in September; failures in different sections.	
1857	United States, nearly all other countries . . .	American crisis due to great discoveries of gold, railroad extension, development of banking and speculation. In England, overdevelopment of credit system.	Suspension of Bank Act in England. Very great unemployment in all countries.	3 years
1866	England . .	Wild speculation in limited liability companies, excessive borrowings by means of "finance bills," unsound banking practices.	Universal distrust of English investments. The failure of the weaker banks left the well-established banks stronger. The practice of giving accommodation bills was checked.	About 1 year
1869	United States	Operations of Jay Gould, made possible by unsound paper money system.	Many failures. (Black Friday, Sept. 24, 1869).	
1873	Nearly all countries .	Payment of French indemnity to Germany loosed a speculative mania in Germany and Austria; railway boom in U. S. A.; excessive construction of permanent works and "overproduction" at high prices. Collapse spread from Vienna to New York, which was swamped with unmarketable railway securities.	Failures of banks and commercial houses; unemployment (3,000,000 "tramps" in U. S. A. during winters of 1873 and 1874). Shrinkage of prices, stagnation, glut.	6 years
1882	France, England . . .	Wild speculation inspired by Union Generale, a company promoted among French and Austrian Catholics to destroy financial supremacy of Jews.	Collapse of this company and of the boom in general. Long period of depression.	5 years
1884	United States	Railroad speculation; large foreign wheat crops caused low prices for American grain and lessened American railroad earnings.	Very low prices.	2 years
1890–1894	England ("Baring crisis"), Germany, France . .	Speculation in South America. Revolution in Argentina.	Support of the Bank of England, aided by the Bank of France, averted panic, and no widespread failures followed.	4 years
1893	United States	Good harvest of 1891 stimulated all sorts of business; but smaller harvest of 1892, low agricultural prices, heavy gold exports, fear that gold standard might be abandoned, and doubtful bank loans occasioned a crisis.	Widespread failures, unemployment, and industrial unrest; march of Coxey's Army. Political and tariff uncertainties prevented thorough recovery until latter part of 1897.	4 years
1900	England, Germany, France	Great prosperity in England in 1898; business further stimulated by war in 1899 till it reached highest point in 1900 and then receded; high taxation and dear coal (both due to South African war) held responsible.	In England, unemployment but no spectacular failures. In Germany alarming failures occurred.	4 years
1903-4	United States	Decline of security prices after speculation of 1900 and 1901, precipitated by withdrawal of European funds—("Rich man's panic").	A few corporations failed, idle money accumulated in banks, but abundant harvests of 1904 hastened recovery.	About 1 year
1907	United States, Europe . .	Failure of Knickerbocker Trust Co. inaugurated panic in New York which spread over the whole country. American panic caused rise of bank rates in London, Paris, Berlin, and intensified depression there.	Failures, but not on a very extensive scale. U. S. government aided banks; Clearing House certificates issued; gold shipped to U. S. A. from Europe. This crisis strengthened movement which led to Federal Reserve System.	1½ years
1914	United States, Europe . .	Crisis due to general overspeculation suddenly transformed into a special financial crisis by the outbreak of the World War.	Many normal features of depression disappeared in the increased business activity due to the war.	About 2 years
1920–1922	United States, England, Europe . .	Increase of productive capacity in victorious countries accompanied with loss of purchasing power in defeated countries partly due to collapse of national currencies. Cessation of wartime demand for goods.	Widespread unemployment and business losses; famines and pestilence in some countries.	Less than 2 years in the United States. Continued depression in England and Europe
1929–1937	World wide except in Russia . . .	Cumulative result of over-expansion in agricultural and industrial productiveness. Reparations and war debt payments combined with trade restrictions.	Unprecedented unemployment. Practically all countries off gold standard. Banking crisis in United States. Free play of economic forces curbed by governments—"economic planning."	About 8 years

INVESTMENTS

INVESTMENT has been defined as the exchange of money for property rights from which a profit is expected. This definition must be qualified somewhat for the purpose of the present discussion. All such exchanges are not investments in the true sense of the word. The true investor receives his profit in the form of an annual income upon his commitment rather than from an appreciation in the value of his investment. One who buys Pennsylvania Railroad stock to procure an annual income of five per cent is an investor; another who buys the same security in anticipation of a rise in price is a speculator.

An absolutely safe investment does not exist. Since safety is a relative term, all securities have a certain element of risk. The yield which the safest security affords may be considered as the true rate of investment income. The higher yield obtainable from all other securities may be considered as a premium received for the additional risk assumed in the purchase of securities less desirable than the best.

The yield on long-term United States government bonds may be accepted as the "true" rate at any given time. As an investment "rule of thumb," it may be stated that the premium for risk should never exceed the true income. This may be interpreted to signify that all securities which afford a yield exceeding twice the current United States government bond yield have too large an element of risk to make them desirable investments.

A true investment may therefore be summarized as a commitment of capital (1) for use in production; (2) intrusted to the management of another; (3) for which the primary purpose of the capitalist is to receive income by reason of the use in production; and (4) in which the estimated risk for use is not so great that the premium for risk is greater than the true interest.

Determination of Yield. The annual return, or yield of an investment is the percentage relationship between the amount of annual income obtained therefrom and the cost price. In the case of stocks, the method of determining the yield is fairly simple. The rule is to divide the number of dollars received in annual dividends per share by the number of dollars paid as original cost per share. To illustrate: A certain stock pays dividends at the rate of $9 per share and is quoted at 180; 9 divided by 180 gives 5 per cent, which is the yield.

The determination of bond yields is somewhat more involved as the bond will be paid at par at maturity date regardless of the purchase price. If the bond is purchased below par, it is assumed that the holder will receive, in addition to the annual interest, an increase in the value of the bond as the bond approaches the due date. Conversely, if the bond is purchased above par, the holder is obliged to charge against his current income a certain amount to cover the decrease in the value of the bond as it nears maturity.

To illustrate: a 6 per cent bond due in ten years is quoted at 105; from the annual interest income of $60 on a thousand dollar bond, a deduction of $5 must be made, leaving $55 net return upon an investment of $1050, or a yield of 5¼ per cent. The amount of deduction, $5 per year, has been arrived at by dividing the number of dollars paid as premium (50) by the number of years (10) in the period during which the bond will run.

Classes of Securities. Investment securities may be divided into two classes, stocks and bonds. Notes are simply short-term bonds. A fundamental difference exists between the position of the stockholder and the bondholder. The stockholder is a part proprietor in the enterprise, and must be prepared to share both in the profits and in the losses according as the business prospers. The bondholder is a creditor who has loaned money to the business and who expects the payment of interest regularly and of principal at maturity, regardless of the incidental prosperity of the company.

The income of a bondholder is said to be fixed, regular, and certain. This is because the bond bears a fixed rate of interest, such as 5 per cent; because the interest must be paid regularly irrespective of earnings; and because default in payment to the bondholder usually brings foreclosure of the mortgage upon the corporate property.

The income of a stockholder is not so satisfactorily assured. The amount will depend upon the prosperity of the company and the discretion of the directors. During poor years, his income may cease entirely. His right to receive income is subordinate to that of all others who have a claim against the company.

The preferred stockholder occupies a middle position between the bondholder and the common stockholder. His income is a fixed amount but the payment is contingent upon the corporate earnings.

A great many types of bonds are in use. The usual form is the mortgage bond under the terms of which the bond is protected by a mortgage upon the corporate property. However, some bonds, known as debentures, have no mortgage security. Other classes will be mentioned in succeeding paragraphs.

Stock is divided into two classes, common and preferred. Many companies issue no preferred stock. Preferred stock always has preference as to dividends, which means the preferred must be paid in full before any distribution to the common, and sometimes has preference as to assets, which means that in the event of dissolution the preferred stocks are paid first.

Tests of Investments. What comprises a good investment? There are many attributes. The first is, that the principal be safe. The second is, that the income be satisfactory. The third, that it possess a fair degree of marketability. The fourth, that its tax position be favorable. The fifth, that both maturity date and denomination of the security be satisfactory. And the sixth is, that its collateral value be reasonably good.

Safety of principal depends chiefly upon the value of the assets of the company. Satisfaction of income comprehends both stability of earnings, which depends upon the nature of the business and the efficiency of management, and amount of income, which should be adequate to compensate the investor for the conservative risk he undertakes. Marketability of a security means that it can be disposed of at a fair price in a reasonable time. Marketability depends in part upon the volume of security outstanding in the hands of the public, but much more largely upon the reputation of the company. These are the three major tests, and unless the prospective security meets each satisfactorily, the subordinate tests may be eliminated.

Public Bonds. Public bonds may be divided into two classes, federal and municipal. Federal bonds include the bonds of the United States government. They are regarded as the premier investment security of the country because they are secured by the credit of the United States. Bonds guaranteed as to principal and interest by the Federal government are in the same class. No question exists as to the ability of the government to arrange payment at maturity. The market price of the bonds will change from month to month with changes in the market rate of interest, but this is in no way attributable to apprehension over their payment.

Municipal bonds comprise the state, county, and city bonds. These bonds are most desirable investment securities. They are secured by the taxing power of the communities. While it is true that the respective states are sovereign powers, and, as such, cannot be sued in the event of default of payment of their bonds, it is also true that constitutional restrictions upon the creation of debt have

kept the bond issues within conservative limits. There has been no default in the payment of state bonds since the early nineties. The value of a state bond depends upon (a) the good faith of the people, (b) the financial standing of the state, and (c) the constitutional restrictions on the amount and purpose of issue.

County and city bonds are also highly regarded as investment securities. Unlike a state, a municipality may be sued. The first test therefore is ability to pay. Experience has shown that a net debt of ten per cent of the value of the taxable property marks the ordinary limit of safety in municipal borrowing. For small communities, seven per cent is a safer limit. The second test is validity of issue. Unless the bonds have been issued in accordance with existing laws, there is constant danger that the issue may be declared invalid. The average investor is not in a position to pass upon questions of validity. His chief protection is to buy municipal bonds only through reliable bond houses which have had the advice of counsel in this respect. The third test is the good faith of the citizens of the city with regard to the payment of their debts. State, county, and city bonds are regarded as tax-free securities, as the income is exempt from the Federal normal and surtax.

Corporate Securities in General. Corporate securities include the stocks and bonds of railroads, public utility, and industrial companies. From the standpoint of investment desirability, they range from very good to very bad. In general the nature of the business has material effect upon the prosperity of the companies. The income of railroad and public utility companies has a greater inherent stability than that of the industrial companies. Consequently, the rails and utilities are more highly regarded in the investment field.

The stability of income depends upon (a) the product it makes or the service it sells, and (b) the character of the management. The bonds of the Pennsylvania Railroad Company are better than those of the Bethlehem Steel Company because there is a more constant demand for transportation service than for steel products. And the bonds of the latter company, which is efficiently managed by men of great ability, are better than those of another company which is less fortunate in this respect.

The strength of corporate securities may be best judged from the financial statements of the company. The balance sheet shows the resources and liabilities; the income statement shows the profit or loss for the preceding year. From the balance sheet may be determined the valuation of the assets which represent the security behind the bonds and stock. From the income statement may be judged the earning power of the enterprise. Of the two, the earning power is by far the more significant.

For a railroad company, the value of the property should not exceed four times the annual revenues. The operating expenses should not exceed 75 per cent of the revenues, and the interest charges on the bonds should not exceed 10 per cent of the revenues. Moreover, the income available to pay the interest charges should be at least 150 per cent of the charges, and the net income available to pay dividends should allow a fair margin over the dividend requirement.

For a public utility company, the value of the property should not exceed four times the annual revenues. The operating expenses should not exceed 65 per cent of the revenues, and the interest charges should not exceed 15 per cent of the revenues. The income available to pay the interest charges should be at least 175 per cent of the charges, and dividend payments should be met with a fair margin of safety.

For an industrial company, the value of the property should not exceed ten times the net income after operating expenses. The operating expenses should not exceed 90 per cent of the revenues, and the interest charges should not exceed 4 per cent of the revenues. The income available to pay the interest charges should be at least twice the charges, and dividends should be met with a fair margin of safety.

Railroad Securities. The securities issued by the American railroad companies enjoy a high rating in investment circles. This is due to many reasons. The roads have proved their earning power over the course of many years. The Pennsylvania Railroad Company has paid regular dividends upon its stock without interruption since 1847. The nature of the business is such that earnings are not greatly affected by periods of business depression. Railroads operate under the supervision of a Federal board—the Inter-State Commerce Commission—which is instructed to regulate rates so that the roads will receive a fair return upon their investment.

Not all railroad securities are equally desirable, however. Some roads have established excellent reputations due to the efficiency of management—such as Pennsylvania, Lackawanna, Burlington, Atchison, and Southern Pacific. Other roads have not fared so well, as is illustrated in Seaboard Air Line, Chicago Great Western, and the Rutland.

Railroad companies issue more different classes of securities than any other enterprise. The senior bonds are those which are protected by an early mortgage on the property; they include the first mortgage and the second mortgage which is usually called a refunding mortgage. The junior bonds are those which follow the senior issues in their claim; they are never given a numeral sequence such as sixth or ninth mortgage but rather are called consolidated, unified, general, or debenture. The rolling stock is usually bought on the installment plan and is financed through the sale of equipment trust and car trust notes. Equipment securities rank among the very best investments. The railroads issue both preferred and common stocks, which have a claim on the earnings subordinate to the bonds.

The first test of a railroad security is the dividend record of the road. If dividends have been paid regularly during the preceding five to ten years, the bonds of the road are entitled to a good rating. If dividends are not being paid on the stock, the investor should assure himself that the annual income is sufficient to cover all interest charges in full after the payment of operating charges, with a fair margin of safety.

The second test is the yield, or rate of return, obtainable from the security. For the ordinary investor, this rate should be not less than 5 per cent and not more than 7 per cent. A lower yield would indicate an abnormally high margin of safety, and a higher rate, too great an element of risk.

The third test is the nature of the commodities carried. A railroad company derives its revenue primarily through freight shipments. Passenger traffic is barely self-supporting. The more diversified the products are, the more stable will be the earnings. The size of the cotton crop has large effect upon the roads in the Southern states; the yield of the grain crops has similar effect upon the roads in the Central states; and, likewise, the prosperity of the mining industry greatly increases the earnings of various roads in the Far West.

Public Utility Securities. Public utility securities comprise those issued by electric light and power companies, by artificial gas companies, by water companies, by electric railways, and by telephone and telegraph companies. The types of securities issued are much simpler than in the case of the railroads. They comprise first mortgage and refunding mortgage bonds, collateral trust notes, debenture bonds, preferred and common stocks.

The utility companies enjoy many of the advantages of the railroads and others in addition. They operate under public service commissions in the different states which aim to set rates sufficiently high to ensure a fair return. They have a virtual

monopoly in supplying their product under the franchises granted by the communities in which they operate.

What has been said applies primarily to utility operating companies. The best known utility securities, however, are those of holding companies, which do not conduct any direct operations but simply buy and hold the securities of operating companies, frequently managing and financing them through other subsidiaries. The prevailing pattern of the industry is control of many local operating companies, often widely separated, by a few large holding companies.

Holding companies do not issue any mortgage bonds as they have no physical property to pledge as security. They issue either collateral notes, secured by bonds and stocks owned, or unsecured debenture bonds. New capital is often raised by sale of common or preferred stock, the proceeds being used for acquisition of new subsidiaries or as loans to subsidiaries for expansion. Holding company securities as a class are subject to much wider variations in price than are those of operating companies.

The chief tests of utility securities are the dividend records and the rate of return. A third test is the location of the communities served. In this connection the effect of competition, actual or prospective, with publicly owned utilities should be weighed. Above all, the distinctions between holding and operating companies should be kept clearly in mind.

Industrial Securities. Industrial securities comprise the stocks and bonds issued by all companies outside the railroad and utility field. The usual plan under which railroads issue securities is in the ratio of two of bonds to one of stocks; in the utility field, the ratio is about one to one; but in the industrial field it is one to four. In other words, 80 per cent of all industrial securities represent stock and 20 per cent, bonds.

More markedly than railroad and utility operating company earnings, the profits of industrial companies vary with changing business conditions. When business is booming, industrial companies realize large returns; when business is dull, the industries are fortunate to avoid loss.

Industrial securities, notably the common stocks of companies which are the leaders in essential and growing industries, have gained greatly in public esteem during recent years. Considerable caution is necessary, however, in choosing industrial securities.

In testing an industrial security, consideration should be given to the nature of the product manufactured, the control of the raw materials used, the type of competition, the effect of the tariff, and the processes employed.

Investment Companies. Investment companies or trusts are financial organizations which make a business of investing the funds supplied by their shareholders in selected stocks and bonds, the investors sharing in the income and profits from the securities held by their company, according to the number of shares they own. These companies have proved attractive to small investors, with perhaps little knowledge of financial markets, because the companies are managed by specialists in the investment field, and because the "mutual fund" permits the buying of a diversity of investments, thus minimizing the risk of loss.

There are two main types of investment companies, the "closed-end" company which has a set capitalization, and the "open-end" company which keeps offering new shares for sale. The companies are regulated by the Federal Investment Company act of 1940, and have, since 1950, been obliged to conform to the rulings of the Securities and Exchange Commission in their dealings with the public and with their stockholders. They are also subject to state regulation.

Real Estate Mortgages. Real estate mortgages have long been one of the most popular forms of investment in this country. The chief concern of the investor should be to secure ample margin of safety. In no case should the mortgage exceed two-thirds of the conservative value of the property pledged. The average investor should avoid all but first mortgages and then only on property which is more likely to appreciate in value than to decline. Moreover, he should invest with particular care during times when rents are abnormally high as this condition makes for inflated real estate values. The mortgage should contain a condition that the entire principal becomes immediately due and payable in the event of default. The average investor in mortgages should confine his holdings to residential property. "Special utilizations," such as office buildings, hotels, and stores, are likely to have wide fluctuations in value. Mortgages on vacant land are likewise inadvisable.

Foreign Securities. Two primary reasons exist for foreign investing: At times, the income return in the domestic market declines to such an extent that investors are compelled to invest abroad to get a satisfactory yield, even at the increased risk of loss. The second reason is the desire to facilitate the financing of foreign trade. Long-term credits make a strong appeal in international trade and are made possible through the willingness of the nationals of the exporting countries to advance the necessary funds by purchasing foreign securities offered directly or indirectly in payment.

In buying foreign securities, the investor should confine his commitments to the bonds of countries whose financial position is strong and whose internal affairs are stabilized.

Effect of Taxation. Present tax laws materially affect investment income. The Federal normal and surtax applies on all bond interest with the exception of municipal and certain government bonds. In addition to the Federal taxes, many of the states impose additional taxes upon income.

Current income taxes are established on a graduated scale under which those having the largest income are required to pay the highest rate of tax. The maximum is over 75 per cent for the Federal tax. This means that more than three-fourths of the taxable income is taken from the wealthy investor by the government. As a result, rich investors have been driven to purchase tax-exempt securities. Consequently, tax-exempt securities are selling too high for the average investor.

Economic Conditions. Business conditions are constantly changing. Periods of prosperity and depression have followed alternately during the entire commercial experience of this country. Interest rates are high when business is active, and low when business is dull. Stock prices are high when business is booming, and low when business is poor. Bond prices, peculiarly, are low during periods of activity and high during periods of inactivity. See *Business Crises*.

Stock prices are determined by the earning power, present and prospective, of the issuing companies. If the present condition is good and the future promising, stock prices will tend upward. But, if the future is unpromising, the trend will be downward regardless of current earnings. Moreover, if the prospect is favorable, prices will move upward even if current earnings are poor. The stock market always endeavors to discount the future, that is, to act before rather than after the influencing event takes place.

Bond prices are determined, not by the earning power of the company, since the bondholder is forever limited to his fixed interest rate, but by the solvency of the company and relative interest rates. If the bond bears a 5 per cent rate, and the current market rate on such bonds is 6 per cent, the bond will sell below its face value regardless of the issuing company; if the current market rate is 4 per cent, the price will be above the face value.

The most favorable time to buy stocks is when

prospective earning power is good but has not yet been reflected in the market, and the most favorable time to sell is when the price already discounts a long period of increasing profits. The most advantageous time to buy bonds is when market interest rates are high, and the best time to sell bonds is when interest rates are low.

Needless to say, there is no unfailing method of telling when the conditions are ripe for buying and selling, since only later events can provide the answer to the question of whether given conditions are the end of a "movement" or midway within it.

Fraudulent Offerings. The first question to ask about any security under consideration for purchase is this: Is it listed on a security exchange? The reason is that securities so listed are subjected to a grilling examination by the securities and exchange commission to see that the selling literature does not misrepresent or conceal essential facts. There is no guarantee against loss by the investor, but there are severe penalties for misstatements by the seller of the securities.

By far the most securities, however, are not so listed, and regarding them the investor must be his own sole protector. Earmarks of fraudulent offerings should be looked for in the sales circular. These include:

1. Telling of large profits made in the same field by other companies. 2. Statements of opinion rather than fact. 3. Fixing a time limit when the price will be advanced or the shares will no longer be available —the "hurry-hurry" game. 4. Promise of large profits—the "get-rich-quick" game. 5. Ridiculing of interest from savings banks. 6. Sale of stock at a large discount. 7. Denunciation of Wall Street. 8. Promise of absolute safety. 9. Offer to take in exchange government bonds or seasoned securities —the "switch and sell" game.

Work of the Bond House. An investor can protect himself in no way more efficiently than by buying only through bond houses with an established reputation. While there are undoubtedly many reputable houses which are not members of the Investment Bankers Association, it is nevertheless true that membership in this association is a decidedly favorable sign.

The bond houses ordinarily act as dealers rather than as brokers. They own outright the securities they sell. Naturally they assured themselves of the worth and marketability of the securities before they themselves purchased. While they do not guarantee the investor against loss, they are usually prepared to buy back at a fair price any of the securities they have sold.

UNITED STATES SAVINGS BONDS

The unprecedented magnitude of governmental borrowing in World War II was met in considerable part by war savings bonds. As a medium of investment for people of moderate means, these securities proved unparalleled in popularity.

Among the reasons for their attractiveness to the mass of the people were:

1. They were made available in small denominations.

2. They could be liquidated without loss at any time after a minimum period.

3. Their purchase was supported by patriotic motives.

With the exception of a special type designed for larger investors, these bonds had other unusual characteristics, which may be described as follows:

1. Instead of paying their interest annually on their face value, they were sold at a price one-fourth below their face value and were made redeemable at a price, after one year from date of issue, increasing each half-year until reaching their face value at maturity.

2. The periodic increases in redemption price are smaller in the earlier years than in the later, thus creating an incentive to avoid liquidation before maturity.

3. They are non-negotiable but a fixed market for them is maintained at all times by reason of the fact that they are redeemable at definite prices.

Terms of the Bonds. The type of savings bond most widely sold to the general public has been that of Series E, offered in denominations of $25, $50, $100, $500, and $1000. The purchase price, representing a discount of 25 per cent, ranges from $18.75 for the lowest to $750 for the highest denomination. Moreover, war savings stamps are offered in convenient denominations as low as 10 cents. They may be converted into bonds when enough have been accumulated.

Series E bonds mature at the end of ten years from the beginning of the month in which the purchase was made. If the bonds are kept to maturity, they yield about 2.9 per cent per annum compounded semiannually when averaged over the ten years. If cashed before maturity, the yield depends on how long they have been retained.

On May 1, 1952, the Treasury Department issued a new series of E bonds with a 3% investment yield when held to maturity and earnings in the early years increased, starting at six months. Optional extension beyond maturity provides a 3% yield up to 10 years more. The new 3% extension applies to all E bonds maturing May 1, 1952 and thereafter—not to new issues alone. The annual purchase limit is $20,000.

For larger purchasers two separate series of bonds of $500 minimum denomination are issued at face value with interest paid semiannually by U. S. Treasury check, and still another series of 12-year appreciation bonds in denominations of $25 to $100,000. All are protected against price fluctuation by a guaranteed redemption price.

Purposes. The small-denomination, fixed-price, discount bond was originally authorized on Feb. 4, 1935, by an amendment to the Second Liberty Bond act, passed during World War I. The early issues were known as United States savings bonds.

The Liberty and Victory loans of 1917–1919 afforded the first instance in which the United States government appealed intensively to the people generally to lend their savings to the government. These earlier loans, however, were subject to market fluctuations, and many thousands of persons who then purchased their first securities found, after the war, that they could be sold only at a loss if there was immediate need to liquidate them.

This disadvantage was eliminated when the government again appealed to the small investor in 1935. The guaranteed redemption value forestalled losses to the investor while the gradation of yield, rising in the later years, discouraged liquidation before maturity.

An additional merit in this type of financing is that, unlike borrowing through the banking system, no inflationary tendency results. These bonds may be purchased only by "natural persons," who must use existing cash or credit to obtain the bonds. Purchase of other government securities by banks, on the other hand, increases the base for possible expansion of credit to customers.

During World War II, the savings bond, renamed defense savings bond and later war savings bond, assumed an additional function of great importance. The war economy brought a huge increase in purchasing power accompanied by a diminution of goods and services available for purchase. To avoid the bidding up of prices, a draining off of purchasing power became essential. One instrument for the purpose was investment in savings bonds.

Sales of Savings Bonds. From the time when these bonds were first offered for sale on March 1, 1935, they proved highly popular. With American participation in World War II, they began to be purchased in huge volume. In January 1942 for the first time purchases exceeded $1,000,000,000 in a single month.

MONEY AND BANKING

Why do men engage in business? Primarily for the purpose of profit. Business is fundamentally a matter of the production and of the distribution of commodities. Therefore, business men might normally expect to profit in proportion as they assist in production and in distribution. But profit under modern business conditions does not arise precisely in this manner.

Production and distribution should be the two most important factors in everyday commerce. But the business man is constantly obliged to subordinate them to two other factors vastly different. He engages in business for profit. Profit is measured by the difference in prices, buying and selling. So commercial men constantly watch price and profit as essential factors in determining conditions of production and of distribution.

Both price and profit are money concepts. Price is the amount of money for which commodities are exchanged. Profit is the relationship between cost and selling prices. If selling price exceeds cost, a positive profit results; if selling price is less than cost, a negative profit, or a loss, results.

If money were a mere go-between, serving simply to facilitate the transaction of commerce, with a stable value of its own, a study of its principles would be of limited service. But money itself is ever changing in value, thus contributing, in a manner not popularly understood, to price changes and to fluctuations in business conditions.

What Is Money? Money has been defined as anything which is universally acceptable in final payment for goods and services. Gold coins have come nearest to meeting this definition. One dollar, which is the monetary unit in the United States, is defined as 13 $^{5}/_{7}$ grains of pure gold. Other forms of currency, such as silver and paper notes, have their face value fixed by law in terms of gold. In physical use, they have supplanted gold although gold remains legally the basis of their value.

Money does not necessarily have to be gold. In bygone days commodities such as wheat, tobacco, or salt have served as media of exchange. The American Indians used wampum, or shells, for money. Gourds were formerly used as money in Haiti, and the monetary unit of Haiti still carries that name. The Latin word for money, *pecunia*, is derived from *pecus*, "cattle," and survives in the English word pecuniary, thus reflecting an early use of cattle as money. Silver has been a rival of gold in the most advanced countries of the world for thousands of years and was not decisively replaced by it until the 19th century. Gold was first coined by Croesus, king of Lydia, in the 5th century B. C.

While gold today serves as a monetary standard rather than actual money used physically in transactions, its position is due to the fact that it was long the most popular form of actual money. It has many attributes which make it especially valuable both as money and as a monetary standard:

It has beauty. Gold is used universally in the arts to add beauty to articles of all description.

It is almost indestructible. Gold resists corrosion by powerful acids.

It is large value in small bulk. One million dollars is represented by less than three cubic feet of gold. This fact makes gold convenient to transport, and economical to store. The Spartans made their coins of iron to prevent exportation of money.

It is homogeneous. Pure gold is all of the same grade. There are many grades of cotton and of wheat but only one of pure gold.

It is both malleable and tenacious. This makes it particularly adaptable for coining.

It is scarce. All the gold stocks in the world assembled, would make a block less than 40 feet square. Moreover, the supply cannot be rapidly increased. The annual production, even under the most favorable conditions, has never exceeded 5 per cent of the existing stocks. This tends to give a stability in value greater than that of any other commodity.

Other commodities have certain of these attributes, but in the case of no other metal does the combination exist so favorably. Even if gold were not used as money, it would still retain its value as one of the most desirable and most useful commodities of commerce.

The Functions of Money. Money serves four important functions in commerce: It is used as a medium of exchange, as a standard of value, as a store of value, and as a standard of deferred payment. As each function differs materially from the others, it should be fully appreciated that money bears a fourfold burden rather than serves a single function.

Money is most popularly known as a medium of exchange. Without money, men with commodities and services to dispose of, would be compelled to exchange them directly for other commodities or for other services. The farmer who produces wheat and desires shoes would be obliged to find some one who had shoes to exchange and who wanted wheat. Under a monetary system, producers simply exchange their production for money, and exchange the money for the commodities and services desired. The barter system of exchange is both slow and inconvenient; the money system has made possible a method of exchange infinitely more efficient.

Complementary with its use as a medium of exchange, money serves as a standard of value. Value is expressed in terms of price. Value and price, however, are not the same. Value is a relationship; it means the worth of one commodity in terms of other commodities. A decline in the value of one commodity must mean a corresponding increase in the value of another commodity or in the value of other goods. Hence, the total value of all commodities cannot change. But the general price level can change, since the value of all commodities is expressed in terms of a single commodity, gold. When gold falls in value, all prices tend to rise; when gold rises in value, prices tend to fall. By reason of this function, one has but to know the price of any commodity to appreciate its value in terms of all other commodities. If wheat is quoted at one dollar a bushel, corn at 50 cents, and oats at 25 cents, it is apparent that wheat is twice as valuable as corn and four times as valuable as oats, and that corn has double the value of oats. This function of money in acting as a common denominator of values is decidedly useful. One likes to remain acquainted with the relative values of different goods without necessarily desiring immediately either to buy or to sell.

Money serves as a store of value. People often have goods or services to dispose of without a concurrent desire for other commodities or services. By exchanging the goods immediately for money, one may hold the money indefinitely, awaiting the desired time for exchanging for other commodities. In the meantime, the money represents so much stored value. In much the same way, money serves as a basis for the security underlying credit transactions. The reserves which banks must maintain are usually in the form of impounded money which is really stored value.

Money serves also as a standard of deferred payment. All credit transactions represent the postponed payment of money. If the transaction is not immediately completed, there must be some agreement between the buyer and the seller, or between the borrower and the lender, as to the method of settlement at the due date. The purchasing power of the money may substantially change in the meantime; nevertheless, the number of dollars agreed upon remains the basis of the settlement.

BANKING POWER OF THE UNITED STATES**
Source: U. S. Treasury Department

Item	All Banks†	Commercial Banks*	Mutual Savings Banks
Number of Banks .	14,655	14,126	529
Loans & Discounts	64,218	30,584	33,634
Investments. . . .	84,212	40,635	43,577
Cash & Balances with Other Banks	38,403	22,253	16,150
Total Assets . . .	189,252	94,658	94,594
Capital, Surplus & Undivided Profits	14,317	6,520	7,797
Total Deposits . .	172,679	86,836	85,843

*National Banks, State Commercial Banks, and Private Banks. †Except for number of banks, all figures are in millions of dollars. **Assets and Liabilities of all active banks in U. S., June 30, 1951.

The Purchasing Power of Money. The purchasing power of money is its worth in exchange for other commodities. It is highly desirable that this power be stable but experience has shown that such is far from the case. When prices advance, the purchasing power of money falls; when prices decline, the purchasing power rises. Prices were much lower in 1913 than in 1920. In 1913, one dollar would have purchased one bushel of wheat; in 1920, one dollar would have bought less than one-half of a bushel. In 1932, it would have bought two bushels. On an average basis, one dollar in 1920 would have exchanged for but 40 per cent of the commodities it would have commanded in 1913 and for 135 per cent of those it would have commanded in 1932. Expressed the other way, it would require $2.50 in 1920 or 74 cents in 1932 to buy the same commodities one might have purchased for one dollar in 1913.

Changes in price levels, therefore, represent concurrent changes in the value of money. It is important to appreciate that these changes exert large influence upon business conditions. It profoundly affects credit transactions, since it creates risk for both parties. It affects production as changes in the value of materials during process interfere with expected profits. Since interest on debt and various other charges are fixed, the effect on profits is much greater proportionately than the alterations in price level would suggest.

But most important is the fact that prices do not change uniformly. There is a wide variance both in degree and in time. The position of the farmer in 1932 was very unfavorable because the prices of farm products had fallen much farther than other prices. The usual sequence of price changes is as follows: first, in the basic raw materials, such as pig iron, copper, wool, rubber, wheat, cotton, corn, etc.; next, in semifinished goods, such as cotton cloths; and later, in finished products. Then wholesale prices are affected, followed at a definite interval by retail prices. Wages are usually the last to be affected.

The Measurement of Prices. The general level of prices is measured through the use of index numbers. Current prices on a great many commodities are taken and a general average is secured after giving weight in accordance with the importance of each commodity. Several of these indices are compiled on a weekly basis. This permits one to judge the general trend of prices, not only from week to week, but also over a period of years. The United States department of agriculture issues a monthly index of wholesale prices based on 1926 as 100. At its high point in 1920, it was above 154, and it declined by 1932 to less than 70, where it had stood in 1903. Within the period 1903-32, therefore, prices more than doubled and then fell below their original level. The index numbers are used inversely to measure the purchasing power of money. The dollar of 1926, which was worth $1.43 in 1903, fell to 65 cents in 1920 and rose to more than $1.43 in 1932.

What Establishes the Value of Money? Money is a commodity itself, and, like all other commodities, its value is determined by the relationship between demand and supply. The demand for money constantly varies. Of course, in the popular sense, there is no limit to the demand for money. The ordinary person really does not demand money, but rather the goods or the services which money commands. The true demand for money comes only from those who have goods or commodities to sell. It, therefore, depends upon the volume of transactions, upon the population, and upon the extent of the use of credit. The volume of transactions depends largely upon the quantities of goods produced in the community.

The supply of money is the amount in circulation. Very little money is hoarded. The chief value of money is in exchangeability. Money must be kept in action, since idle money earns nothing. The person who has money "idle" in a bank expresses a condition which is pertinent to him only. The bank has the money constantly at work.

The extent of the use of credit naturally affects the demand for money. At least 75 per cent of the ordinary business transactions are on a credit basis.

A most peculiar relationship exists between the demand for and the supply of money. The supply always equals the demand. A bushel of wheat has the power of satisfying only so much hunger, but a given quantity of dollars may satisfy any demand, however large, for money. The adjustment is taken up in price levels. If, at current prices, there is a demand for six billion dollars for exchanges, and only five billion is available, the supply will automatically equal the demand through a decrease of one-sixth in price levels.

Why Prices Rise and Fall. The price of any commodity, therefore, depends upon two different sets of conditions: the value of the commodity, which is determined by the demand and by the supply of that commodity, and the value of money, which is determined by the demand and by the supply of money. Wheat will *rise* in price under any one of the following conditions, other factors remaining unchanged: (1) an increase in the demand for wheat; (2) a decrease in the supply of wheat; (3) a decrease in the demand for money; and (4) an increase in the supply of money. Wheat will *fall* in price under any one of the following conditions, other factors remaining unchanged: (1) a decrease in the demand for wheat; (2) an increase in the supply of wheat; (3) an increase in the demand for money; and (4) a decrease in the supply of money.

It is self-evident that the total value of the money in any nation is irrespective of the number of monetary units in circulation. To double the number of units in circulation simply serves to double prices, rather than to double the value of money. One important reason why prices rose so high in the United States during and following the World War was because of a large increase in the currency in circulation and the velocity or speed with which it was spent. The reason why the German mark, for example, fell so low was primarily because Germany issued so many marks. The value of each monetary unit decreases in proportion as the total number of units is increased.

An equation of exchange is the most convenient approach to the study of the interdependent and interacting forces that effect changes in the level of prices in general. The most familiar form of the equation of exchange, expressed in algebraic terms, is that developed by Irving Fisher as follows: $MV + M'V' = PT$. In this equation, M equals the average quantity of money, including metallic and paper money, in circulation during a year's period, V represents the velocity or speed of circulation of money, which means the number of times the total supply of money turns over during the course of a year in facilitating trade. If the velocity of circulation of money happens to be twenty-five, only one

twenty-fifth as much money is required as if its velocity were one.

The rapid turnover of money increases the efficiency of its use. M′ stands for the average quantity of money substitutes, or the rights to receive money, in circulation subject to check. Actually, the "dollar on deposit" as represented by M′, directly facilitates much more trade than the "circulation dollar," represented by M. V′ represents the velocity of circulation of bank deposits, the number of times on the average that the "dollar on deposit" does duty in an exchange transaction annually. P represents the average price paid for all units of goods acquired in an exchange transaction, and T represents the total number of units so exchanged, or the volume of trade.

If the algebraic symbols are translated into their meanings, the equation of exchange may be expressed as follows: the average quantity of money in circulation, multiplied by its velocity of circulation, plus the average quantity of bank deposits for checking, multiplied by their rate of turnover, equal the average price per unit paid for goods multiplied by the volume of trade. Apparently, the total of money payments for goods plus payments through bank deposits transfer must equal the total value of all the goods acquired in exchange. The equation, by transposition, may be written: $P=\frac{MV+M'V'.}{T}$ This equation indicates that prices vary directly with the quantity of money and of substitutes for money, together with their velocities of circulation, and inversely with the volume of trade. The algebraic equation sets forth the proper relationships of the factors involved; it does not, however, offer a complete explanation of price changes.

Of course, if there is an increased demand for money proportionate to the increased supply, the value of each unit will remain unchanged. But the European experience has been a large arbitrary increase in the supply, regardless of the demand.

The Use of Credit. The extent of the use of credit has been given as one of the factors affecting the demand for money. Credit is the power to obtain goods or services by giving a promise to pay money at some time in the future. Credit is usually divided into two classes, general acceptability and limited acceptability. Credit is essentially a promise to pay money, and, if the credit is in the form of an instrument which is universally acceptable in payment of goods or services, it becomes of general acceptability. A Federal Reserve note is credit of general acceptability as it is freely accepted in payment of debts. In this same class are silver certificates, treasury certificates, United States notes, and coins other than gold.

A bank check is an instrument of limited acceptability, since it will be accepted only by those who are acquainted favorably with the drawer of the check. And likewise are promissory notes, drafts, and acceptances. Bank loans and buying on open account are also examples of credit of limited acceptability.

PUBLIC DEBT OF THE UNITED STATES

Source: U. S. Treasury Department

June 30	Amount in Millions of Dollars	Per Capita Dollars
1800	83	15.87
1900	1,263	16.56
1915	1,191	11.83
1920	24,299	228.33
1930	16,185	131.49
1940	40,440	308.29
1944	201,003	1,456.54
1945	258,682	1,855.90
1946	269,422	1,914.35
1947	258,286	1,793.46
1948	252,292	1,721.30
1949	252,770	1,694.00
1950	257,357	1,696.11
1951	255,221	1,653.50
1952	259,105	1,649.98
1953	266,071	1,666.80
1954	271,260	1,670.17
1955	274,374	1,660.56
1956	272,250	1,628.37

What We Own. What and how consumers, businessmen, government units and others save and invest determines the wealth of our country. Stocks, money, bonds, property of all kinds—these make up the stock of American wealth. The facts about them are statistically summarized and analyzed in the following distribution of American items of wealth which determine our living standards:

	1926	1950
Automobiles	17,500,000	36,292,703
Telephones	16,900,000	40,709,398
Homes with radios	3,700,000	39,281,250
Homes with electric washers	2,800,000	25,563,800
Homes with electric ranges	300,000	6,706,000
Homes with vacuum cleaners	4,000,000	19,660,500
Homes with electric refrigerators	68,000	29,500,000

Credit thus serves as a medium of exchange in over 75 per cent of the daily business in the United States. The demand for money as a medium of exchange is therefore materially affected by the use of credit. Credit does not displace money; it makes money more efficient. Yet, in times of financial panic, prices drop because of an increase in the demand for money for which credit cannot be substituted.

Credit does not increase the supply of money. It does increase the efficiency of money and so lessens the need of it. Since goods can be bought with credit as well as with money, an increase in the volume of credit advances prices as effectively as does an increase in the volume of money.

Credit of General Acceptability. In order that credit may gain general acceptability, all persons in the community must be willing to accept it. For this to result, credit must have four attributes: (1) the promisor must be one in which the people have confidence; (2) credit must be in convenient denominations; (3) it must be easily recognizable; and (4) it must be difficult to counterfeit. Practically all the currency in circulation in this country is credit of general acceptability.

Credit of Limited Acceptability. The most important form of credit of limited acceptability is the bank check. As is discussed later, business obligations are settled customarily with check payments. Technically, a check is an order to the bank to pay money to the payee. In practice, this seldom happens as the payee deposits the check in his own bank for collection. The banks offset balances against each other rather than actually pay the checks in full in cash. This greatly reduces the demand for money.

The Gold Standard. Each nation has its own distinctive unit of money. If commerce is to be carried on readily between nations, it is essential that there should be some common standard for determining the relative values of the national currencies. This standard is provided by gold. When a nation defines its unit of currency as a definite weight of pure gold, it is said to be on the gold standard.

The American dollar is now defined as $13\frac{5}{7}$ grains of pure gold. Otherwise stated, an ounce (480 grains) of gold is worth $35.00.

The gold content of the dollar was originally 24.75 grains, being so defined in 1792. In 1834, it was altered to 23.22 grains.

The gold dollar retained its 1834 value for a century. In 1933, Congress authorized the president to reduce its gold content by as much as 50 per cent. On January 31, 1934, President Franklin D. Roosevelt established its present value.

Modification of Gold Standard. A nation may be legally on the gold standard yet the circulation of gold may be modified in various degrees. The chief restrictions include:

1. Circulation of coinage is forbidden, but paper money is convertible into gold bars or bullion. Countries having this system are said to be on the *gold bullion standard.* The purpose is to discourage the circulation of gold, which can be used more economically as a basis for credit money. See *Advantages of Credit Money.*

2. All domestic circulation of gold is forbidden, both that of coin and of bullion.

3. Export of gold is forbidden except under governmental license.

Devaluation. When the United States suspended the operation of the gold standard in 1933, restrictions numbered 2 and 3 were used. At the same time all gold was nationalized. By this move the Federal government obtained all "profit" from the procedure by which the same amount of gold was made to represent 69 per cent more dollars.

Of this profit, amounting to about 2,800 million dollars, approximately two billion dollars was used as a *stabilization fund,* the purpose of which was to keep on an even keel the exchange rate between the dollar and other currencies.

Devaluation of the currency has the tendency of raising domestic prices. It acts most quickly on those of goods which are bought abroad, the effect then spreading slowly to other prices. Until this process is completed, there is a stimulus to export trade.

Stabilization of Currencies. The chief purpose of a freely operating gold standard is to make possible the conversion of one national currency into others at an approximately constant level. Such conversion is known as foreign exchange. See *Exchange.*

In practice, such conversion is a market transaction, the price of each currency being determined by supply and demand. Price changes in foreign exchange, however, usually receive an automatic check when they rise above, or fall below, a certain point. When gold flows freely, this point is known as the *gold shipment point.* Under managed currencies, it is known as the point of support or the *stabilization point.*

The gold shipment point may be defined as the point of price increase in a foreign currency at which it becomes more profitable to ship gold instead of buying the foreign currency.

Thus, under a free exchange system, if the Canadian dollar were in such demand by Americans wishing to send money to Canada that they bid up the Canadian dollar to $1.02, it might be more profitable to buy a dollar's worth of gold and ship that instead. The gold shipment point in this case would be $1.02.

In theory, inequalities in the distribution of gold among nations should be self-correcting. When one country receives an unduly large supply, prices would normally rise, as explained in the paragraph *Why Prices Rise and Fall.* This rise would make it easier for foreign countries to sell in that market and harder for producers there to sell abroad. Hence the imports would tend to be larger than the exports, and would have to be paid for by the export of gold. This in turn would tend to lower domestic prices and encourage export trade.

Difficulties in Maintaining the Gold Standard. Many obstacles to this self-corrective process have arisen. In the first place, the increase of gold may or may not be followed by a proportional increase of currency and credit, which are actual determinants of price level. Central bank policies and national habits may prevent such increases in money and credit. The normal effect of the gold influx is thereby "sterilized." This result occurred in France and to a certain extent in the United States in the years 1928-30, when these two countries together acquired about two-thirds of the world's monetary gold.

Again, even though the price level does rise, tariff barriers and other trade restrictions may be imposed so as to prevent the inflow of goods. Other countries, therefore, have no opportunity to acquire claims to the excessive gold so as to bring about its redistribution.

PER CAPITA NATIONAL INCOME OF THE UNITED STATES AND FOREIGN COUNTRIES

Source: National Industrial Conference Board

Country	1935	1936	1937	1938	1939	1940
United States	443	511	536	484	522	545
Australia	...	421	446	444	416	...
Canada	315	341	374	366	371	369
France	275	293	234	183	...	...
Germany	349	388	421	452	...	...
Japan	61	68	76	...	...	...
New Zealand	293	365	408	...	...	...
United Kingdom	418	457	500	454	...	445

Managed Currencies. The great depression beginning in 1929 led to partial or complete suspension of the gold standard by every nation in the world. Stability of exchange rates was made to depend on action by governments or central banks. Such action is known as currency management.

The plan adopted by the United States, as by Great Britain, was the use of a stabilization fund, mentioned above. Thus when the dollar price of the pound or franc deviated by a certain amount from a point chosen as normal, the Treasury of the United States would buy or sell pounds or francs until the normal price was restored.

Many other countries met the situation by limiting transaction in foreign currencies so as to make purchases balance sales. German nationals, for instance, could not obtain dollars until American nationals had purchased an equivalent value of marks.

The Rate of Interest. Interest is the cost of borrowing money. The rate changes with conditions of business, and is determined, not by the demand for and the supply of money, but by the demand for and the supply of loanable funds. The business man seldom withdraws actual money at his bank when arranging a loan. He secures a credit to his deposit account which he draws against in payment of his obligations.

The average business man is a constant borrower

MONEY IN CIRCULATION (IN MILLIONS OF DOLLARS)

Source: U. S. Treasury Department

June 30	Total	Gold Certificates	Silver Dollars	Silver Cert.	Subsidiary silver	Minor Coin	U. S. Notes	Federal Res. Notes	Fed. Res. Bank Notes	Nat'l Bank Notes
1939	7,047	72	42	1,454	361	155	266	4,484	26	187
1942	12,383	59	66	1,754	504	213	317	9,310	19	139
1943	17,421	57	84	1,649	610	236	322	13,747	584	132
1944	22,504	54	103	1,588	700	263	322	18,750	597	126
1945	26,746	52	125	1,651	788	292	323	22,868	527	120
1946	28,245	50	140	2,025	843	317	317	23,973	464	114
1947	28,119	48	147	2,022	873	331	318	23,857	414	108
1950	27,154	41	170	2,177	964	361	321	22,759	274	86
1952	29,018	38	191	2,086	1,092	394	318	24,601	221	77
1955	30,229	34	223	2,169	1,202	432	319	25,617	162	66

at his bank. He needs additional capital for the expansion of his business and secures it through his bank. The extent to which he borrows depends upon the relationship between the cost of borrowing—the rate of interest—and the return he can obtain in his business from the added investment. There must be a profit margin, else he will not borrow. Low rates of interest therefore encourage borrowing by business men and make for increased business activity. High rates of interest discourage borrowing and make for decreased business activity.

Money in the United States. The present monetary system of the United States is on a gold monometallic basis, which means that a single metal, gold, is the basis of our monetary system. Although our monetary unit, the dollar, has been fixed by executive order of the President at 13$^{5}/_{7}$ grains of pure gold, coinage has not been authorized. Gold coins in the Treasury are multiples of the dollar before it was devalued.

Credit Money in the United States. Credit money is also called representative money. All money which circulates freely in the United States is credit money. This applies to silver as well as to paper money.

It should be remembered that the silver dollar takes its monetary value in the United States from the fact, not that it is made of a precious metal, but because it is convertible into 13$^{5}/_{7}$ grains of pure gold. Although individual holders may not thus redeem their silver dollars, since gold has been nationalized, it is sufficient that the conversion is possible in foreign exchange transactions.

If one were to melt down a silver dollar into silver metal, the metal itself would be worth possibly only fifty cents. It is only when silver has a market price of $1.29 an ounce that the silver in a silver dollar is worth one dollar in gold.

Silver in Monetary System. By the Silver Purchase act of 1934, Congress directed the Treasury to purchase silver and add it to the monetary stock of the nation until its value, computed at $1.29 an ounce, was one-fourth that of the total money stock, or until the market price of silver reached $1.29 an ounce. The difference between what the Treasury pays for silver and the value of the silver when minted is known as *seigniorage*. It represents a profit to the Treasury.

The difference between the American silver dollar and a silver-standard monetary unit, such as that used formerly in China, is that the American silver dollar's value does not depend on the market value of silver; the other's does. The American silver dollar is arbitrarily valued in terms of gold.

Advantages of Credit Money. The wide use of credit money as a substitute for real money both in this country and abroad is due to two important advantages:

It is more economical. The use of credit money, which is easily manufactured, relieves the demand for gold, which is much more difficult to produce.

It makes possible an elastic currency supply. In view of the fact that the demand for money is constantly changing, it is highly desirable that the supply be regulated accordingly; otherwise, price levels will constantly fluctuate. Elasticity of currency means the power to expand and to contract according to the needs of business. The supply of gold currency in circulation may be increased or decreased only with extreme difficulty; the supply of paper currency—credit money—may be easily regulated, as is illustrated in the use of Federal Reserve notes in the United States.

Federal Reserve Notes. Federal Reserve notes are issued by Federal Reserve banks to member banks of the system when eligible paper, discounted by the member bank for its depositors, is rediscounted by that bank at the Federal Reserve bank. Jones, a rancher in Montana, borrows $500 from the First National bank of Butte for sixty days to enable him to market his wool crop. The First National bank of Butte rediscounts the promissory note of Jones at the Federal Reserve bank of Minneapolis, which issues as proceeds Federal Reserve notes to the Montana bank, which puts them into circulation. Sixty days later, Jones pays his loan at the Montana bank with Federal Reserve notes, and the bank returns the notes to Minneapolis to liquidate the rediscount.

It should be noticed that the notes were issued as the result of a legitimate business demand and that the notes were withdrawn from circulation when the demand no longer existed. It should also be appreciated that the Montana bank was charged interest on the notes as long as they remained outstanding. This interest charge gives the essential "homing quality" which is lacking in other forms of currency.

By the Banking act of 1935, longer-term loans on any assets approved by the Reserve banks were made eligible as security for this type of currency. Loans of a longer term, however, may be rediscounted only at a penalty rate of at least ½ of one per cent above the normal rediscount rate.

The security behind the Federal Reserve note is the promissory note of the borrower plus a reserve of at least 40 per cent in gold certificates in the vaults of the Federal Reserve banks. These certificates, which may not be circulated, represent gold

UNITED STATES POSTAL SAVINGS SYSTEM, 1950 *

State or Dependency	Amount Due Depositors	Interest Paid Depositors
Alabama	$ 31,684,097	$ 641,508.01
Alaska	2,402,277	42,893.30
Arizona	12,537,512	257,257.57
Arkansas	46,014,613	[896,733.08
California	205,609,898	4,360,897.39
Colorado	45,429,556	921,901.34
Connecticut	27,036,760	577,600.46
Delaware	1,436,558	24,475.32
District of Columbia	23,391,168	460,463.39
Florida	86,388,018	1,761,421.44
Georgia	38,197,083	783,086.32
Hawaii	1,842,296	34,248.13
Idaho	14,647,668	314,175.07
Illinois	441,381,095	8,397,976.35
Indiana	130,296,715	2,543,809.72
Iowa	132,531,240	2,652,649.86
Kansas	70,966,242	1,486,879.33
Kentucky	45,037,363	830,949.25
Louisiana	20,041,214	402,636.15
Maine	3,371,021	79,927.84
Maryland	6,475,218	144,926.64
Massachusetts	42,325,015	861,172.09
Michigan	179,982,560	3,725,681.16
Minnesota	99,497,494	1,940,328.82
Mississippi	9,078,728	133,837.91
Missouri	98,357,973	1,943,224.73
Montana	24,530,222	469,773.33
Nebraska	68,777,705	1,366,142.46
Nevada	2,835,245	58,161.87
New Hampshire	2,684,219	58,632.96
New Jersey	38,943,870	618,160.42
New Mexico	8,759,454	182,254.67
New York	173,231,673	3,521,923.93
North Carolina	57,443,040	1,115,628.44
North Dakota	32,595,149	603,083.15
Ohio	145,479,216	2,972,625.22
Oklahoma	53,205,770	1,091,826.26
Oregon	45,858,909	924,392.11
Pennsylvania	151,733,358	2,915,923.31
Puerto Rico	7,794,660	137,344.53
Rhode Island	3,581,537	66,861.76
South Carolina	53,069,358	1,082,888.96
South Dakota	39,151,840	739,587.17
Tennessee	30,839,593	629,222.95
Texas	111,988,911	2,121,443.81
Utah	4,876,398	118,762.08
Vermont	614,625	14,691.18
Virginia	16,067,171	337,601.00
Virgin Islands	340,951	5,663.80
Washington	73,873,105	1,523,614.22
West Virginia	12,280,554	280,352.48
Wisconsin	112,915,776	2,204,712.08
Wyoming	7,536,270	151,999.75
United States	$3,096,967,961	$61,533,934.57

*Total deposits at end of fiscal year 1955 were $2,007,400,000.

belonging to the banks but actually held in the Treasury.

Federal Reserve notes come into existence also when Reserve banks purchase government bonds and are retired when the bonds are sold. See *Open Market Operations*.

Legal Tender. Any form of currency which the law states must be accepted in payment of obligations is known as legal tender. Since 1933, all forms of United States currency have been legal tender. Before that date, a large proportion of it was not, notably Federal Reserve notes and silver certificates. But since all forms of currency bore the promise of the government to redeem in lawful money on demand, the distinction between what was and what was not legal tender was of little practical importance.

Money and the Banks. In the popular sense, banks are institutions where money is stored for safe-keeping. This is far from being the case, however. A bank may be holding many thousands of dollars on deposit for its patrons. But, under ordinary circumstances, only a very small fraction of this amount is carried as money in the vaults of the bank. One may wonder why banks are willing to safeguard the funds of their depositors without making a charge for the service. The answer is that the bank loans out the deposits to borrowers and receives interest payments upon the loans. In some cases, the bank shares this revenue with its patrons by paying interest on the deposits. National banks are forbidden to pay interest on demand deposits.

Kind of Banks. Just as there are different kinds of stores at which we may purchase various kinds of commodities, so there are various kinds of banks with which to do business. The percentage of the country's banking strength represented in the Federal Reserve system is evidenced by the following statistics:

NUMBER OF BANKS IN THE UNITED STATES

1952

Member banks		6,611
National banks	4,744	
State banks	1,867	
Non-member banks		7,698
Mutual savings banks	525	
Other non-member banks	7,173	
Total number of banks		14,309

Numerically, over 46% of the banks of the country are members of the Federal Reserve system. The vast majority of the country's banks are commercial banks.

Commercial Banks. Commercial banks are banks for business men. They accept deposits subject to check, which means that the depositor may at any time, without notice, draw against his deposit by writing out a check. This means that the bank must exercise extreme caution in loaning out the funds on deposit, since it can never tell in advance just when the depositor is going to withdraw his funds. The bank knows from experience, however, that it is extremely unlikely that all the depositors will ask repayment on the same day. It knows also that the new deposits each day tend to equal the amount of the withdrawals. Consequently, it feels safe in loaning out the largest share of the funds on deposit.

Sometimes a rumor of unsatisfactory conditions at a bank will cause depositors to become apprehensive of the safety of their deposits and will result in large withdrawals in short intervals. This is known as a "run" on the bank. Unless the bank can meet the sudden demand, it will be obliged to suspend operations. It was chiefly to meet this situation that the Reserve banks were formed. They enable a hard-pressed bank to turn some of its loans into cash to pay insistent depositors.

This machinery, particularly as recently liberalized to permit rediscounting of "approved" assets instead of "commercial paper" only, is designed to make longer-term loans no less safe for commercial banks than the 60- and 90-day loans to which they largely confined themselves in the past.

Bank Deposits. Banks accept funds on deposit from their patrons and make a corresponding credit in the deposit book of the patron and on their own books of account. It should be appreciated that the funds deposited immediately become the property of the bank and that the depositor becomes a creditor of the bank to that amount. Items which are payable at other banks are credited conditionally, subject to collection. If payment is refused at the other bank, the credit at the first bank is canceled.

Deposits are of two kinds, demand and time. A demand deposit is subject to withdrawal at any time at the option of the depositor. A time deposit may not be withdrawn before the expiration of the definite period for which the deposit was made. Time deposits are more satisfactory to the bank, because the institution knows in advance when withdrawal may be expected. Banks having their deposits insured by the government are forbidden to pay interest on demand deposits.

Deposit Insurance. Through an agency known as the Federal Deposit Insurance Corporation, the United States government insures all deposit accounts in all member banks of the Federal Reserve system and in other banks which are willing to pay for the service. On the failure of one of these banks, depositors are paid up to the amount insured.

Each deposit is insured up to $10,000. Cost of the insurance is defrayed by a levy of $^1/_{12}$ of one per cent on total deposits. All national banks having deposits insured are required to join the Federal Reserve system, but state banks may insure without joining.

Bank Checks. A check is an order drawn upon a bank by one who has funds in that bank to pay a certain sum to another party upon demand. The party to whom the check is payable may possibly present the check to that bank and secure cash from the bank. More probably, he will deposit the check in his own bank for credit to his account. Each day the banks exchange these checks, usually through a clearing house. In this way, the payee receives his funds without being obliged personally to present the check for payment, and the banks are relieved of the obligation of carrying large cash reserves to meet checks presented by individuals for payment. The depositors in a certain bank may during one day draw checks aggregating $10,000; yet that same day the bank may receive in deposits $15,000 in checks on other banks. The net result is an increase of $5000 in the funds of the bank, despite the fact that checks for $10,000 were drawn against it.

Payment by check is the most popular method in this country. At least three-quarters of the daily business transactions are settled on this basis.

Bank Loans. From the banker's viewpoint, he is in business to make loans. Deposits and withdrawals are simply a service which he offers as an inducement for customers, but which, of themselves, bring no profit to the bank. The bank profits, as has been stated before, from the interest it receives upon its loans.

Loans differ in thousands of ways. One man desires to borrow $1000 for ten days to meet his payroll at a time when his cash balance is low; a second man desires to borrow $10,000 to finance the purchase of one hundred shares of United States Steel Common Stock as a speculation for an indefinite period; a third man wishes to borrow $5000 for five years to buy a home; and so on. The first two men may receive accommodation at a commercial bank, but the third man will normally go to a savings bank.

Commercial loans should never exceed one year at the outside. A depositor is usually permitted to borrow in proportion to his bank balance. If he is well and favorably known, he will secure the credit upon his simple promissory note; otherwise, he may be obliged to pledge collateral as security. The more

marketable the collateral, the more satisfactory it is to the banker. The interest charge is usually collected in advance when the loan is made. The bank is usually less interested in what the borrower is going to do with the funds than it is in the chance for repayment; yet the two are closely interrelated. Often the depositor is expected to allow a part of his loan—about one-fifth—to remain on deposit to permit the bank to carry an adequate reserve.

Banks loan in proportion to their deposits. It is a popular misconception that banks make large profits because they loan in excess of deposits. A bank can loan in excess of its cash reserve but not conservatively in excess of its deposits. For the ordinary bank, the loans average about three-quarters of the deposits.

The total loans outstanding in the banks of the United States run into enormous figures. At the present time, the total is over 20 billion dollars.

Basis of Credit Granting. If the nature of the loan is satisfactory, the question whether or not it will be granted by the bank becomes almost purely a matter of the personal equation. The banker considers capital, capacity, and character. The *capital* of the prospective borrower is his financial worth, and this is shown by the statement of his assets and liabilities which ordinarily he is asked to submit. His *capacity* is his ability successfully to engage in business, and this is shown by the earning power he has demonstrated in the past. His *character* is his personal integrity, and this is reflected by his standing in the trade and by his reputation for honesty. The banker considers all three carefully in reaching his decision.

Rediscounting Loans. Banks which are members of the Federal Reserve system are permitted to rediscount customers' promissory notes. All loans are not eligible for this purpose, especially those which are made for stock speculation. The Cleveland Trust Company may lend $5000 to a manufacturer in Cleveland, and then have the Federal Reserve bank of Cleveland rediscount it, in the same manner as was previously mentioned in connection with the Montana bank. The rediscount privilege greatly increases the lending power of the member banks. But, more important, it allows the bank quickly to convert loans into cash in times of emergency. It is this rediscount privilege which is one of the strongest features of the Federal Reserve act.

Other Types of Loans. Other types of loans handled by commercial banks include drafts and acceptances. Brown in Albany buys merchandise from White in Buffalo on terms of thirty days. White may immediately draw an order upon Brown, payable in thirty days, and have this order, or draft as it is called, discounted at his Buffalo bank in the same manner in which he would discount his personal promissory note. An acceptance is a draft which bears the written acceptance of the party upon whom it is drawn that payment will be made when due. Many firms now have their customers sign acceptances upon receipt of goods. In this manner the firm is able to receive immediate payment through discounting the acceptance at its local bank. Otherwise the firm would have to wait until the invoice was due before receiving the money.

Types of Commercial Banks. Commercial banks are divided into two classes, depending upon the method of incorporation. National banks receive a Federal charter. State banks receive charters from the states in which they are located.

National banks are required to operate under the provisions of the National Banking act. The minimum capital is $25,000 for a country bank and $200,000 for a large city bank. Loans cannot be made to any individual in excess of ten per cent of the capital of the bank. They were formerly permitted to issue circulation notes backed by government bonds, but this privilege was discontinued on August 1, 1935.

GROWTH OF UNITED STATES SAVINGS IN SELECTED MEDIA

(In Billions of Dollars, at Year-End)

Year	Total	Savings Assns.	Mutual Svgs. Banks	Comm'l Banks (Time Deposits)	U. S. Savings Bonds
1940	34.7	4.3	10.6	15.3	3.2
1943	65.4	5.5	11.7	19.0	27.4
1944	86.3	6.3	13.3	23.9	40.4
1945	104.0	7.4	15.4	30.1	48.2
1946	111.8	8.5	16.8	33.4	49.8
1947	118.1	9.8	17.7	35.2	52.0
1948	123.5	11.0	18.4	35.8	55.0
1949	127.8	12.5	19.3	36.1	56.7
1950	131.2	14.0	20.0	36.3	58.0
1951	135.2	16.1	20.9	37.9	57.6
1952	142.8	19.2	22.6	40.6	57.9
1953	150.9	22.9	24.4	43.5	57.7
1954	167.8	27.3	26.3	44.7	57.7
1955	178.1	32.3	28.2	46.0	58.2

Source: United States Savings and Loan League.

National banks are permitted to have branches within states which grant this privilege to state banks. National banks must be members of the Federal Reserve system and of the Federal Deposit Insurance Corporation.

State banks operate under the banking laws of the respective states. These laws vary widely but, in the main, follow closely the Federal law. State banks are permitted, though not required, to join the Federal Reserve system if their capital is over a certain specified minimum.

Federal Reserve System. The Federal Reserve system is the machinery by which a central control may be exercised over the expansion and contraction of credit. Since credit is the life blood of trade and the state of trade governs the well-being of almost the entire population, the Reserve system may be said to be the most potent instrument for good or ill in American economic life.

Before this machinery for credit control is described, it should be noted that it cannot actually produce credit if there is no demand for credit, that is, if people do not wish to borrow. What it can do is to make credit easier or more difficult to obtain.

The Reserve system comprises 12 Federal Reserve banks and upwards of 6300 member banks. The Federal Reserve banks are located in the following cities: Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, Saint Louis, Minneapolis, Kansas City, Dallas, and San Francisco. Each Reserve bank may have branches.

The Federal Reserve banks are bankers' banks. Except under certain emergency conditions, they deal only with other banks. Their capital is subscribed to by the member banks to an amount equal to 6 per cent of the capital and surplus of each subscribing bank. Each Reserve bank is permitted to pay to stockholders from its earnings a cumulative dividend of 6 per cent of its paid up capital. The balance is transferred to reserve.

Purposes of the System. The two most important dates in the history of the Federal Reserve system are 1914 and 1936.

On the first of these dates, the system was established and most of the mechanisms were set up by which credit may be controlled.

On the second date, 1936, additional controls were provided, and all of them were placed in the guiding hands of one authoritative commission, known as the board of governors of the Federal Reserve system. The enabling law was passed in 1935.

The Reserve banks were created in the first place to prevent recurrence of the "money squeeze" known as the currency panic of 1907. They provided elasticity of currency, as explained under the paragraph *Federal Reserve Notes.*

The system was strengthened in 1936 to avoid, as far as possible, a recurrence of an unstable boom, such as that which preceded 1929, and the collapse of credit which followed.

The following paragraphs outline the chief features of the system. Under the headings *Pooling of Reserves, Rediscount Rate,* and *Open Market Operations* are described the credit control methods originally provided. The additional controls established in 1936 are explained under the headings *Raising of Reserves* and *Margin Requirements,* while, under *Board of Governors,* is described the way in which central control may be exercised.

Pooling of Reserves. Member banks not only subscribe to the capital of the Federal Reserve bank but are required to carry a portion of their reserves there. These reserves amount usually to 10 per cent of the banks' demand deposits (checking accounts) and 3 per cent of the time deposits (savings or interest accounts). Member banks in New York and Chicago must carry 13 per cent and those in small centers must carry 7 per cent of their demand deposits with the Reserve banks. These are basic reserve requirements which may be raised as explained below under *Raising of Reserves.*

The Federal Reserve banks, in turn, must carry as a reserve in their vaults at least 35 per cent of the deposits they have received from member banks. This reserve must be in the form of gold certificates or legal tender. They must also deposit in this reserve an amount equal to 40 per cent of all Federal Reserve notes in circulation.

To illustrate: The First National Bank of Albany may be assumed to hold one million dollars in demand deposits; it must, therefore, carry on deposit with the Federal Reserve Bank of New York as a reserve at least $100,000. In turn, against this deposit balance, the Federal Reserve Bank of New York must carry in gold certificates or lawful money in the Federal Reserve vaults at least $35,000, or only 3½ per cent of the deposits in the member bank. This reserve seems extremely low, but experience has shown that it is sufficient under ordinary conditions.

This pooling of reserves in a central institution has at least two distinct advantages. It reduces to a minimum the transfer of actual cash from one part of the country to another. When a check on a member bank in Bangor, Maine, is paid by a member bank in Fresno, California, money is not sent from Bangor to Fresno in settlement, but the transfer is effected by a debit and credit entry in the Federal Reserve books. This entry signifies the transfer of a definite amount of ownership in the so-called gold settlement fund, which is held in Washington. It is due to this procedure that there is usually no collection charge for checks drawn on member banks.

A second advantage from the pooling of reserves is the protection afforded a sound member bank when its deposits are withdrawn too rapidly. The Federal Reserve bank is in a position to come quickly to its support with enormous resources.

The means by which a member bank may command the liquid resources of the Reserve bank are normally two. It may rediscount "eligible paper" which it holds, as explained in the article *Federal Reserve Notes,* paying interest at the regular rediscount rate or at a slightly higher rate if the paper represents longer-term loans. Or it may borrow on its own promissory note secured by eligible paper or United States government obligations, such as Liberty bonds and treasury certificates.

FEDERAL RESERVE SYSTEM*
ASSETS AND LIABILITIES OF ALL MEMBER BANKS
(All money in millions of dollars)

	1930	1940	1955
Loans	$23,870	$15,321	$ 70,982
U. S. Gov't Obligations	4,125	15,823	50,697
Other Security Investments	6,864	5,982	13,860
Total Deposits**	37,029	56,430	163,757
Demand Deposits	18,796	33,829	105,400
Time Deposits	13,012	12,178	38,838
Capital Accounts	6,593	5,698	12,783
Number of Banks	8,052	6,486	6,543

*Source: Federal Reserve Board. **Includes interbank deposits, domestic and foreign, and U. S. Gov't and Postal Savings deposits.

Rediscount Rate. The Federal Reserve banks may exert a considerable effect on the expansion or contraction of business by two devices. One is raising or lowering of the rediscount rate. The other is known as open-market operations.

By raising the rate of interest charged member banks when they wish to borrow on eligible paper, a Reserve bank not only discourages borrowing but serves notice to the business community that it regards current expansion as excessive. On the other hand, by lowering the rediscount rate, it encourages borrowing and the consequent expansion of credit.

Open-Market Operations. By this term is meant the purchase or sale of government securities and bankers' acceptances by the Federal Reserve banks. These operations automatically expand or contract the nation's currency in circulation. When Jones sells a $1000 bond to Smith, there is merely a transfer of funds or credit from one individual to another. But when a Federal Reserve bank buys a $1000 bond, it issues new currency in payment. When it sells a bond, it retires the currency which it receives. Since the currency so created or destroyed may be made the basis of many times its face value in bank credit, it may be seen how large an influence the Reserve banks can exert on business conditions.

Raising of Reserves. This is the first of the new controls introduced into the Reserve system in 1936. Its purpose is to prevent a credit inflation by cutting down the amount of loans member banks may make. This is accomplished through raising, by a maximum of 100 per cent, the proportion of deposits which banks must keep in reserves. Under this rule, a New York bank might be required to maintain with a Reserve bank 26 per cent of its deposits and the Reserve bank itself to retain 70 per cent of its deposits in its vaults.

Margin Requirements. To check speculation on the stock exchanges, those in control of the Reserve system are empowered to set rules to govern the amount of money which may be lent to finance the purchase of a given value of securities. This applies both to member banks and to brokers doing business on stock exchanges. See *Margin.*

Board of Governors. The most important change in the banking system effected in 1936 was to place authority in the hands of the reserve board. The old board had the right to recommend use of controls and to see that policies pursued by the twelve Reserve banks were within the law. Actually control over each of the twelve banks was exercised by officers of those banks, who were private bankers and not public officials. Concerted action by the entire system was difficult if not impossible to effect.

The new board, consisting of seven members appointed for 14 years by the president, with the advice and consent of the Senate, is armed with actual control. Its decision is mandatory in setting the rediscount rate, reserve requirements, and margins for security speculators. Policies for open market operations are set by a committee consisting of the seven board members and five representatives of the Reserve banks, chosen regionally.

Furthermore, the presidents of the twelve Reserve banks must be acceptable to the board of governors. Additional assurances that the system shall be operated in the public interest rather than for the profit of bankers include a provision that members of the board of governors may not return to the private banking business for two years after the expiration of their terms of office.

The policy of the board is insulated from influence of the executive branch of the government through a requirement that the terms of members

expire in rotation at two year intervals. It would take six to eight years for a president to have his appointees form a majority of the board.

The reason for this precaution is to prevent the government from using the banking system as a source of indefinitely large Federal loans if the Federal Reserve board does not agree with the policy.

Government as Banker. The Federal government began providing credit for its citizens with the establishing of the Farm Loan Banks in 1916. See *Farm Loan Banks*. These banks were provided for farmers who demanded mortgage money for farm property at rates comparable to those prevailing in cities.

Both World War I and World War II brought a vast expansion in government lending. Through the War Finance Corporation, Federal funds were advanced to private corporations for the purpose of enabling them to forestall serious failures in financial institutions during the deflation period of the early 1930's. Banks, insurance companies, and later, railroads, states, school districts, and even private individuals were beneficiaries. The Federal Deposit Insurance Corporation was created by the Act of 1933 and made permanent in the Banking Act of 1935. Through this act the insurance of deposits was made mandatory for members of the Federal Reserve system and optional for sound non-member banks. Deposits in insured banks are fully protected up to $5000 for each depositor. This provides 100 per cent insurance coverage to the vast majority of all the depositors in the insured banks of the country.

Federal Credit Unions. Two forms of credit constitute the credit structure of American business: investment credit and commercial credit. The Federal government adopted the National Banking Act of 1863 by which it chartered national banks; about 5000 such banks were in existence at the beginning of 1951. Twelve Federal Reserve banks were chartered by the U. S. Government in 1914 and since then have established 24 branches. In 1916, the Federal Farm Loan act authorized the creation of special types of mortgage banks, designed to help finance agriculture. In 1932 Federal Home Loan banks were created for the financial needs of prospective home owners and the same year the Reconstruction Finance Corporation was created by Congress to help meet an emergency situation. With a capital of 500 million dollars, the RFC loaned to banks themselves funds to liquidate frozen credits and to strengthen their capital structures. The Home Owners Loan Corporation provided capital for individual home purchasers and, in the financial operations of World War II, the Reconstruction Finance Corporation, through such affiliates as the Defense Plant Corporation and the Defense Supplies Corporation, provided investment of billions of dollars.

UNITED STATES AID TO EUROPE*

First Five Years of Grants and Loans, 1948–1953

Austria	$ 726,100,000
Belgium-Luxemburg	556,500,000
Denmark	278,900,000
France	3,103,800,000
Federal German Republic	1,472,600,000
Greece	773,900,000
Iceland	34,600,000
Irish Republic	146,200,000
Italy	1,577,800,000
Netherlands	980,100,000
Norway	274,700,000
Portugal	49,800,000
Sweden	106,800,000
Trieste	31,800,000
Turkey	277,500,000
United Kingdom	3,585,500,000
Total	$13,976,600,000

*More than 90 per cent of the funds were grants not to be repaid, the balance in loans. The money was spent for food, fuel, raw materials, machinery, and technical help. Part of the aid was in support of the defense programs of the North Atlantic Treaty Organization countries; but the figures do not include the cost of finished military equipment supplied by the United States.

In 1933 there were organized the Federal Farm Mortgage corporation, to refinance farm mortgages in distress, and the Home Owners Loan Corporation, to prevent foreclosures on urban residences. The Federal government owns the stock of the corporations, while their bonds were issued to private individuals in exchange for defaulted mortgages after these had been readjusted to less onerous terms. The bonds are guaranteed by the government. Their total reached about five billion dollars, two-thirds having been used for aid of city dwellers and the remainder for safeguarding farm ownership.

Additional banking aid for farmers includes: 12 intermediate credit banks, which discount agricultural paper as the Federal Reserve banks do commercial paper; 12 production credit corporations, which lend money for general farm transactions much as the Federal Land banks do for purchase of farms; and one central bank and 12 regional banks for financing farm co-operatives. In all these agencies, the government owns the stock but most of the capital comes from private investors.

Thousands of co-operative savings and loan associations have been organized pursuant to the Federal Credit Union act of 1934 and subsequent amendments, and pursuant to similar legislation enacted in all but a few of the 48 states.

Savings Banks. As the name indicates, savings banks aim to provide a place to safeguard the savings of the people. The funds are invested in securities of the highest class, and the income is distributed to the depositors in the form of interest. In New York State, all savings banks are mutual, which means they are owned by and operated for the depositors. The entire investment income becomes the property of the depositors after the payment of expenses. The entire amount is seldom distributed, however, as a certain part is placed in a surplus account for the protection of the accounts. It is the custom to limit the maximum balance to a few thousand dollars.

Savings and Loan Associations. This type of financial institution is chartered by both the state and Federal governments for the development of thrift and home ownership. They are also identified by such corporate names as building and loan associations, building associations, homestead associations, and co-operative banks. Their function is simple since they accept savings from the public in large and small amounts regularly or irregularly at the convenience of the savings customers. Investments are generally limited by law to loans, repayable monthly, to persons buying or building homes. To a limited degree funds can be invested in other real estate loans, U. S. government obligations, and municipal bonds. As a result of this specialization in home financing, these associations provide more home loans than any other type of financial institution. The depositor subscribes for a certain number of shares and pays in regular installments in the form of dues. At maturity, the depositor has paid in full a loan made at the time of subscription, or is entitled to receive the face value of the subscription. Earnings are paid to savers either by crediting their account or by check at the average rate of from 2% to 3%.

An instrumentality of the Federal government, the Federal Savings and Loan Insurance Corporation insures savings account holders as to the safety of their funds up to $10,000. Of the 6000 of these associations in existence, 2800 are insured. The Federal Home Loan Bank System, to which the majority of associations belong, makes available credit to even out the demands for funds from borrowers and savers with the supply of funds coming in from loan repayments and savings receipts.

Federal Home Loan Bank System. Twelve regional Federal Home Loan banks were originally

established in 1932 to serve as a reserve credit agency for savings and loan associations, mutual savings banks, and life insurance companies. In 1943, two of the banks were merged, leaving 11 in operation today. While the Federal government supplied the initial capital of $125 million, apportioned among the regional banks, members bought capital in the bank to which they became a member, equivalent to 1% of their net home mortgage loans. Members of the Home Loan Bank System are entitled to obtain advances on an unsecured basis for a term up to one year or on a ten year term basis where the loans are secured by mortgage loans. The banking system raises its funds through the issuance of bonds and debentures which are the consolidated obligation of all the banks in the system. Also, members of the bank system may deposit funds at interest which likewise provides the system with funds to lend to members.

Federal Savings and Loan Insurance Corporation. This corporation was established in 1934 to insure the savings accounts of all types of savings and loan associations. Originally, this guarantee of safety was limited to $5000 but in 1950 it was raised to $10,000. In the event of an insured institution becoming insolvent, the insurance corporation makes up any impairment to make it possible for all account-holders to receive 100% of their accounts up to the insurable limits. The original capital of $100-million was provided by the Federal government, which capital is being retired out of the premiums paid by insured institutions for this insurance of accounts. The premium rate originally was ¼ of 1% of insured accounts, but in 1950 it was reduced to 1/12 of 1% of insured accounts.

Federal Housing Administration. This corporation was established in 1934 to insure mortgage loans made to finance the construction, improvement or purchase of all types of residential property. Loans made on the FHA plan are originated by any type of financial institution that is making mortgage loans. The loans to be insured are submitted to the FHA and upon acceptance a premium is paid by the borrower of ½ of 1% per annum. The protection of insurance is given to the lender in return for his willingness to make high percentage, long-term loans. Whereas most lending institutions are confined, on their loans on residential property, to 60% to 80% of value, FHA loans can be made for as high as 95%.

The Veterans Loan Guarantee. As a part of the Veterans Rehabilitation Act of 1945, provision was made for loans to be made by private lending institutions to veterans for as much as 100% of the purchase price or the construction cost of homes for terms up to 25 years at a rate of 4%. The lenders making these loans were originally protected with a guaranty up to $2000 or 50% of the loan. These guarantees were increased in 1950. In the first five years of the operation of this program, 2½ million veterans acquired homes on this plan.

Ratios to Determine Credit Strength. Some banks use ratios to determine credit strength or the immediate ability of the applicant to meet current liabilities. This procedure is used to find the ratio of cash, receivables, and marketable securities to current liabilities. This ratio is known as the "acid-test" or "quick" ratio. Inventories are omitted on the principle that they are not liquid assets. If the marketable securities are stocks that fluctuate violently, they should be omitted from the acid-test ratio. One dollar of quick current assets to one dollar of current liabilities is generally regarded as acceptable; i.e., a ratio of 100 per cent, or 1 to 1, is the accepted standard in banking.

MONEY UNITS OF PRINCIPAL COUNTRIES

With Equivalents in United States Dollars

Country	Monetary Unit*	Value in U. S. Money†	Country	Monetary Unit*	Value in U. S. Money†
NORTH AMERICA:			Germany	Reichsmark	.40
United States	Dollar	$1.00	Great Britain‡	Pound	8.24‡
Canada ‡	Dollar	1.69 ‡	Greece	Drachma	.02
Mexico	Peso	.84	Hungary	Pengo	.30
British Honduras	Dollar	1.69	Italy	Lira	.09
Costa Rica	Colon	.79	Latvia	Lat	.33
Cuba	Peso	1.00	Lithuania	Litas	.17
Dominican Republic	Dollar	1.69	Netherlands	Guilder (florin)	.68
Guatemala	Quetzal	1.69			
Haiti	Gourde	.20	Norway	Krone	.45
Honduras	Lempira	.85	Poland	Zloty	.19
Newfoundland	Dollar	1.69	Portugal	Escudo	.07
Nicaragua	Cordoba	1.69	Rumania	Leu	.01
Panama	Balboa	1.69	Russia	Chervonetz	8.71
Salvador	Colon	.85	Spain	Peseta	.33
			Sweden	Krona	.45
SOUTH AMERICA:			Switzerland	Franc	.33
Argentina	Peso	1.63	Turkey	Piaster	.07
Bolivia	Boliviano	.62	Yugoslavia	Dinar	.03
Brazil	Milreis	.20	ASIA:		
Chile	Peso	.21	China	Yuan	.29
Colombia	Peso	1.65	India, British	Rupee	.62
Ecuador	Sucre	.34	Indo-China, French	Piaster	.66
Paraguay	Peso	1.63	Japan	Yen	.84
Peru	Sol	.47	Persia	Rial	.08
Uruguay	Peso	1.75	Philippine Islands	Peso	.50
Venezuela	Bolivar	.33	Siam	Baht (tical)	.75
			Straits Settlements	Dollar	.96
EUROPE:			AFRICA:		
Austria	Schilling	.24	Egypt	Pound (Turk.)	8.37
Belgium	Belga	.17			
Bulgaria	Lev	.01	Liberia	Dollar	1.69
Czechoslovakia	Koruna	.04	South Africa, Union of	Pound	8.24‡
Denmark	Krone	.45			
Estonia	Kroon	.45	AUSTRALASIA:		
Finland	Markka	.04	Australia	Pound	8.24‡
France	Franc	.07	New Zealand	Pound	8.24‡

*With the exception of China, all countries appearing in this list are on the gold standard, their monetary units being defined as a certain number of grains of pure gold. The Chinese Yuan is defined in terms of the pound sterling, the British monetary unit.

†Values given are for the units as legally defined. Since very few of the countries actually redeem their currency in gold, the realizable value of the units in dollars frequently departs widely from the legal values.

‡Exchange value of the pound fluctuated around $4.00 (1951-around $2.80); of the Canadian dollar around $0.95.

BUSINESS, BANKING, AND LEGAL TERMS

THE everyday life of the average man or woman brings frequent occasions which demand the ability to understand and use many terms peculiar to business, banking, or the law. To know the nature and the meaning of commercial forms and legal instruments is to be acquainted with the necessary working tools of the business world. Every person needs to know what these tools are and how they are used.

The treatment of the topics in the following dictionary of business, banking, and legal terms is adapted to meet such everyday needs. This alphabetic list will supply definite information upon specific subjects, and it will supplement with greater detail the chapters that precede it in the department of Economics.

Acceptance. A term used broadly to designate any bill of exchange which has been accepted by the drawee—the person upon whom it is drawn.

The term is more narrowly and appropriately used with reference to the act of the drawee in accepting the bill of exchange, by writing upon the face of the bill the word "accepted" and signing his name as acceptor. The date of acceptance and the place of payment are generally added. These, however, are not essential to the validity of the acceptance. After the bill has been accepted, it becomes the direct obligation of the acceptor, and the drawer of the bill then becomes liable to pay the amount of the bill only in the event that the acceptor does not pay it.

A bank or banker's acceptance is a bill of exchange of which the acceptor is a bank or trust company or some person, firm, or corporation which makes a business of lending its credit by accepting bills of exchange.

A trade acceptance is a bill of exchange drawn by a seller upon a purchaser to cover a current sale of goods. Ordinarily, the trade acceptance is drawn by the seller payable to himself, and the acceptance of the bill by the purchaser converts the bill into what is substantially the same as a promissory note. The trade acceptance, however, bears upon its face the statement: "The obligation of the acceptor hereof arises out of the purchase of goods from the drawer"; and it is made a crime under the Federal laws to use a trade acceptance in interstate commerce for any other purpose than in payment for an original purchase of goods. See *Bill of Exchange, Payee.*

Acceptor. One upon whom a draft or bill of exchange is drawn, and who, by writing his acceptance upon the face of the bill, has undertaken to pay the amount of the bill.

Acceptor for Honor. One who accepts a bill drawn upon another, in order to prevent the bill from being protested for nonacceptance or nonpayment. Thus the acceptance is deemed to be for the "honor" of the person upon whom the bill is drawn.

Accommodation Paper. An instrument by which one person lends his credit to another. Usually, but not necessarily, the transaction involves no financial profit to the person lending his credit. The accommodation may take the form of signing a note as maker or endorser, or of drawing, accepting, or endorsing a draft or bill of exchange, or otherwise affixing one's name to a commercial instrument in such manner as to become liable in the event that the instrument is not paid when due by the person receiving the accommodation.

Accounts Payable. Sums owing by a person, partnership, or corporation to others upon open account, the obligations not being represented by notes, bills, or other instruments of indebtedness. See *Bills Payable.*

Accounts Receivable. Sums due to a person, partnership, or corporation from others upon open account, the obligations not being represented by notes, bills, or other instruments of indebtedness. See *Bills Receivable.*

Accrued Dividends. A term improperly applied to dividends which have not been paid or declared, but which are loosely regarded as having "accrued" because the stock upon which the dividends are payable entitles the holder to cumulative dividends at a specified rate. In fact, a stockholder can have no right to dividends until they have been declared by the board of directors of the company. See *Preferred Stock.*

Accrued Interest. While interest upon an obligation usually becomes due and payable at the termination of some definite period or periods of time, the interest upon the obligation, in fact, accrues from day to day. In the purchase and sale of securities between interest payment dates, the amount of interest accrued must be added to the face value of the obligation in order to determine the actual present value. Similarly, an exact statement of the financial condition of a business at any particular moment must include among the liabilities of the company the item of accrued interest upon interest-bearing obligations of the company held by others. A similar item will also be included among its assets, representing interest accrued upon interest-bearing obligations of others held by the company. Interest already due and unpaid is not properly included in the item of accrued interest.

Active Stocks. Stocks that are frequently bought and sold upon the general market in considerable quantities.

Actuary. One whose business is the formulation of mortality tables based upon statistics of the death rates per unit of population within different periods of life and among different groups of people. Upon these mortality tables, rates of insurance, values of annuities, and values of remainder interests in property are based.

Ad Valorem Duties. Taxes imposed upon articles according to their value.

Affidavit. A written statement sworn to or affirmed before some person who has authority by law to administer an oath. Affidavits are prescribed by law for proper execution of many documents. They are frequently used in place of oral evidence at court trials. Their proper substance is confined to statements of fact regarding which the witness has certain knowledge. Making a false statement in an affidavit is the crime of perjury.

Agent. One hired to carry on certain activities for an employer. The person employing the agent is known as the principal, and is bound by any acts performed by the agent within the scope of the agent's employment. The principal is liable also for any damages sustained by third persons from wrongful acts committed by the agent in the course of his employment.

Frequently it is difficult to distinguish an agent from an independent contractor. Under a mere agency, the employer may direct and supervise the work of his agent, both in large matters and in details. In the case of the independent contractor, this power of supervision does not exist.

Agio. The rate at which the money of one country exchanges with the money of another country; also applied to the rate at which one kind of money, such as gold, exchanges with another kind of money in the same country.

Amortization. The setting aside periodically, out of revenue or earnings, of a definite proportion of the initial cost of machinery, plant, or other capital investment, for the purpose of providing a fund with which to replace the machinery or equipment when it has become worn out.

The term is applied also to the building up of a fund for the retirement of a loan when it becomes due.

Ancillary Receiver. A receiver appointed in a state or a district other than the one in which the principal or original proceedings have been begun. The duties of an ancillary receiver are to gather in and administer property in the state or the district of his appointment. See *Receiver.*

Arbitrage. Purchasing exchange, securities, or commodities in one market, and selling immediately at a higher price in another market. This practice tends to keep the price of a particular security or commodity at substantially the same level at any particular time in all markets of the world.

Assay Office. A bureau connected with the United States mint, in which the weight and fineness of metals used in the coining of money are tested and certified to.

Assessed Valuation. The value placed upon property by government or municipal officials as a basis for the imposition of taxes. Frequently the assessed valuation of property is considerably below its real or market value. In most communities, the assessed valuation averages from about 60 to 80 per cent of the true value of the property.

Assessment. (1) A tax or charge imposed upon property to defray a part of the cost of a local improvement by which the property has directly benefited. Assessments for paving and cleaning streets, for installing sewers, and for widening streets are of this character.

(2) A levy made by a company upon its shareholders for the purpose of securing additional capital. The stock of most business corporations is today nonassessable if the par value of the stock has once been fully paid in cash or its equivalent. However, stockholders in banking and similar corporations are generally subject to assessment to make good any impairment of capital, and to pay the obligations of the company in the event of its insolvency, even though their stock has been paid in full.

Assets. Anything of material value belonging to a person, firm, or corporation. The term includes, not merely real property and tangible personal property, but also good will, copyrights, patent rights, and all other rights, privileges, franchises, and property interests having any value.

Assignee. One to whom any contract, right, security, or interest has been assigned.

Assignment. The transfer to another of one's interest in a contract, security, or any other thing of value. Except in the case of negotiable instruments, an assignee receives no better title to the thing assigned than his assignor had.

A "general assignment for the benefit of creditors" is sometimes made by a debtor who is insolvent or financially embarrassed. The assignment takes the form of a transfer, by the debtor, of all his assets to a trustee. The purpose of such an assignment is to show the good faith of the debtor and his willingness to distribute his assets among his creditors. If satisfied that the debtor has not withheld assets from the trustee, the creditors will join in a composition agreement whereby each creditor agrees to accept, in satisfaction of the debt, a certain percentage of the amount due him. If all the creditors join in the composition agreement, the property of the debtor can be equitably distributed among the creditors, without the stigma and the wastage of assets which bankruptcy proceedings would entail. Any group of creditors, however—sometimes one creditor is sufficient—may refuse to enter into this plan for an informal distribution of the debtor's assets, and may insist upon formal bankruptcy proceedings; and the general assignment is itself a sufficient ground for the institution of bankruptcy proceedings against the debtor.

Assumed Bonds. Bonds issued by one corporation and assumed by another, as a result of a merger or consolidation of the two companies, or as a result of the acquisition of the control of the former company by the latter. The bonds so assumed become the liabilities of the second corporation as though such bonds had originally been issued by it.

Attachment. A writ issued by a court of competent jurisdiction, authorizing the seizure of a person or of designated property.

Audit. An examination by an accountant of the books of a person, firm, or corporation, to determine whether there are any arithmetical errors or fraudulent entries in the accounts, or whether any improper methods of accounting have been employed.

Available Assets. Property, personal or real, not already pledged or otherwise encumbered, that can be sold, pledged, or mortgaged as security for a proposed indebtedness.

Balance of Trade. A term applied to the relation between the volume of exports and the volume of imports of a country. Where the exports from a country exceed its imports during any period, the balance of trade is said to be "favorable." Where imports exceed exports, the balance of trade is regarded as "unfavorable." It is so regarded largely because an excess of exports is likely to be accompanied by an influx of gold—in payment of the excess of products sent abroad. And, vice versa, an excess of imports may result in a flow of gold out of the country.

As a matter of fact, however, an excess of imports frequently indicates merely that the citizens of a country have loaned or invested heavily abroad and are receiving the income upon their investments, or repayment of the principal, in merchandise. When this is the case, there can be no harm in an "unfavorable" balance of trade.

Balance Sheet. A statement of the assets, liabilities, and net worth of an individual, firm, or corporation as of a certain date.

Bank Acceptance. See *Acceptance.*

Bank Balance. The amount credited to a customer or a depositor by a bank at any particular time. This sum does not represent actual currency in the custody of the bank to the amount of the balance; rather, it represents the amount of an obligation due from the bank to the customer or depositor. In the ordinary deposit in a commercial bank, the amount of this balance is subject to withdrawals upon written orders called checks, drawn by the depositor upon the bank.

Bank Book. A book, issued by a bank to a depositor, in which the deposits made with the bank are recorded. The bank book issued by the ordinary commercial bank is nothing more than a receipt; and a transfer of the book by the depositor to another, whether as a gift or for value, will not ordinarily transfer the ownership of the deposit. A bank book, issued by a savings bank, however, is for many purposes regarded as a symbol of the deposit itself; and, in some states, a gift, or a transfer for value, of a savings bank book gives to the transferee a valid claim against the bank, to the extent of the deposit represented by the book.

Bank Discount. Simple interest deducted in advance from the face value of a loan, the principal of which is payable at a definite future date. By thus taking the interest before it is earned, a slightly higher rate of interest than the rate nominally charged is actually received by the bank, since the full amount of the principal is never turned over to the borrower. Banks, however, are very generally permitted to indulge in this practice, even though the interest which they thus obtain is in excess of the legal rate of interest.

Bank Draft. An order in writing, drawn by one bank upon another, directing the latter to pay a designated sum of money to a third person. The draft may be payable at sight, that is, on demand, or at a definite or determinable future time.

Banker's Acceptance. See *Acceptance.*

Bank Examiner. Both state and national banks, as depositories of the funds of the general public, are subjected to stringent control and supervision by the respective state and Federal authorities. This control is exercised by examinations of the books of the banks, made periodically by bank examiners acting under the authority of the comptroller of the currency, or under the direction of the banking department of a particular state. In addition, the Federal Deposit Insurance Corporation is empowered to examine the books of state banks which are not members of the Federal Reserve system. Such examinations supplement and check the statements which banks are required to furnish, setting forth in detail the financial condition of the institutions. Any fraudulent or false entries or unsafe practices discovered by the bank examiners are reported to the proper officials, and the bank guilty of the improper practice or false entry is promptly required to rectify the situation. These examinations of the records and accounts of banks by trained examiners have proved to be a most effective safeguard against dishonest and improper practices by banks and bank employees.

Bank Note. An instrument containing a promise of a bank to pay to the bearer on demand a definite sum in legal tender. These notes commonly bear no interest. When safeguarded by an adequate redemption fund, so as to be redeemable upon presentation by a holder, and when carefully limited and supervised by governmental authorities, bank notes may circulate at par as a part of the paper currency of the country. Prior to 1837, bank notes were issued, in unlimited quantities and without adequate security, by numerous state banks. When a number of these issuing banks failed in the panic of 1837, many persons who held what appeared to be currency found that they had only worthless promises to pay.

By the National Bank act of 1862, a tax of 10 per cent was imposed on bank notes issued by state banks, and national banks were permitted to issue bank notes only by depositing, with the United States treasury, certain bonds of the United States government to an amount equal to the face of the notes to be issued. The bonds eligible for this purpose were retired in 1935, a procedure which ended the note-issuing privilege of national banks. The tax of 10 per cent upon notes issued by state banks was intended to be prohibitive and was in fact so. Federal Reserve banks were formerly permitted to issue "Federal Reserve bank notes" in the same manner as the national banks but this privilege expired also in 1935. See *Federal Reserve Notes.*

Bank of Deposit. Any bank which receives deposits subject to withdrawal by check. National banks, state banks, and, in many states, trust companies are included within the general class of banks of deposit.

Bank of Issue. A bank legally authorized to issue bank notes which may circulate as currency. Only Federal Reserve banks are banks of issue in the United States. The Bank of England and the Bank of Paris are the leading banks of issue in Europe. The National Canadian bank is the bank of issue for Canada.

Bankrupt. One who has been adjudicated a bankrupt, in proceedings under the National Bankruptcy law.

Bankruptcy. Proceedings under which the property of an insolvent debtor may be distributed ratably among his creditors under the supervision of a court, and the bankrupt be thereupon discharged of his debts. Bankruptcy proceedings thus serve two purposes: (1) the equitable distribution of the property of the debtor among his creditors; (2) the release of the debtor from his obligations, giving him a fresh start in the business world.

Bankruptcy proceedings in the United States are governed by the Federal Bankruptcy act of 1898 and the amendments thereto. Under this act, proceedings may be either "voluntary" or "involuntary." In the former, the debtor himself institutes the proceedings by filing a voluntary petition showing that he owes debts to the amount of at least $1000, which he is unable to pay. In involuntary proceedings the creditors file the petition. Three or more creditors with unsecured claims amounting to at least $500, or, if there are fewer than twelve creditors, one creditor with a claim amounting to $500 may institute the proceedings.

A debtor may be adjudicated an involuntary bankrupt only if, within four months prior to the filing of the petition, he has done one or more of the following acts: (1) concealed, removed, or otherwise fraudulently disposed of property with intent to hinder, delay, or defraud his creditors; (2) transferred property, while insolvent, to any creditor, with intent to prefer that creditor over others; (3) permitted a creditor to obtain a preference by legal proceedings, as by attachment or levy upon goods of the debtor, and failed to vacate the preference at least five days before a sale under the levy or attachment; (4) made a general assignment for the benefit of creditors; (5) being insolvent, applied for a receiver, or if a receiver has been appointed at the request of creditors.

Wage earners receiving less than $1500 a year and farmers cannot be adjudicated bankrupts. Claims for torts, that is, injuries to person or property, usually may not be proved in bankruptcy proceedings, and are not affected by the discharge of the bankrupt.

Bank Statement. A statement issued by a bank or trust company, setting forth in detail its assets and liabilities, together with its capital stock and surplus profits.

The term "bank statement" is sometimes applied also to a statement of financial condition supplied to a bank by one seeking a loan, to enable the bank to determine whether the loan should be made.

Bar Gold. Gold in the form of bars, of a specific weight and fineness. When gold is shipped from one country to another in payment of obligations, it is shipped in the form of bar gold.

Baring Panic. A panic in England in 1890, which came at the end of a period of violent overspeculation. The failure of the brokerage house of Baring Brothers precipitated the panic which at once spread to a number of other banks and brokerage houses. The intensity of the panic was alleviated by loans of gold obtained by the Bank of England from the Bank of Saint Petersburg and the Bank of France.

Bar Silver. Silver in the form of bars, of a specific weight and fineness.

Bear. A stock or commodity speculator who gambles on the prospect of prices going down. The "bear" sells, for future delivery, stock or wheat which he does not then have, expecting to cover, that is, buy in, at a lower price than that for which he has agreed to sell, at some time before delivery must be made.

Bear Market. A condition of declining prices in securities or commodities, generally accompanied by little activity in the market and by a general depression in trading.

Bear Panic. When those who have sold "short" in any security or commodity find that the market is rising, they attempt to cover in order to keep their losses as low as possible. When the rise in prices is very sudden or very pronounced, the haste of the "bears," to cover their sales by buying in on the market, reaches the point of a veritable panic. See *Cover, Selling Short.*

Bear Raid. A concerted movement by those traders who make a business of selling "short" on stock or commodity exchanges, the purpose of which is to cause the market price of a certain stock or commodity to fall. This result is effected by sales of the stock, against which the raid is directed, at prices below the true market value of the stock. In the case of a successful "bear raid," these sales, which usually provide for delivery at some future time, result in a very pronounced temporary fall in the price of the stock, the public being afraid to hold a stock, the price of which is apparently on the down grade. When the market price has thus been hammered down to an artificially low price, the bears "buy in" and so cover at a profit their earlier sales for future delivery.

Bids and Offers. The rules of the New York stock exchange provide definite terms upon which bids and offers must be made and construed in dealings upon the exchange. These are: "cash," that is, for delivery upon the day of contract; "regular way,"—for delivery upon the business day following the contract; "at three days,"—for delivery upon the third day following the contract; "buyers' or sellers' options,"—for not less than four days nor more than sixty days. Unless otherwise specified, bids and offers are deemed to be "regular way."

Bill of Exchange. An unconditional order in writing, addressed by one person (called the drawer) to another (called the drawee), requesting the person to whom it is addressed to pay on demand, or at a fixed or determinable future time, a definite sum of money to the order of a third person (called the payee). The term "draft" is used in the United States with respect to domestic bills of exchange.

A check is in effect a bill of exchange drawn upon a bank, payable upon presentation or at sight. See *Acceptance, Check, Draft.*

Bill of Lading. A receipt given by a railroad or other carrier, stating that the goods described in the receipt have been received by the carrier for transportation to a designated point, and setting forth the terms of the contract between the carrier and the shipper under which the goods are transported. There are two kinds of bills of lading in use in the United States. One is the so-called "order bill of lading," and the other the so-called "straight bill of lading."

In the "order bill of lading," the carrier undertakes to deliver to the *order of* a designated person, and only upon the surrender of the document. In the "straight bill of lading," the carrier merely undertakes to transport and to deliver to the person named as consignee in the bill of lading; the surrender of the bill of lading is not made a condition precedent to the surrender of the goods by the carrier.

The distinction between the order bill and the straight bill has become very important by reason of the effect which the law has given to order bills of lading. Since the order bill may be negotiated from one holder to another by mere endorsement and delivery, and since the carrier undertakes to deliver the goods represented by it only upon a surrender of the document, the order bill has come to be dealt with commercially as the symbol of the goods. Thus loans are frequently made upon the security of properly endorsed bills of lading, the lender being protected by the assurance that the carrier will not deliver the goods represented by the bill of lading except upon the surrender of that instrument properly endorsed.

In order to further the use of the order bill of lading as an instrument in commerce and as the basis for the advance of credit to owners of goods in transit, 39 states have passed the Uniform Bill of Lading act, which makes the order bill of lading in effect a negotiable instrument and protects from loss all bona fide purchasers of such bills, as well as persons who lend upon the instruments, even though the bill of lading itself may have been lost by, or even stolen from, the true owner. The Uniform Bill of Lading act also forbids any attachment of, or interference with, goods in transit represented by an order bill of lading, unless the negotiation of the bill has first been enjoined and thus its transfer to a bona fide purchaser or lender has been rendered impossible. The Uniform Bill of Lading act has been passed by Congress, and has thus been made applicable to all shipments in interstate and foreign commerce.

The straight bill of lading possesses none of these peculiar attributes that the law has given to the order bill. The straight bill of lading, therefore, does not in any sense represent the property in the possession of the carrier, and cannot form the basis for a loan upon the goods. The duty of the carrier, where a straight bill of lading has been issued, is merely to deliver to the person named as consignee, and this duty remains unchanged and unaffected by any attempted dealing with the bill of lading.

Bill of Sale. A written instrument transferring or assigning, from one person to another, personal property or any interest therein.

Bills Payable. Obligations owing to others, represented by bonds, notes, or other instruments of indebtedness.

Bills Receivable. Obligations due from others, represented by notes, bills, or other instruments of indebtedness.

Bimetallism. The free and unlimited coinage of both gold and silver as the basis of the monetary system. The bimetallic system has been abandoned in all Western countries. The single gold standard was not definitely adopted by the United States, however, until 1900.

Black Friday. September 24, 1869. A day when the "bears" of the New York stock exchange were practically ruined by a "bull" movement engineered by Jay Gould and Jim Fisk, which caused an unprecedented rise in the prices of speculative stocks upon the exchange. The movement was precipitated by the redemption by the United States of $4,000,000 of its bonds in gold.

Blanket Mortgage. A mortgage which covers several different properties, or one mortgage which is issued in place of several existing mortgages. Such a mortgage is not necessarily a first mortgage.

Block of Stock. A number of shares of stock held by an individual or by a group in a particular corporation.

Bond. An instrument by which a person, corporation, or government agrees to pay a certain sum of money on a determinable date. Bonds are usually given under seal and, in many states, are enforceable for a period of twenty years after their maturity; while the ordinary promissory note, or contractual obligation, is not enforceable after the lapse of six years from the date when the obligation matured.

Bonded Debt. The amount of the indebtedness of a government, a corporation, or an individual, represented by bonds issued and outstanding. The bonded debt is taken to represent the fixed or permanent indebtedness, as opposed to current or short time indebtedness, which must be paid or renewed currently.

Bonus. Stocks and bonds are frequently sold under a plan which purports to give to the purchaser a "bonus"—a nominal interest in the corporation in excess of the amount paid by the purchaser for the securities. Thus, stock selling schemes have frequently provided for the sale of two classes of securities or two classes of stock, the purchaser paying the par value of one class of security and receiving in addition thereto a further interest in the company as a bonus.

A not unusual plan is to offer one share of preferred stock having a par value of $100, together with one share of common stock also having a par value of $100, for a total purchase price of $100, the common stock being thrown in as a "bonus." In fact, stock which is thus issued as a bonus is valueless until some surplus has been created in the corporation beyond the amounts actually received by the company in exchange for the stock issued. Moreover, persons who receive stock as a bonus, pursuant to such a selling plan, may, under some circumstances, be compelled later to pay the par value of the stock so received to the corporation or to its creditors. This is true even though the stock which they have received as a bonus purports on its face to be fully paid and nonassessable. The newer plans for the flotation of stock avoid some of the legal dangers heretofore involved in the acceptance of bonus stock, by issuing the bonus stock without any nominal or par value.

The term "bonus" is frequently used also with reference to the sum paid by a borrower to a lender or his agent, as a consideration for granting or obtaining a loan. Frequently the bonus is merely an attempt to circumvent the usury laws, and, where that is the case, the law will see through the device and deem the loan usurious and unlawful.

Books Closed. The books of a corporation are usually closed as of a certain date, for the purpose of determining what persons are entitled as stockholders to share in a dividend to be declared, or in other distributions to be made by the company, or to determine who are entitled to vote as stockholders in any stockholders' meeting of the company. During the period when the books are closed, no transfers of stock are made on the books of the company. For all corporate purposes, the holders of record, as of the date upon which the books are closed, are deemed the stockholders of the company until the books are again opened to transfers of stock.

The term "books closed" is sometimes used also with reference to subscriptions to a new issue of securities, when the issue has been fully subscribed. In the event of oversubscription, the issue is frequently prorated among all who have sent in subscriptions. But, unless the right to prorate the issue among the subscribers has been specifically reserved in the offer of sale of the securities to the public, a subscriber is not obliged to accept less than the full amount called for by his subscription.

Book Value. The value of the assets of a company as set forth upon the books of the company.

The book value of a share of stock issued by a company, as distinguished both from its par value and from its market value, or selling price on the market, may be obtained by dividing the net assets of the company by the number of outstanding shares. If the books of the company are accurately kept, the book value of any share of stock is thus a closer approximation to the amount of capital investment represented by each share than either the par or the market value of the stock.

Boom. Unusual activity and enthusiasm in any line of business, or in business generally, resulting in a marked rise in prices.

Bottomry. Lending money upon the security of vessels or their cargo.

Bourse. The stock exchange of Paris; by extension, any exchange in continental Europe.

Break in the Market. A sharp and rapid decline in the prices of stocks or bonds, generally coming at the end of a period of violent speculation and rising prices.

Broker. One who, for a commission or other fee, buys or sells personal or real property for others.

Brokerage. Fee charged by a broker for services in buying or selling.

Bucket Shop. An establishment operated by irresponsible brokers, generally not members of any recognized exchange, who, when they receive orders from their clients to buy or sell, do not in fact make the purchase or sale, but merely make entries upon their own books. Instead of being actually executed, orders received are simply "bucketed," figuratively, thrown into a bucket. Thus the bucket-shop broker stakes his judgment against the judgment of his own client. For example, in the event that a client has sent in an order to purchase, and the particular stock thereafter falls in price, the broker can purchase the stock at the lower price, when a sale is actually demanded by the client. In such a case, he may pocket, not merely a commission upon the purchase and sale, but also a profit equivalent to the difference between the amount for which the client bought and the amount at which the client directed the broker to sell.

Where the orders to buy and the orders to sell any particular stock are substantially even over a period of time, the bucket shop may with a fair degree of safety make two sets of commissions without in fact executing any of the orders. But, where buying and selling orders do not remain even, the bucket shop in an adverse market may lose heavily and be unable to meet its commitments to its clients. The rules of stock exchanges uniformly forbid "bucketing" orders, and, under the laws of most states, this practice is made unlawful.

It has been said that the term "bucket shop" originated from the practice, at one time common in the Chicago grain exchange, of calling in outside brokers, who had no regular connection with the exchange, when business became dull. These outside brokers were carried to the floor of the exchange, huddled together in an elevator, and each group so invited came to be called a "bucket full of brokers." The "bucket shop" was, therefore, synonymous with a brokerage house maintained by a broker of no recognized standing.

Bull. A speculator in the stock market who gambles upon the expectation of a rise in prices; one who manipulates the market in such a manner as to bring about a rise in prices.

Bullion. Uncoined gold or silver, generally in the form of bars or ingots, ready to be turned into coins. Bullion is frequently used in payment of obligations due from persons of one country to those in another. See *Dollar Exchange.*

Bull Market. A bull market is one of activity and rising prices. The term is particularly applied to such a condition in the stock market.

Buyer's Option. A special term applied to a contract permitted by the rules of the New York stock exchange, whereby the buyer of stock is not compelled to accept and pay for the securities purchased until the expiration of a specified time. The buyer has the privilege, however, of demanding delivery of the stock upon one day's notice. The rules of the New York stock exchange provide that such a contract must be for a term of not less than four days and not more than sixty days. A buyer's option, the term of which is four days, is called "buyer's four"; if the term is ten days, it is called "buyer's ten"; and so forth.

Buying Outright. A purchase of stock or other security by a payment of the full purchase price at once or within a definite period after the purchase. This is distinguished from buying "on margin," where only a portion or percentage of the purchase price is paid by the purchaser, the remainder of the price being loaned to the purchaser by the broker. See *Margin.*

Callable Bonds. Bonds issued with a right reserved by the issuing corporation to redeem or "call" the issue, in whole or in part, after a specified date, at a designated price. The "call" price is generally five to ten points above par. A redemption provision is now commonly inserted also in issues of preferred stock.

Call Loan. The lending of money repayable on demand. Loans of this character are very common in New York City, where brokers and speculators upon the various exchanges borrow large sums of money from the banks upon securities as collateral. In this type of loan, both the borrower and the lender have the right to terminate the loan at any time. The advantage to the bank of such a loan is that it enables the bank to make some profitable use of its available funds during any period of temporary abundance; while leaving the bank free to terminate the loan at any time, should any extraordinary demand for cash arise. Its advantage to the borrower is that, as soon as the temporary need of cash or credit has passed, the loan may be repaid and the incurring of interest may at once be terminated.

Calls. Transactions upon stock and commodity exchanges in which one person is given an option to require another to deliver a specified amount of stock or of a commodity at a particular price at any time within a specified period. A "call" is frequently referred to as a "buyer's option."

The term "call" is used also with reference to a notice issued to stockholders or subscribers to the stock of a corporation, requiring payment to the corporation of sums upon stock purchased or held by them. In this sense a "call" may be issued either before or after the stock has been paid in full. If issued prior to full payment, it is nothing more than a notice that an installment is due upon the purchase price of the stock. Where a call is issued after the stock has once been fully paid for, it amounts to an assessment of stockholders to enable the corporation to carry on its business.

Most stock is now issued as nonassessable after it has once been fully paid for. In that event, a "call" of the latter character cannot be made. If it is in need of further capital, a corporation must then issue additional securities to be taken up either by the existing stockholders or by the general public. See *Buyer's Option, Callable Bonds, Put.*

Capitalism. The economic system of private enterprise in industry and trade in which capital and capitalists play the chief rôle, subject to regulation by the state. Capitalism emphasizes freedom of individual initiative in business. Its greatest development has been since the Industrial Revolution in the 19th century, but it has been known to most civilizations.

Carrier. Any person or company that purports to engage in the business of transporting passengers or freight for hire. The more appropriate term is "common carrier," the term "carrier" being used as a colloquial abbreviation of the longer term. Included within the general class of common carriers are railroads, steamships, ferries, street railways, airplanes, trucks, and other vehicles which make a business of carrying persons or property from one place to another. An elevator has been held not to be a common carrier.

From the early days of feudal England down to the present time, common carriers have been subjected to special rules of law, at least with respect to the transportation of property. Thus, a common carrier is held absolutely liable for any damage or loss to goods in transit, regardless of the negligence or fault of the carrier. The origin of this rule is said to have been in the danger in the middle ages—sometimes perhaps founded in the fact—that carriers of goods were in league with the robbers who frequently held up carriers and relieved them of their goods. This rule of absolute liability has not been applied to the transportation of passengers, the theory of the law being that a passenger is, to some extent, able to look out for himself.

From early times, too, the law limited the charge which a common carrier may make, for transporting persons or property, to such sum as was deemed a reasonable compensation for the service rendered. In modern times, common carriers have come to be strictly regulated by statutes administered by governmental commissions; and the more important carriers, such as the huge railroad systems and steamship lines, as well as street railway systems, are looked upon as quasi public corporations. The Interstate Commerce act, originally enacted by Congress in 1887, and amended from time to time since then, created a commission with power to regulate the service rendered and the rates charged by any carrier engaged in interstate traffic. The commission may also prescribe rules to insure safety of operation. In most states, there are similar regulatory statutes.

Carrying Charges. Interest on moneys advanced by banks or brokers, insurance, storage charges, and similar costs incurred by one who has purchased goods or securities on credit or on margin.

The term is sometimes used also as the equivalent of "fixed charges," that is, costs incurred regardless of the volume of operations or the amount of business done.

Cashier's Check. A check issued by a bank, usually signed by the cashier (whence the name is derived), and drawn against the bank itself or against a metropolitan bank with which the drawing bank keeps an account. New York funds are generally provided in the form of cashier's checks. The cashier's check differs radically from an uncertified check drawn by a depositor of the bank. The cashier's check gives the holder an obligation against the bank itself, while the ordinary check gives the holder no claim against the bank, but only a claim against the depositor in the event that the check is not honored.

Certificate of Deposit. A certificate or receipt, in which a bank acknowledges that it has received a certain sum of money from the person to whom the certificate is issued, and agrees to pay the sum to the person named in the certificate, or to his endorsee, upon demand or at a definite future date. Such a certificate is usually negotiable and bears interest. The amount represented by a certificate of deposit is generally not subject to withdrawal by check. In the case of a time certificate of deposit, that is, one payable at a definite future date, the holder of the certificate is not regarded as a depositor of the bank. A bank book issued by a savings bank is, for some purposes, equivalent to a certificate of deposit.

Certified Check. A check having the word "certified" stamped or written upon it, and bearing the signature of an official of the bank upon which the check is drawn. The effect of the certification is merely to furnish a guarantee from the bank that the amount to the credit of the drawer of the check is adequate to meet the check, and that the amount of the check will be set aside for the purpose of paying the check when presented for payment. It is not true, as is sometimes thought, that a certified check constitutes a direct obligation of the bank to pay the amount of the check. Thus, if the check is a forgery, the bank may subsequently refuse to pay the check, even though it be certified, without liability to any holder or endorsee. Or, if the check has been fraudulently raised before certification, a subsequent holder of the check can recover only the amount for which the check was originally drawn.

Chattel Mortgage. A lien given upon personal property, generally as security for a loan or other obligation. Nominally, a chattel mortgage takes the form of a transfer of title of the personal property to the person to whom the mortgage is given (called the mortgagee). In almost all states, however, a chattel mortgage is now regarded, not as a transfer of the title to the property, but as merely giving a lien upon the property.

Generally, a chattel mortgage, to be valid against creditors of the mortgagor or against subsequent transferees of the property, must be recorded in the city or town where the mortgagor resides. Chattel mortgages usually provide for a sale of the property in the event of nonpayment of the debts they are given to secure. The method of sale, however, is usually expressly prescribed by statute.

Check. A check is a written order directed to a bank, requesting the bank to pay a specified sum of money to the order of the person named in the check or to the bearer of the check. A check does not operate as an assignment of any part of the deposit maintained by the drawer in the bank on which the check is drawn. The check, therefore, gives no direct right to the payee or holder of the check against the bank.

A check payable to "cash" is equivalent to a check payable to bearer, and may be negotiated from one person to another without endorsement. It is the practice of banks, however, to require one who presents a check payable to bearer or payable to cash to endorse the check. Such an endorsement, however, merely operates as a receipt to the bank.

Checks should be presented promptly for collection or payment. Where a check is not presented promptly for payment and the bank upon which it is drawn becomes insolvent during the interval, the holder may in some cases be compelled to shoulder the loss. Moreover, death or bankruptcy of the drawer of the check renders the instrument void, and relegates the holder to the status of a mere general claimant against the drawer's estate.

C. I. F. An expression used in quoting prices, particularly in the export trade, to indicate that the price includes the cost of the goods plus insurance and freight.

Clearing House. The place at which the banks of a particular city or vicinity meet daily for the purpose of presenting checks drawn upon each other. A definite debit or credit balance against or in favor of each of the member banks is made on the basis of these balances.

The method by which the clearing house operates is as follows: Each bank sends a messenger to the clearing house with the checks which it has received that are drawn against the other members of the clearing house. Each bank assorts the checks it receives, placing all of the checks drawn against one bank in an individual folder, to which is attached an itemized statement of all of the checks contained and their total amount. Each bank has a designated desk at the clearing house, and, at an appointed time, a gong is sounded and the messenger of each bank distributes to the desks of the other banks the checks drawn upon the latter, retaining a duplicate memorandum of each amount. When the distribution is complete, each bank is in possession of all the checks which have been drawn upon it and deposited in other banks. The amount of such checks is then totaled, and, in the event that this total exceeds the amount of the checks presented by it against the other banks, a debit balance is entered against the bank. In the event that the amount of checks presented by any bank against the other banks exceeds the amount of checks presented by the other banks against it, a credit balance is entered for the particular bank.

If there is a debit balance, the amount thereof is paid by the particular bank to the clearing house; if there is a credit balance, the amount of the credit is received by the bank having the credit balance from the clearing house. Under the Federal Reserve system, debit and credit balances are paid by means of checks upon Federal Reserve banks, rather than upon the clearing house.

In the larger cities, clearing house organizations have functions wider than those of the ordinary clearing house.

Clearing House Balance. Applied both to an amount due from a clearing house to a creditor bank and to an amount due from a debtor bank to the clearing house. In the former case the balance is called a favorable balance, and in the latter it is called an adverse balance, at the clearing house.

Collateral Loan. A loan secured by a pledge of securities or other personal property.

Collateral Note. A form of note in common use, in connection with secured loans, by banks and other institutions which make a business of lending funds. This type of note not merely recites the promise of the borrower to pay but also sets forth the terms upon which the security is deposited with the lender. The terms of the collateral note are designed to relieve the bank or other lender from the obligations imposed by law upon pledgees who undertake to sell the pledged property.

Commercial Agencies. Organizations which make a business of compiling and furnishing to their subscribers information with respect to the assets and liabilities, promptness of payment of obligations, and general solvency and credit of individuals, firms, and corporations engaged in business. This information is given out in the form of general ratings, furnished to all subscribers, and in special reports with respect to any particular concern, furnished upon the special request of a subscriber.

Dun and Bradstreet, Inc. is the leading commercial agency in the United States. The credit ratings and reports given by this agency constitute an important basis for extending or withholding of credit to prospective borrowers or to purchasers on credit.

Commercial Paper. Notes of business concerns of national reputation, which are purchased by so-called note brokers and then distributed by them among various banks and investors throughout the country. The broker usually makes a profit or commission of one-quarter of one per cent upon the principal of these notes. By using this type of commercial paper, these large borrowers are able to borrow at a lower rate than they would be compelled to pay for current loans obtained from local banks.

This type of security, by reason of its general marketability, has come to be highly regarded throughout the banking community as an excellent mode of investment for superfluous funds and as a secondary reserve. The notes, commonly in amounts of $2500 and $5000, usually run for a period of six months, and can be made to bear such a maturity as will fit in with the needs of the banks purchasing the securities. While these notes are not guaranteed by the houses which buy and sell them, the larger note brokerage houses have made a practice of virtually protecting their purchasers against loss, both by thorough examination of the businesses of those whose notes are purchased and by taking control of such businesses, if necessary, in order to save purchasers from loss.

Commission House. A firm which buys and sells commodities or securities, as a broker or agent for others, receiving a commission on the purchases or sales, or upon both, in compensation for the service rendered.

Common Stock. That class of stock which is entitled to receive dividends or otherwise share in the earnings of a company only after all preferential rights to payments out of the earnings of the company have been satisfied. The term common stock is also used with reference to all of the stock issued by a corporation where only one class of stock has been created. Usually the control of the company is vested in the holders of the common stock. This, however, is not necessarily so, and sometimes the holders of preferred stock are given an equal or greater share in the control of the corporate affairs.

While the common stock usually receives no dividends until the preferential dividends to which any class or classes of preferred stock may be entitled have been paid, the common stock is normally entitled to receive all of the surplus after the preferential payments to the preferred stockholders have been made. The relative rights of holders of any particular issue of preferred or common stock depend, however, upon the special provisions of the certificate of incorporation of the company which issues the stock, and, to determine what these rights are, resort must always be had to the certificate.

Usually, the holder of preferred stock is assured the more continuous and steady return upon his investment. On the other hand, the common stock carries with it the possibility of great profits, in the event that the enterprise proves especially profitable. See *Preferred Stock*.

Consignee. A person named in a bill of lading as the one to whom goods are to be delivered by a railway or other carrier.

Consignment. Goods are said to be shipped upon "consignment" when they are forwarded by a seller, called the principal in the transaction, to a broker or sales representative, pursuant to an arrangement whereby the broker is to sell the goods and remit to his principal the proceeds less his commission, the broker undertaking no responsibility for the purchase price of the goods until they are actually sold. However, when a sale has in fact been made, if the goods were shipped upon consignment, the broker becomes personally responsible for the sale price, less the commission to which he is entitled. In this respect, such a broker is similar to a "*del credere factor*" who insures the financial responsibility of his purchasers.

Consignor. One who delivers goods to a railway or other carrier for transportation to a designated point.

Consols. The name applied to the 3 per cent "consolidated annuities," sometimes referred to as "consolidated threes," issued by the government of Great Britain, entitling the holder to a certain sum from the government annually. These annuities are obligations of the British government, but differ from bonds in that they have no definite date of maturity. The government, however, reserves the right to pay the principal represented by the securities at any time. They are, therefore, in a real sense, mere annuities—a promise by the government to pay to the owner of the consol a certain amount annually.

The full name, "3 per cent consolidated annuities," had its origin in the fact that this form of obligation was issued to replace the entire or consolidated debt of Great Britain, and a purchaser received 3 per cent annually upon the amount paid to the government for the consol.

Controlling Interest. A phrase used to indicate a person, or a body of persons united in mutual interest, who have secured the right, by purchase or by proxy, to vote a majority of the shares of capital stock in a corporation at any stockholders' meeting.

Convertible Bonds. Bonds which are issued subject to a provision for their surrender and cancellation at some future time and the issuance of stock in their place. The provision for conversion may make the conversion optional in the bondholder or in the company, or may be made absolute upon the fulfillment of some condition, depending in each case upon the particular provision contained in the bond.

Corner. The acquisition by an individual, or by a group of speculators, of the larger part or of all of the available supply of a particular stock, or of a commodity such as cotton, wheat, copper, or sugar. When a corner has been successfully effected, one who has sold the stock or commodity short, or who must have the commodity to carry on his business, is compelled to pay any price demanded.

The most notable corners in American financial history were the successful corner of Harlem Railroad stock by Commodore Vanderbilt in 1863 and the attempted corner of gold by Jay Gould in 1869.

Corporation. A corporation is any body of persons treated by law as a unit. The most common form is the joint stock corporation, which is organized for the profit of its members, known as stockholders. Stockholders are not liable for the corporation's debts. Consequently, capital may be invested in a corporation without jeopardizing the estate of the investor. Stockholders have no claim on the corporation's assets. Hence the corporation may carry on indefinitely, irrespective of the death or withdrawal of any of the investors. Through these two advantages, the corporate form of organization has made possible the concentrations of capital on which modern industrial society rests.

A corporation is formed by applying to the state or Federal government for a certificate of incorporation. When granted, this document entitles the corporation to carry on the type of business described therein. The business is managed by officers chosen by a board of directors, who have previously been elected by the stockholders. A typical set-up would be a board of directors consisting of three or more people and executive officers known as president, vice president, secretary, and treasurer.

The owners of a corporation are the stockholders. Their degree of ownership depends on the number of shares of stock they hold and on the special rights which these shares may confer. Profits are distributed to the shareholders at the discretion of the directors. See *Common Stock*, *Preferred Stock*.

Cost, Insurance, Freight. See *C. I. F.*

Country Banks. A term sometimes used to designate Federal Reserve member banks in small communities. They are required to keep with the Reserve banks a reserve of only 7 per cent of their demand deposits as against 10 per cent required of city banks and 13 per cent required of New York and Chicago banks.

Coupon. A certificate attached to a bond, representing the interest for a given period, to be detached and forwarded to the corporation or government which has issued the bond when such interest becomes due. The coupon generally bears the name of the debtor or obligor upon the bond, the number of the bond, the rate of interest, and the amount due or payable upon the coupon.

Coupon Bonds. Bonds issued with coupons attached, representing the interest falling due from time to time. The interest upon coupon bonds is obtained by detaching or clipping the coupons as they fall due and forwarding them to the debtor corporation for payment.

Cover. Where a person has sold for future delivery stocks or commodities which he does not actually own at the time he makes the sale, he is said to "cover" when he buys in such stocks or commodities.

Curb. The name given originally to the group of brokers who formerly made a practice of meeting daily in Broad street, New York, one block from the New York stock exchange. There they bought and sold securities of both the better and the cheaper grades. This practice of congregating at a point near the financial center of New York City, for the purpose of engaging in stock transactions, began as early as 1869, and continued until 1920, when an ordinance was passed by the city of New York prohibiting the carrying on of brokerage transactions upon the public streets. As a result of the enforcement of this ordinance, the so-called curb brokers organized and erected their own exchange, which has continued to be called "the curb exchange." Here is now carried on the business which formerly was transacted upon the street and sidewalks of Broad street.

Current Assets. Assets which are readily convertible into cash and which change in amount from day to day. Cash on hand, bank deposits, merchandise, and accounts and bills receivable are all regarded as current assets.

Current Liabilities. Obligations which fall due from day to day or which will mature in the near future. Included within this designation are accounts payable, notes payable, wages unpaid, interest due or accrued, and similar obligations which are immediately payable or of short term duration.

Cutting a Melon. An extraordinary distribution by a corporation of accumulated profits or surplus in the form of either cash dividends or stock dividends. In the case of a holding corporation, the "cutting" may take the form of a distribution of securities of the subsidiary companies controlled by the holding corporation.

Dating. An agreement between a buyer and a seller of goods, providing that the date of purchase shall be deemed to be of a later date than the actual date of purchase. The purpose of "dating" is to extend the period or term of credit beyond that normally allowed.

Days of Grace. The laws of many states formerly allowed the obligor or debtor, upon a note or other commercial instrument, three extra days after the date of maturity within which he could pay the amount of the instrument without subjecting the instrument to protest or dishonor. Days of grace have now been abolished in nearly all states. In some parts of Europe, however, days of grace are still granted.

Debenture Bonds. In the United States, an evidence of indebtedness issued by a corporation and not secured by a mortgage or other lien upon property of the corporation. Such a bond is similar to an ordinary promissory note, except that it normally runs for a longer period.

Deed. An instrument signed and sealed, purporting to convey an interest in real property from one person to another.

A *quitclaim deed* is one in which the grantor purports merely to convey such right, title, or interest as he may have in the property described in the deed. Such a conveyance does not carry with it any representation of ownership vested in the grantor, and, in the event that it is later discovered that the title to the property is encumbered or was vested in some other person than the grantor, no recourse can be had against the grantor.

A *warranty deed* is one in which the grantor covenants that he is the owner of the property and that there are no encumbrances upon the property (except such as are expressly excluded from the covenants), and that the grantee will enjoy quiet and peaceful possession of the property. A grantor who executes a warranty deed may be called upon to defend the title to the property, should the grantee's title or possession be attacked. He may also be compelled to respond in damages, should the title prove to be defective.

Deferred Dividend. When dividends are not regularly paid upon preferred stock, carrying cumulative dividends, such unpaid dividends are regarded as "deferred," and ordinarily must be paid before any dividends can be paid upon the common stock.

Demurrage. A charge imposed upon a shipper for detaining a railroad car, or other vehicle of transportation, for a longer time than that allowed by the agreement with the carrier for loading or unloading the cargo.

Deposit. Funds deposited with a bank, entailing an obligation upon the bank to repay an amount equal to the sum deposited. The ordinary deposit with a commercial bank involves an undertaking by the bank to honor withdrawals, in the form of checks drawn upon the account, until the amount of the deposit is exhausted. A deposit of this character is a "demand deposit," being payable at any time upon presentation of a check or order drawn upon the bank.

Deposits in savings banks are usually withdrawable in whole or in part only upon presentation of the bank book. Such deposits are also usually "time deposits," and nominally are payable only after the lapse of a definite period—frequently 30 days—after notice of the intended withdrawal has been given to the bank. Many commercial banks and trust companies now accept deposits in so-called "special accounts," which are in fact similar to the type of deposit formerly typical of the savings bank. These accounts draw interest quarterly or semiannually, and sometimes are made subject to withdrawal only at definite future dates or upon the lapse of a prescribed period after notice of intended withdrawal, as is the case of savings bank deposits.

Depreciation. Diminution in the value of any property, real or personal, whether due to ordinary wear and tear or to any other cause resulting in the lessened value of the property, during any period of time.

Discount. This term has several meanings. It is applied to a loan made by a bank to a customer upon his note, where the interest which is to accrue upon the loan during the term of the note is deducted in advance. Thus, if a customer wishes to borrow $1000 for six months at 6 per cent, the bank "discounts" his note and credits him with the sum of $970. The $30, which is deducted from the principal of the loan, is termed discount or unearned interest, and the entire transaction is called a "discount."

The term discount is applied also to the purchase by a bank, from the payee or holder, of a note having a definite maturity. In such a purchase, as in a direct loan upon the paper of the borrower himself, the interest to become due upon the note during the term it has to run is deducted in advance, and the net proceeds only are credited to the seller of the note.

Discounts are sometimes distinguished from "loans," the latter term being applied to demand obligations, having no definite date of maturity, the interest upon which cannot be computed and deducted in advance of the termination of the loan.

Another use of the term discount is with reference to the amount or percentage by which the market price of a particular kind of domestic or foreign currency, or of a bond or other obligation, falls below its nominal or par value. Thus, when bonds of the United States government, having a face value of $100, sell for $98, they are said to sell at a discount of $2 or of 2 per cent.

Dishonor. The refusal of one upon whom a draft or bill of exchange is drawn to pay or to accept the bill in accordance with the terms of the instrument.

Dividend. A proportionate distribution of profits by a corporation among its stockholders. Where the stock of the company has a nominal or par value, the dividend will be payable in terms of a certain per cent of this nominal or par value. Where, however, the stock has no nominal or par value, the dividend merely represents a distribution of cash among the stockholders, out of the earnings or surplus profits of the company, in proportion to their respective holdings in the company. The laws of practically all the states prohibit the payment of dividends to stockholders except out of earnings or surplus profits, in order that the capital of the corporation may be kept intact for the benefit of creditors. Any violation of this prohibition usually renders the directors participating in the declaration or payment of the dividend guilty of a crime.

A stock dividend is entirely different from a cash dividend, and represents merely a distribution of additional evidences of ownership in the corporation, no property of the company being turned over to the stockholders.

Dollar Exchange. Bills of exchange, drawn in foreign countries upon banks or business concerns of the United States, and payable in United States currency.

Domestic Exchange. Drafts or bills of exchange, drawn upon banks or commercial houses located in New York or other important commercial centers, used in making remittances from one part of the country to another. Bank drafts upon New York City formerly constituted the greater part of domestic exchange. In recent years, however, bank drafts upon Federal Reserve banks have in large measure replaced drafts upon New York.

Double Taxation. Frequently the same person or the same property is taxed by more than one governmental authority. The most common instance of double taxation of this sort is taxation by both the Federal and the state government. But sometimes the same person or interest in property may also be taxed by more than one state. Thus, where a person residing in the state of New York owns property which is physically present in the state of Ohio, a tax may be imposed by both states, one by reason of jurisdiction over the person owning the property, and the other by reason of jurisdiction over the property or *"res"* itself.

Likewise, where two different states or countries impose income taxes, a tax may be imposed by one state or country, by reason of the income being derived within the limits of its territorial sovereignty; and an income tax may be

imposed upon the same income by another state or country, by reason of its jurisdiction over the person earning the income. Frequently, too, succession or inheritance taxes seem to operate to impose double or multiple taxation, where the decedent was a resident of one state and had property subject to the jurisdiction of other states. Double or multiple taxation of this sort may sometimes appear to operate unjustly, but the courts have uniformly held that such taxation is entirely lawful and constitutional.

Draft. A written order drawn by one person, directing a second person to pay a definite sum of money to a third person and to charge the same to the account of the one drawing the instrument. A draft may be drawn payable at sight or on demand, that is, upon presentation; or it may direct payment at a definite or determinable future time. A draft is similar in all respects to a bill of exchange. In the United States, however, the term draft has come to be applied to ordinary domestic or inland bills of exchange, as distinguished from bills of exchange used in foreign commerce.

Duebill. A written nonnegotiable acknowledgment of a credit to the account of the person to whom the bill is addressed. This type of instrument is usually given by merchants to persons who have purchased goods and have subsequently returned them.

Earnest Money. A sum paid at the time of making an offer or of entering into an agreement of purchase, as evidence of the good faith of the person making the offer or entering into the agreement. In contracts for the sale of personal property, the law has laid stress upon, and has given important legal effect to, the giving of earnest money at the time a transaction is entered into. Thus, under the Statute of Frauds—originally enacted in England in 1666—an oral agreement for the sale of personal property was not valid if the consideration involved was in excess of the sum of ten pounds, unless, at the time the agreement was entered into, a part payment of the purchase price was made. This part payment was regarded as the earnest money which made the transaction enforceable. This provision of the Statute of Frauds has been adopted in one form or another in most of the states in this country. In the case of real property, however, the giving or withholding of earnest money has no effect upon the legality or legal enforcement of a contract of sale, although earnest money frequently accompanies an agreement to purchase real property.

E. & O. E. Abbreviation for "errors and omissions excepted." This term appearing upon any financial statement negatives any representation of the one furnishing the statement that it is absolutely accurate. Its use absolves the one furnishing the account from personal liability for errors in the statement, other than those due to fraud or willful misrepresentation.

Endorse. To write one's name upon the back of a note, check, or other instrument, for the purpose of transferring the instrument to another, or for the purpose of lending one's credit as a guarantor of the payment of the obligation. An endorsement by one whose name already appears upon the instrument as a payee or endorsee should be made without variation from the form in which it first appears upon the instrument. An endorsement, however, is legally sufficient if, in fact, the person who endorses the instrument is the same person as the one to whom the instrument was payable as payee or endorsee.

Endorsee. One to whom a note or other negotiable instrument has been transferred by endorsement by the holder of the instrument.

Endorsement, Anomalous. Where one who is not a party upon the face of a note or other instrument writes his name upon the back of the instrument, as a guarantor of its payment at maturity, such endorsement is termed anomalous.

Endorsement, Restrictive. An endorsement which indicates that the holder or endorsee of the instrument is not the owner of the instrument, but has merely been intrusted with it for certain definite purposes specified in the restrictive endorsement. Thus, a note or check may be restrictively endorsed, "Pay to the First National Bank for collection only," or "Pay to John Jones as agent," signed by the holder of the instrument.

Endorsement, Special. Where a payee or endorsee of a note or other instrument, upon transferring it, designates upon the back of the instrument the particular person to whom or to whose order the instrument shall be paid, such endorsement is termed a special endorsement. When an instrument has been thus endorsed, it may be further negotiated or transferred only by an endorsement of the person named in the special endorsement.

Endorsement without Recourse. See *Endorser, Without Recourse.*

Endorser. One who has signed his name upon the back of a note, check, or other commercial instrument, to lend his credit to the maker or to the holder of the instrument, in which case he may be an anomalous endorser; or one who, being the holder of the instrument, endorses the instrument in order to negotiate it or sell it to another. Unless an endorser has signed his name "without recourse," he may be held liable for the payment of the instrument, in the event that the maker fails to pay it at maturity. The endorser may, however, be released from liability if the instrument is not duly presented to the maker and protested, and notice of the protest given to the endorser within 24 hours.

Escrow. An instrument deposited with a third party, to be delivered to the grantee named in the instrument upon the performance of some condition or upon the happening of a certain event.

Excess Profits Tax. In 1918, the United States imposed a tax upon corporations whose profits exceeded 8 per cent of the actual capital invested or used in the business. This tax was removed in 1920. A similar tax was imposed in 1934, exacting 5 per cent of all profits which exceeded 12½ per cent on the declared value of the capital stock of each corporation. This was repealed in 1937. Since then economic necessity has dictated the advisability of whether or not there should be such a law.

Exchange. Claims upon foreign merchants or banking institutions, in the form of bills of exchange or drafts accepted or drawn upon them, arising out of the export of goods to foreign countries or out of other international transactions. These instruments are bought by persons who are obliged to make remittances to such countries. The result of this buying and selling of "exchange" is that claims by individuals in one country against individuals or banks in another country are offset by claims which individuals in the latter country have against individuals and banks in the former country. In this way, the actual shipment of gold from one country to another is to a very considerable extent, avoided.

Excise. Any tax imposed by a government upon commodities manufactured, sold, or used, or upon activities carried on, within its territorial jurisdiction. The tax upon cigars and cigarettes, and the tax upon liquors, formerly constituted the most important excise taxes in the United States. In recent years the scope of excise taxes in the United States has been very much widened. At the present time, excise taxes are imposed upon deeds, bonds, and other commercial instruments, and upon transfers and contracts for the sale of stock. The tax on theater tickets and on automobiles when originally sold by the manufacturer are also properly to be regarded as excise taxes.

Ex Dividend. Literally, without dividend. When stock is sold during a period when the stock books of the particular company are closed in anticipation of the payment of a dividend, no transfers of ownership being recorded by the company during this period, the stock is said to sell on the market "ex dividend." This is because the purchaser of the stock during such a period will not be entitled to receive the dividend about to be paid by the company.

External Loan. A loan which a country obtains by selling its bonds or other obligations to investors in other countries; it is to be distinguished from an internal loan, which is obtained by the sale of securities to the country's own citizens. Frequently, in the case of an external loan, securities are made payable in the currency of the country in which they are intended to be sold.

Face Value. The value noted upon the face of a check, note, bond, certificate of stock, bank note, or unit of currency. The term "face value" is used in contradistinction to the actual value of the instrument, which may be either greater or less than its face value. See *Par.*

Factor. One who sells goods for another upon commission. See *Agent, Consignment.*

Farm Loan Bank. Banks organized pursuant to the Federal Farm Loan act of July 17, 1916. This act provided for the creation of a Federal land bank in each of twelve designated farm loan districts. A part of the stock in these land banks is subscribed by the United States government through the secretary of the treasury. The act provides for the lending of funds to farmers, but only upon the security of first mortgages on farm land; and the loans are to be made, not directly to the farmer, but through advances to local farm loan associations. In order to obtain a loan under the provisions of this act, an intended borrower has to become a member of one of these associations and subscribe to stock in the association to an amount equal to at least 5 per cent of the amount to be borrowed. The land banks are restricted to an interest rate of 4 per cent per annum on their loans. The act provides also that the mortgages shall run for not less than 5 nor more than 40 years.

F. A. S. Free alongside ship. This term is used to indicate the extent of the obligation of the seller with respect to delivery of goods sold. Where the goods are sold "F. A. S.," the seller's obligation is fulfilled when the goods are delivered to a wharf from which the goods can be loaded into a vessel for transportation to the port of destination. Where it is necessary to carry the goods from the wharf to the vessel by means of small tugs or lighters, the seller would be obligated to bear the expense of this part of the transportation in addition to carrying the goods to the wharf.

Federal Reserve Bank Notes. Currency formerly issued by Federal Reserve banks in denominations of one, two, five, and ten dollars, secured by deposit, with the secretary of the treasury, of certain issues of United States bonds to an amount equal to the bank notes issued. After these bonds were called in 1935, the bank notes were gradually retired from circulation.

Federal Reserve Notes. Currency issued by Federal Reserve banks, secured by a gold certificate reserve of at least 40 per cent of the amount of the notes issued, and by commercial or other eligible paper to the extent of the remaining 60 per cent. Whether additional Federal Reserve notes shall be issued at any time by a particular bank is determined by the Federal Reserve board, which also has the power in emergencies to permit the issuance of Federal Reserve notes with a lesser gold reserve than 40 per cent. The Federal Reserve note, secured as it is, in part at least, by commercial paper, has introduced an elastic element into the currency of the United States. Its volume can be increased or decreased in accordance with seasonal and extraordinary demands. The Federal Reserve act, under which these notes are issued, also provides for the prompt redemption of such notes by the issuing bank, and forbids their reissue. Through this limitation, a permanent inflation of the currency is prevented.

Federal Reserve Ratio. The ratio which gold certificates held by Federal Reserve banks as backing for their notes bear to total liabilities, comprised by the notes issued and by deposits. Forty per cent is the lower limit permissible under the law.

Fee Simple. The absolute, unconditional ownership of real property. The fee simple is the highest estate known to the law. The ownership of the fee simple in any particular parcel of property is not inconsistent with the existence of restrictions or encumbrances upon the property.

Fiduciary. One who occupies a position of trust, or who receives and dispenses funds for another. Executors, administrators, trustees under wills and deeds of trust, directors of corporations, agents, committees of the estates of lunatics, and guardians of infants are all within the general class designated as fiduciaries.

Firm. Descriptive term applied to prices of securities or commodities when there appears to be no tendency toward a fall in prices, and when the supply at the price quoted does not appear to be in excess of the demand. When prices are "firm," a rise in prices may normally be expected.

First Mortgage Bond. A bond secured by a first or prior lien upon a part or all of the assets of the company issuing the bond. The extent of this lien depends upon the particular terms of the mortgage in each case. Some so-called "first mortgage bonds" cover only a very limited part of the tangible assets of the issuing company. Others purport to cover not merely specific physical property described in the mortgage, but also property both tangible and intangible which may subsequently be acquired. In the event of a default in the payment of interest or principal upon first mortgage bonds, a foreclosure of the mortgage securing the bonds would bar all secondary or subsequent liens or mortgages upon the property.

Fiscal Year. Any twelve consecutive months used as a period of financial accounting by an individual or a corporation. The fiscal year of any business concern may or may not coincide with the calendar year.

Fixed Charges. The fixed expenses of a business, which can be determined in advance, and which do not vary in proportion to the amount of business carried on. Fixed charges include interest upon bonds or other fixed or long-time indebtedness, taxes upon property, rent, insurance, and depreciation.

F. O. B. Free on board. This term is used in price quotations to indicate the extent of the undertaking of the seller with respect to defraying the cost of transportation, at the price quoted. Thus, if flour is quoted at ten dollars a barrel, f. o. b. cars Buffalo, the seller undertakes merely to deliver the flour to the railroad company at Buffalo, and the cost of transportation from that point on must be borne by the purchaser.

Foreclosure. A remedy provided by the law for realizing upon the security given for a loan or other obligation, in the event of a failure of the obligor or debtor to comply with the terms of his agreement. The usual mortgage upon real property, for example, provides that in the event of a failure to pay any installment of principal when due, or to make any payment of interest within thirty days after the payment is due, the mortgagee may sell the property at a foreclosure sale and receive payment out of the proceeds of the sale. If, upon a mortgage foreclosure, the amount received from a purchaser is more than sufficient to satisfy the claim of the mortgagee and the expenses of sale, the surplus is turned over to subsequent lienors or, if there are none, to the mortgagor.

The term foreclosure applies, not merely to the sale of real property to realize upon sums advanced upon real property as security, but also to sales of personal property under like circumstances. A foreclosure sale may take place also to satisfy a judgment obtained against the owner of the property or to obtain payment of taxes which have been imposed upon the property.

Fractional Currency. Coins of less than one dollar.

Fully Paid. Stock is "full paid" or "fully paid" when it has been completely paid for by the stockholder and no further payment or assessment can legally be demanded from or imposed upon the stockholder by reason of his ownership of the stock. In order that stock be fully paid, it must have been issued in exchange for cash, property, or services having some reasonable relation in value to the par value or amount of the stock issued.

The practice of issuing so-called fully paid stock, bearing a par value of a particular amount, for worthless patents, fictitious good will, and highly overvalued services of promoters, together with the associated practice of issuing shares of stock as bonuses to subscribers or purchasers of stock, has rendered this term in practice almost meaningless. The misleading character of issues of this sort has led to the introduction of non-par-value stock. This becomes fully paid when any sum, however small, is paid to the corporation for the stock, if the agreement between the stockholder and the corporation does not require any further or other payment.

Funding. The floating of a new issue of securities to pay off obligations which have matured or are about to mature. The term is used also with reference to the replacing of a number of outstanding issues of securities by a single new issue, generally for a longer term than the outstanding issues. Such a funding plan frequently provides economies in administration, in addition to extending the period during which the obligations will remain outstanding.

Futures. Contracts for the delivery of stocks or commodities at a future date. Dealing in futures is a very legitimate and even a necessary element in the conduct of some businesses. Thus, a flour manufacturer, in order to make his plans of production for the ensuing quarter or half year, must make his purchases in advance of his actual needs. Only by so doing can he, with any safety, make quotations to his customers for future delivery to them. But speculators upon the commodity and stock exchanges deal in futures in a manner which amounts to plain gambling. These speculators, however, by selling for delivery in the future, relieve the business man of the risks incident to possible fluctuations in prices, and enable him to do business upon a safe, carefully calculated basis.

Garnishee Proceedings. Legal proceedings by which a creditor reaches an obligation owed to his debtor by a third person. Thus, if A owes B $50 and C owes A $50, B may garnishee the sum which C owes to A and thus obtain payment of B's claim against A. In these proceedings, C, the debtor's debtor, is known as the garnishee.

Gold Basis. The currency of a country is said to rest upon a "gold basis," when a certain quantity of gold by weight constitutes the basic monetary unit and standard of value of the country. Most countries have currencies on a gold basis as a matter of law but not as a matter of practice since the unit of currency is not exchangeable with gold at the statutory rate. For an explanation of this paradox, see *Managed Currencies*.

Gold Bond. Bonds payable, according to their terms, in gold coin of the present weight and fineness. The term gold, in this connection, was intended to promote sale of such bonds by promising protection against devaluation of the dollar. When the dollar actually was devalued in 1934, however, the supreme court refused to enforce the payment of the bonds in dollars of the earlier value. Since Congress has the authority to determine the value of currency, the court held that private contracts may not be enforced which nullify the effective exercise of this power by Congress.

Gold Certificates. Paper which was formerly circulated as legal tender but is now severely restricted in use. It represents gold in an amount equal to the face value of the certificate, deposited with the treasury.

When all gold was called in to the treasury in 1933, gold certificates also were taken out of circulation. They may be retained by Federal Reserve banks, which now hold their required gold reserves, not in actual gold, but in gold certificates. Gold surrendered by these banks in 1933 was paid for by gold certificates.

Gold Reserve. The term applied to the reserve of $150,000,000 in gold which the treasury department is required to keep, under the act of Congress of March 14, 1900, as a redemption fund for outstanding United States notes or "greenbacks," of which there are still some $346,000,000 outstanding. This act provided that if this reserve at any time fell below $100,000,000, it should be replenished by the sale of government bonds.

The term "gold reserve" is applied also by courtesy to the reserve of 40 per cent in gold certificates which normally must be held by a Federal Reserve bank against its issues of Federal Reserve notes. This gold certificate reserve may be reduced below 40 per cent in emergencies by special dispensation from the Federal Reserve board. It may also be doubled. Five per cent of this reserve must be maintained with the secretary of the treasury as a redemption fund for outstanding Federal Reserve notes.

Good Will. Reputation enjoyed by a company or its product, which gives to the product a ready and wide marketability. Frequently, good will constitutes the most valuable single asset a business possesses. Where the good will has been acquired through the expenditure of large sums in advertising, it is deemed proper accounting to set forth as an asset the good will achieved by the advertising at a valuation approximately equal to the sum spent in advertising.

Greenbacks. See *United States Notes.*

Gresham's Law. The principle of public finance, according to which, if there is an excess of money of different kinds in a country, the better money, that which intrinsically is more valuable, will go out of circulation or will leave the country, and that kind of money which is of less intrinsic value will tend to become the sole currency of the country. Thus, depreciated paper currency, so long as it continues to circulate as money, will tend to drive gold out of circulation entirely, the gold finding its way into industry or to foreign countries in payment for imports.

Guarantee. The undertaking by one who is not a direct party to a transaction to perform the promise or obligation made or assumed by another, in the event that the latter does not himself perform the promise or obligation. Bonds of subsidiary corporations are frequently guaranteed by the principal or holding corporation. It is not legally possible, however, for a company to guarantee the payment of the principal or interest upon its own bonds or the payment of dividends upon its own stock. For, in order to have a true guarantee, there must be three parties in the transaction,—the creditor, the debtor, and the guarantor.

Hedging. Either buying or selling in such a manner as to curtail threatened losses through speculative sales or purchases in stocks or commodities. Thus, for example, a speculator agrees to deliver a certain number of units of stock or of a commodity at a certain price at a future time. He intends to cover the sale by purchasing at some time before delivery is due, at a price lower than that named in his contract of sale. Prices then begin to advance in such a manner as to indicate that there probably will be a continuous advance rather than any decline in prices. The speculator will then at once "cover" by buying in the amount of stock or commodity that he has sold, and thus limit his loss to the difference between the price at which he has sold and the price at which he has covered.

High Finance. A popular term applied to the large scale promotion of financial ventures which yield unconscionably great profits to the promoters and yet successfully evade any civil or criminal liabilities.

Holder in Due Course. One who has acquired a promissory note or other negotiable instrument for value, without notice of any defect in the instrument or in the title of the transferor. A holder in due course may ordinarily recover upon the instrument, regardless of defenses claimed by the maker or by other parties to the instrument. The defense of forgery, however, is available even against a holder in due course.

Holding Company. A corporation whose chief function is the holding of stock in other corporations, the latter being sometimes referred to as its "subsidiaries."

Honor. The act of paying or accepting a check, draft, or bill of exchange upon presentation by the holder, in accordance with its terms.

Hypothecation. Depositing stocks or bonds with a creditor as security for the payment of a debt.

Inactive Account. An account of a depositor in a commercial bank or trust company, against which few checks are drawn. Many commercial banks now pay interest upon inactive accounts at rates as high, or nearly as high, as those paid by savings banks; while accounts which are regarded as active receive no interest upon balances, or interest at considerably lower rates.

Inactive Stocks and Bonds. Stocks and bonds for which there is no active market, and which are seldom bought or sold or quoted upon the exchanges.

Income. Gains received in any form capable of valuation, including compensation for services rendered, interest, dividends, gains from sales and exchanges of personal or real property, profits derived from the conduct of a business, and any other thing of value received during any period. Under the Federal income tax law, the value of gifts received is taxable at a graduated rate rising from 1½ per cent to a maximum of 52½ per cent.

Income Tax. Tax imposed upon a person and measured by the income he receives. A state may impose an income tax by reason of the fact that gain has been derived from sources within that state's jurisdiction, even though the person upon whom the tax is imposed has never been, by citizenship or residence, or otherwise, personally subject to the jurisdiction of the state imposing the tax. In such cases, the income tax is more properly to be deemed a tax upon property rather than upon the person.

A second type of income tax is one imposed on corporations. As levied in the United States, it presents two differences from the income tax on individuals.

First, the rate is not increased to so high a figure for large incomes. Prior to 1934, a flat rate on earnings was applied irrespective of the amount of earnings. In that year for the first time a slightly higher rate was imposed on larger profits. The change was designed to encourage small enterprises.

Secondly, higher rates are imposed on companies which retain larger proportions of their earnings to add to surplus. First used under the Revenue act of 1936, this principle is for the purpose of encouraging larger distributions in dividends. The money thus distributed is taxable under the individual income tax schedules, which, for wealthy individuals, run to much higher rates than schedules applying to corporations.

The needs of World War II caused further tax increases, greater deficits and a mounting public debt. The 80th Congress repealed wartime excess profits taxes and cut corporation levies, but retained most of the wartime excises. Both the Income Tax Reduction bill, reducing income tax rates on a sliding scale ranging from 10.5 to 30 per cent on July 1, 1947, and the Income Tax Reduction bill as resubmitted on Jan. 1, 1948, were vetoed and defeated. However, the Revenue act was passed over presidential veto, effective May 1, 1948. In 1954 Congress made sweeping changes in the entire Revenue Code.

Indenture. An agreement or deed under seal, executed by two or more persons. The origin of the term was in the practice, now obsolete, of executing an agreement in duplicate, or in as many counterparts as there were parties, the copies being separated unevenly in such manner as to create indentures, those in one copy fitting into those in another.

Inheritance Tax. A tax levied upon the succession to property of a deceased person. Thus, the term "transfer" tax or "succession" tax is sometimes applied to this tax.

Usually, an inheritance tax is imposed upon the entire estate of the decedent by the state in which he resided at the time of his death, regardless of the situs or physical location of the property left by him. Most states, however, also impose a so-called inheritance tax upon the transfer of property from a deceased person to his heirs at law, or other beneficiaries, if any of the property of the deceased lies within the territorial limits of those states. A so-called inheritance tax is sometimes imposed upon a beneficiary also, by reason of his succession to property, whether under a will or by operation of law, even though the property had no situs or physical presence within the taxing state and the decedent had no residence or domicile there.

Insolvent. Formerly one was deemed insolvent if he was unable to meet his obligations as they matured. The repeated failure of anyone engaged in business to pay definitely maturing obligations upon their due dates was regarded as conclusive evidence of his insolvency.

In recent years, the term has acquired a new meaning. This meaning has been legislated into legal and commercial usage by the Federal Bankruptcy act of 1898. This act defines an insolvent as one whose liabilities exceed his assets at a fair market valuation. Obviously, under this latter definition, one who fails to meet his obligations as they mature may nevertheless be solvent.

Interlocking Directorate. The holding by the same persons, of directorships in two or more corporations. When the corporations have dealings with each other, the results may be prejudicial to the interests of one corporation or the other. This circumstance has given rise to criticism of the practice and to restriction of it by Federal law in the field of public utility companies.

Interest. A periodical return paid for the use of money or other capital. Fundamentally, interest is regarded as a compensation paid to those who deprive themselves of the present use of their funds or capital, in order that these funds may be put to productive and profitable employment. The rate of interest, from the economist's viewpoint, is therefore determined by two factors—the amount necessary to induce individuals to sacrifice the present for the future, and the amount of additional value that can be created by using the capital thus set aside in producing goods to be consumed in the future.

Interim Certificates. Frequently, in the reorganization of corporations, considerable time is consumed in carrying into effect the plans of reorganization. It is then customary for stockholders who join in the plan of reorganization to deposit their certificates of stock with designated trustees or with a stockholders' committee, who act for the participating stockholders. These trustees—commonly a single trust company is designated to perform this function—issue to the stockholders interim certificates in exchange for the stock certificates deposited with the trustees. The interim certificate is issued only as a temporary evidence of the interest of the holder. When the reorganization has been completed, the interim certificate is surrendered to the trustees, and the new securities to which the stockholder is entitled, under the reorganization, are then issued to him in exchange for the interim certificate.

Internal Loan. A government loan, the securities for which are intended by the government for flotation and sale primarily among its own citizens; as distinguished from an external loan, which is intended primarily for foreign investors. See *External Loan*.

Inventory. An itemized statement or schedule of the assets of an individual, a firm, or a corporation, usually accompanied by a statement of the value of each of the separate items set forth in the schedule.

Investment Banker. One who buys securities wholesale and sells them retail. It is the practice of the well established investment bankers to underwrite or purchase blocks of new securities of corporations and then to market them to their customers. The investment banker is thus the connecting link between persons who have funds in large amounts to invest and persons actively engaged in existing industries or in the promotion of new enterprises.

Invoice. Statement furnished by a seller to a buyer, setting forth in detail the character, quantity, and price of goods sold, and any other terms of the sale.

Jetsam. Goods thrown overboard to lighten a vessel in distress.

Judgment. A determination of a judicial tribunal, reached at the conclusion of legal proceedings. The judgment may impose upon the defendant an obligation to pay a certain sum of money; it may order him to do or to refrain from doing certain acts; or it may merely state a conclusion of law as to what are the rights of the parties.

Judgment Debtor. A debtor against whom a creditor has obtained from a court a judgment which has been placed on record.

Judgment Note. A promissory note containing a power of attorney, authorizing the holder of the note to confess judgment on behalf of the maker or obligor in the event the note is not paid at maturity. The purpose of such a provision is to avoid the necessity of bringing formal legal action against the maker for the recovery of the amount due upon the note. In many states such a power of attorney, if incorporated in the note itself, is given no legal effect. This form of note, however, is still valid and is commonly used in Pennsylvania, Illinois, Wisconsin, and some other states.

Killing. The making of exceptionally large profits in a speculative transaction. The word "coup" is sometimes used in a similar sense.

Kiting. A method of obtaining from banks the use of funds for a short period, without paying interest therefor, by the exchange of checks between two or more individuals having accounts in different banks. Thus, if A desires the use of $1000 and is unable or unwilling to borrow the sum from a bank, he may, by prearrangement with a friend, B, who has an account in another bank, request the friend to forward to A a check for $1000. A deposits B's check in the bank with which A keeps his account, and receives credit therefor immediately. A then draws upon the amount thus placed to his credit in his bank, either by obtaining cash from the bank or by issuing checks, to pay his current obligations.

Before B's check reaches the bank with which B keeps his account—and several days may elapse between the deposit of the check in A's bank and its presentation to B's bank—A forwards to B a check drawn upon A's bank for a similar sum, and B deposits the check of A in B's bank, thus obtaining a credit upon the books of the bank sufficient to meet the check drawn by B in A's favor. B then draws a second check in favor of A in the sum of $1000, or in some other sum, which A again deposits in the bank with which A deals. Again A forwards a check to B in a similar amount, which B deposits in time to meet the second check drawn by B in favor of A. By continuing this exchange of checks, it is possible for A to carry indefinitely a fictitious credit in his favor, upon which he can draw in the form of cash or otherwise, depending upon the practice and rules of the particular bank.

Kiting is, therefore, merely a method of taking advantage of the delay incident to the collection of checks. Ordinarily, depositors are not expected to draw checks unless they have on deposit, at the time the check is drawn, sufficient funds to meet the checks. Where depositors adhere to this proper banking practice, banks receive the use of the funds deposited during the several days, or sometimes more, that elapse before a check is presented for payment. Banks feel that they are justly entitled to this use of funds while checks are in transit, and frown upon depositors who deprive them of this advantage.

Lamb. An amateur speculator upon the stock market who is shorn of his money as the lamb is shorn of its fleece. Thus, buyers of worthless securities, or others deprived of their savings in near-fraudulent transactions, are said to have been "fleeced."

Latin Union. Agreement in 1865 of France, Belgium, Italy, Greece, and Switzerland to adopt a common gold monetary unit as the basis of their systems of currency. In Italy this monetary unit was called the lira; in Greece, the drachma; and in France, Belgium, and Switzerland, the franc. The unit was equivalent to 19.3 cents in United States currency. The World War disrupted the agreement.

Lawful Money. A term covering broadly any form of currency in common use, whether or not it be legal tender in a technical sense. Prior to 1933, Federal Reserve notes, silver certificates, and national bank notes were lawful money but were not legal tender. In that year the distinction was wiped out as affecting currency in the United States. See *Legal Tender*.

Legal Investment. Savings banks and insurance companies are, under the laws of most states, required to invest their funds in a limited class of securities. These securities consist of Federal, state, county, and municipal bonds; first mortgages on real estate in an amount not exceeding, under the laws of most states, 60 per cent of the value of the real property; and bonds of certain designated railroads. A further limitation with respect to investment in railroad and municipal bonds is frequently imposed, to the effect that the bond of a particular municipality or of a particular railroad may not be the subject of investment if there has been, at any time during the preceding five years, or sometimes a longer period, a failure to pay interest upon its bonds; and, in the case of some railroad bonds, if there has been, for a certain period preceding the investment, a failure to pay dividends.

In most states, either by statute or by repeated rulings of the courts, fiduciaries (in which class are included trustees under wills and under deeds of trust, executors and administrators, and guardians of the estates of minors and incompetents) are required to invest the funds of the trust estate in securities which are legal investments for savings banks. This rule, where not prescribed by statute, is not an absolutely hard and fast limitation upon the investments of fiduciaries. But, if investments are made in any other securities or property than the so-called "legal investments," the fiduciary runs a very serious risk of being held liable personally for any diminution orudepreciation in the value of the principal of the estate.

Legal Rate of Interest. The maximum rate of interest fixed by the laws of a state or country as a lawful charge for the use of money. Each state in the Union may fix its own lawful rate of interest. Where individuals of different states, having different legal rates of interest, are involved in a transaction, that rate governs, which is fixed by the laws of the state in which the transaction takes place, or in which it is to be performed.

Where interest in excess of the rate allowed by law is charged, the rate is usurious, and the lender is guilty of usury. Under the laws of most states, if the facts are proved, the lender can then recover neither the interest nor the principal. In some states usury is also made a misdemeanor, punishable under the penal law.

Legal Tender. Currency which a creditor is compelled to accept in payment of a debt, in the absence of an express agreement prescribing the specific kind of money to be paid by the debtor.

Before 1933, when all lawful money in the United States was made legal tender, gold certificates, gold coin, United States notes, originally issued during the Civil War and known as greenbacks or legal tenders, United States treasury notes of 1890, and silver dollars were full legal tender in unlimited amounts. Silver coins of less than one dollar were legal tender to the amount of ten dollars in any one transaction; also nickels and pennies up to 25 cents. See *Lawful Money*.

Letter of Advice. A formal notification sent by the drawer of a bill of exchange to the one upon whom the bill is drawn, generally a banking house with which the drawer has made arrangements for the acceptance of bills drawn by him, advising the latter of the drawing of the bill and of the amount and terms of the instrument.

Letter of Credit. A formal letter, issued by a bank or banking firm at the request of a customer, requesting correspondents of the bank to honor drafts drawn by the person named in the letter of credit, and to charge the amounts thereof to the issuing bank.

Letters of credit are of two general classes—travelers' letters of credit and commercial letters of credit. The traveler's letter of credit is merely a letter addressed generally to the correspondents of the issuing bank, introducing the person for whose benefit the letter has been issued, and requesting that his drafts be honored up to a named amount by any correspondent bank. The signature of the one in whose favor the letter is issued is written at the bottom of the letter at the time it is issued. With this letter in his possession, a traveler may, at the office of any correspondent bank, obtain currency in any sum up to the amount named in the letter of credit, by writing a draft for the amount desired. The signature upon the draft is compared with the signature upon the letter of credit, and, if it appears to be in proper form, the desired funds will be paid to the holder of the letter of credit in any form of currency he may desire. Whenever any payment is made pursuant to the letter of credit, an entry is made on the reverse side of the letter, showing the date of payment, the bank making the payment, and the amount paid. Travelers' checks issued by express companies and also by the Bankers' Trust Company of New York City, on behalf of the American Bankers' Association, are a simplified form of the letter of credit.

Commercial letters of credit are drawn by a bank at the request of a customer, usually in order to facilitate purchases abroad. Thus, if an importer desires to purchase goods in a foreign country on credit, he obtains a letter of credit from his bank or from another bank with which his bank has made arrangements for the issuance of letters of credit. This document may be addressed to a foreign correspondent of the issuing bank, or it may be addressed by the issuing bank directly to the foreign exporter.

The letter in effect is an undertaking or a guarantee that the issuing bank will pay all drafts drawn in accordance with the terms specified in the letter of credit. Where the letter specifies that drafts will be honored only when accompanied by bills of lading, consular invoices, and, sometimes, also by policies of insurance, the instrument is called a "documentary" letter of credit. Where there is no requirement that drafts shall be accompanied by bills of lading or other instruments of title, the letter is called a "clean" letter of credit.

The letter may be a "revocable" letter of credit or an "irrevocable" letter, depending upon the particular terms of the instrument. In the former, the bank reserves the privilege of withdrawing the credit at any time before drafts have been drawn against it. Where the letter is "irrevocable," it remains in effect until it is exhausted or expires by its terms.

Where the letter of credit is forwarded first to a correspondent of the issuing bank, and the correspondent notifies the exporter and undertakes on behalf of the issuing bank to accept drafts drawn by the exporter, pursuant to the letter of credit, the letter is said to be "confirmed." Where, however, the correspondent or notifying bank merely advises the exporter of the receipt of the letter of credit, without itself undertaking to accept or guarantee drafts drawn against it, the letter is "unconfirmed."

Lien (*lē'ĕn*; *lēn*). A legal right of a person to detain or control property belonging to another until certain charges upon it have been paid, or until some pecuniary claim against the owner has been satisfied.

Lighterage. Transferring goods from a dock or wharf to a lighter or barge, and then from the lighter or barge to a ship, or vice versa. The term is applied also to the expense involved in thus loading or unloading a vessel. This expense will be incurred whenever the shallowness of the water or the lack of proper dock facilities makes it impossible to load or unload directly from wharf to ship.

Limited. See *Ltd.*

Limited Partnership. A partnership in which the liability of one or more of the members is limited to the amount invested in the business. Such a partner, in the event of the insolvency of the partnership, cannot be held liable for any of its obligations beyond the amount which, under the partnership agreement, he has undertaken to place at the disposal of the business.

Usually, limited partnerships are strictly regulated by statute, the purpose of such regulation being to provide adequate notice to the public of the limited liability of one or more of the partners. These laws generally provide that the active management of the partnership shall be vested solely in the general partners—those members of the firm who are liable, without limitation, for any and all debts contracted by the partnership.

Liquidation. The conversion of the assets of a corporation, firm, or partnership into cash, and the distribution of its assets among the creditors and stockholders or other persons having an interest in the company or business.

A liquidation is known as a "voluntary" liquidation where it results from the mere desire of the owners of the business, or the stockholders of a corporation, to terminate the business and distribute its assets. The liquidation is a "forced" liquidation where the pressure of creditors has thrown the business, or has threatened to throw it, into receivership, and liquidation is the only method by which creditors can receive payment of the sums due them.

Listed. Before a stock or bond may be bought and sold on any of the larger stock exchanges, the security must be submitted to the governors of the exchange or to a special committee appointed to pass upon the character of the security and the qualifications of the corporation issuing the stock or bond. Certain definite requirements usually must be met to qualify the security for listing. When the stock or bond has been approved as fulfilling these requirements, it becomes "listed" on the particular exchange.

Sometimes the term listed is used with reference solely to listing on the New York stock exchange.

Lombard Street. The name applied to the financial section of London, of which Lombard street forms a part. The use of this term corresponds to the use of the term "Wall Street" in this country, as expressive of the entire metropolitan financial district.

Ltd. Abbreviation for the word limited, required to be included in the names of companies organized under limited liability statutes in Louisiana, Great Britain, Canada, and in some other countries. The term "Ltd." is used with the same purpose and effect as the abbreviation "Inc."—which is more commonly used in the United States—to indicate that the company is one in which the liability of the stockholders is limited to the amount invested in the corporation.

Manifest. A complete list of the passengers or freight carried upon each voyage made by a vessel. This list must be signed by the captain or other person in charge of the ship. If a passenger ship, it must contain, in addition to the name of every passenger, a complete record of the voyage, including particularly the name of the port of embarkation and that of the port of landing. Where the manifest covers a shipment of freight, it must contain the name of each shipper or consignor, the character of the freight, the number of packages, and the ports of loading and destination.

Margin. A sum deposited with a broker for the purchase of stocks or commodities on speculation. The "margin" so deposited constitutes a protection against loss to the broker, in the event of a fall in the value of the securities purchased. The amount of the margin required by the broker varies with the speculative quality of the security or commodity to be purchased for the customer. In the case of stocks traded on national exchanges, margin rules are set by the Federal Reserve Board.

Whenever the price or quotation of a security purchased for a customer on margin falls to such a point that the margin is reduced below the stipulated percentage, the broker calls upon the customer for additional margin. If this is not forthcoming, the broker "sells out" the customer before the fall in price has completely wiped out the margin deposited.

Matched Order. An order to buy, given simultaneously with an order to sell a similar number of shares of the same stock or an equal quantity of a commodity. Such an order really amounts to a fictitious sale and gives an appearance of activity in the particular stock or commodity which has no basis in actual demand. The purpose of "matched orders" is usually to cause an artificial or temporary rise in prices. Penalties are prescribed against traders on national exchanges who use this device. Detection is a duty of the securities and exchange commission.

Mechanic's Lien. Under the laws of many states, one who performs labor or provides materials used in the construction of a building may obtain a lien upon the building for the value of the labor or materials rendered, by filing a notice in the office of the county clerk or registrar of deeds. Such a lien is called a mechanic's lien. The purpose of these statutes is to provide security and some assurance of ultimate payment to those who render services or provide materials by which the owner of the building benefits.

In order to obtain a mechanic's lien, it is not necessary that the work or materials be rendered directly to the owner at his request. A notice of lien may be filed by one who performs work for a contractor or subcontractor. But, in that event, under the laws of most states, the lien is valid

only to the extent to which money is or may become due from the owner to the contractor or subcontractor, by reason of work performed upon the structure. The filing of a notice of a mechanic's lien, therefore, operates as a notice to the owner that, if any sums are or may become due to his contractor, he must set aside out of these sums, an amount sufficient to pay the mechanic's lien asserted against the building. To avoid double payment, it is customary for the owner to require a contractor to file a bond, protecting the owner against the possibility of having his property subjected to liens of persons hired by the contractor to perform services upon the building.

Middleman. One who stands between the producer or manufacturer and the consumer. Distributors of all kinds, such as jobbers, wholesalers, retailers, brokers, factors, and commission merchants, are included within this class.

Money. Any recognized medium of exchange. In a more limited sense, and as the term money is now commonly used, it applies to the currency either issued or recognized by governmental authority, whether or not it is legal tender. See *Legal Tender*.

Money Order. An order payable at sight to a person designated in the instrument, the amount to be charged to the account of the drawer. Money orders are issued by express companies and by the post-office department of the United States government, and, more recently, also by bankers' associations. They are quite similar to cashiers' checks in their essential character and in the purpose which they serve. By reason of their almost universal acceptability and further by reason of the fact that they are made payable to a designated party—so that one not entitled to the money order cannot avail himself of it—they provide a safe and convenient means for transmission of payment through the mails.

Moratorium. An act of the government providing that, during a certain period, creditors shall have no right to bring proceedings against debtors for the collection of debts.

Mortgage. Technically, a transfer of title to real or personal property as security for a loan or other obligation.

Formerly a mortgage was deemed to convey to the mortgagee the ownership in the property subject to defeasance; that is, subject to termination upon payment of the debt for which the mortgage was given as security. Today, however, mortgages, upon either real or personal property, are commonly regarded as giving to the mortgagee merely a lien upon the property mortgaged, and not as conveying any actual rights of ownership.

In most states, statutes provide specifically how mortgages may be foreclosed in the event of nonpayment of the debt for which the mortgage was given, the purpose of these statutes being to protect the mortgagor—the one who gives the mortgage—from a forfeiture of his interest in the property.

In order that the mortgagee shall have a valid lien upon the property mortgaged, as against a person to whom the property may be sold by the mortgagor, or, in most states, even as against judgment creditors of the mortgagor, the mortgage must be recorded. If the mortgage is upon real property, it will be recorded in the office of the clerk or the registrar of deeds of the county where the property is located. Chattel mortgages must generally be recorded in the office of the clerk of the town or municipality in which the mortgagor resides.

Mortgage, Insured. Congress set up in 1934 a Federal housing administration, one of whose functions is to insure approved mortgages on homes. The mortgage is insured in favor of the lender of the money, and the insurance is paid for by the borrower, the charge being one-half of one per cent of the face of the mortgage annually. To be eligible for insurance, a mortgage must be amortised over a 20-year period, must be secured by an approved city or suburban residence, and must bear not more than 5 per cent interest. The mortgage may cover up to 80 per cent of the value of the property, but the amount must not exceed $16,000. If the borrower defaults, the housing administration makes good the loan. One purpose of the law is to create a class of negotiable mortgages.

Mortgage Bond. A bond secured by a mortgage upon real or personal property.

Municipal Bonds. Obligations of a city, school district, incorporated village, or other municipality, issued to provide funds for municipal purposes.

National Bank. A bank organized under the National Banking law of the United States, and subject to regulation by Federal authority. The present national banks have been organized pursuant to acts passed on February 25, 1863 and June 3, 1864, as a part of the general financing plan of the Northern states during the Civil War. These banks were specifically given the power to issue bank notes upon depositing with the Treasury certain types of bonds of the United States. When the eligible types of bonds were called for redemption in 1935, the note-issuing privilege of the national banks lapsed. All national banks are required to be members of the Federal Reserve system and of the Federal Deposit Insurance Corporation.

Negotiable Paper. A check, draft, bill of exchange, or other commercial instrument payable to bearer or to order, the title to which may be transferred by delivery or by endorsement. An instrument is not negotiable unless it is payable to "bearer" (or a recognized equivalent of the term bearer, such as "cash") or to "the order of" a designated person. In order to be negotiable, the instrument must have also a definite or ascertainable date of maturity, and must contain an unconditional obligation to pay a definite sum of money. One who acquires a negotiable instrument for value, prior to maturity and without notice of any defect in the title of previous holders of the instrument, usually may recover against those who appear to be liable upon the instrument, irrespective of any defenses which they may claim or possess against previous holders of the instrument.

Negotiable Securities. Bonds payable to bearer and therefore transferable by delivery, as distinguished from registered bonds, which can be effectively transferred only by changing the registration of the bond at the office of the issuing corporation.

Net. A term applied to a price or to an amount after all discounts and other deductions have been made.

The net weight of a commodity sold in a container is the weight of the contents alone, free from the container.

No Account. When a check, drawn upon a bank in which the drawer is not a depositor, is presented at that bank, it is stamped with the words "no account."

No Funds. When a check is drawn upon a bank in which the drawer has or has had an account, but which has no funds to his credit when the check is presented for payment, the check is returned with the words "no funds" stamped upon its face. Where the drawer of the check has some funds on deposit, but not enough to meet the check, the words "insufficient funds" are stamped upon it.

Nonassessable. A term applied to stock in a "limited liability" corporation, which has been paid for in full, and the owner of which, under the terms of the issuance of the stock, cannot be required to make further contributions to the capital or business of the corporation. When such stock has once been fully paid for, the ownership of it entails no further liability on the part of the owner, either to the corporation or to its creditors.

No Protest. An instrument that is not subject to protest is marked with these words. See *Protest*.

Note. An unconditional written promise to pay a specific sum of money at a definite or determinable future date, signed by the person making the promise.

Oath. In law, an oath is a solemn affirmation, usually accompanied by a set formula, such as the words "I do hereby solemnly swear that", etc. One who swears falsely is liable to criminal penalties in nearly all jurisdictions.

Option. A right or privilege to buy (or sometimes to sell) property upon designated terms. An option differs from a contract in that the person to whom the option is given is under no obligation to buy or to sell, whichever the case may be. He may or may not exercise his privilege, as he chooses. In order that an option may be valid and binding, usually something of value must be given to the person granting the option. Otherwise, it is a mere offer, which may be withdrawn at any time.

Outlawed. A colloquial term applied to the barring of rights by the failure to enforce them within a certain period.

The practical administration of justice requires that a definite limitation be placed upon the time within which those who claim rights against others shall enforce these rights in courts of justice. The principle upon which statutes of limitation rest is that the facts about a matter are likely to be obscured by the lapse of time, and also that it is socially desirable that a long existing situation should not be disturbed by reason of long past events.

The period within which an action must be commenced upon a note or other contractual obligation is, under the laws of most states, six years. An instrument under seal, however, does not become outlawed in some states until twenty years have elapsed from the date when the obligation matured. Tort actions—actions for injuries to person or property—are usually "outlawed" in two, three, or four years, the term varying in different states.

Overdrawn. When a depositor draws checks to an amount in excess of the credit to his account, his account is said to be overdrawn. Where such an overdraft is permitted by a bank, it constitutes, in effect, a loan by the bank to the depositor. Such a loan, however, is not represented by any written instrument from the depositor to the bank, and is therefore deemed a highly objectionable bank practice.

Paper Money. Any paper currency, whether or not it is legal tender.

Par. The face value of a note, security, or other instrument. A stock or bond is said to sell at par, above par, or below par, accordingly as its sale price is equal to, greater than, or less than, the nominal value stated upon the instrument itself.

Pass Book. A term sometimes applied to a bank book. See *Bank Book.*

Payable to Bearer. An instrument payable to "bearer" is payable to the holder of the instrument, and may be transferred from one holder to another by mere delivery, without endorsement. Where an instrument is made payable to "cash," it is regarded as payable to bearer.

Payee. The one to whom a note, draft, or other instrument is made payable.

Payor (Payer). The maker or drawer of a promissory note, or of a similar instrument.

Personal Property. Any property, whether tangible or intangible, that is not affixed to land. Stocks, bonds, jewelry, furniture, live stock, automobiles, trade-marks, good will, patents, and leases for definite periods of years are all included within the general class of personal property.

Pit. The trading room of the Chicago board of trade, in which grain, rye, oats, barley, and other commodities are bought and sold.

Point. The unit used in designating the extent of a rise or fall in the market price of a security or a commodity. A point may indicate different amounts for different securities or commodities. Thus, a rise or fall of a point in the quotation of a stock ordinarily indicates a rise or fall of one dollar. In quotations of cotton, a point is $\frac{1}{100}$ of a cent, and a rise of 25 points in the price of cotton would indicate merely an increase of one-quarter of a cent per pound. In foreign exchange, a rise of one point would mean normally an increase of one cent in the exchange value of the foreign monetary unit.

Pool. A combination of individuals or interests for the purpose of creating an artificial rise or fall in the price of securities or commodities dealt in upon the stock or commodity markets. The members of the pool combine their resources and, under the management of a designated individual or group of men, buy and sell in a particular stock or commodity with the purpose, either of hammering down the price of the stock or commodity, or of artificially raising the price to a point that will enable them to unload the security or commodity upon the public at a profit. The method of operation most frequently used is the following:

A particular stock is chosen as a desirable one with which to execute the series of maneuvers which it is expected will yield a profit to the members of the pool. A large quantity of this stock is bought up quietly at the normal price. The members of the pool then engage in sales to and from one another, sales which by reason of the ultimate identity of interest of the parties to the pool are in fact fictitious or "wash" sales. When a block of the stock is offered upon the stock market by one member of the pool, it is promptly purchased by another member of the pool. As additional blocks of stock are offered, the stock is bought up at continually rising prices by members of the pool. By this series of operations, the price of the stock is artificially raised to a point much higher than its actual or true market value, and, when a favorable moment arrives, the pool unloads the stock upon the public at this artificially created high price. As soon as the unloading has been effected, the bottom falls out of the stock, and the innocent purchasers upon whom the stock has been unloaded by the pool find that their stock cannot be sold at anywhere near the price which they paid. A pool which operates in this fashion is sometimes called a "bull" pool.

In a "bear" pool, the members of the pool combine their resources and proceed to sell a particular stock or commodity at the current price for future delivery. They then, by actual sales of the stock or commodity in the market at continually falling prices, as well as by fictitious transactions, "hammer down" the price of the stock or commodity to a point where they can cover at a profit the sales which they have made. Just as in the "bull" pool, the repeated purchases of the stock at a continually rising price cause the price of the stock to rise abnormally, so, in the "bear" pool, the psychological effect of a continuous series of sales, at a steadily falling price, results in a demoralization of the market.

Operations of these types on national security exchanges were forbidden by law in 1933; those on the commodity exchanges, in 1936. Security traders are now required to obtain licenses from the securities and exchange commission; commodity traders, from the commodities exchange commission. The penalty for engaging in pool operations may be revocation of the trader's license.

Postdated Check. A check bearing a later date than the date upon which it was actually drawn. A postdated check will not be honored by a bank until the date indicated upon the check arrives.

Power of Attorney. A writing or instrument signed by one person and giving to another person authority to perform certain acts on behalf of the signer of the instrument. A power of attorney, in most states, must either be witnessed, or be acknowledged before a notary public or other official authorized to take acknowledgments. The power of attorney may be very general in its scope, or it may be limited to a single specific act.

A power of attorney may be terminated at any time by the grantor of the power, unless the holder of the power of attorney has some pecuniary interest of his own which would be violated or infringed by the termination.

For some purposes, a power of attorney may be conferred by one person upon another by mere oral or parol authorization, without any instrument in writing. An authority conferred in this manner is more properly termed a mere agency rather than a power of attorney.

Preferred Creditor. A creditor entitled to payment of his claims before the claims of mere general creditors are paid. Whether a creditor has a preferred claim becomes important where a debtor has become insolvent or has been adjudicated a bankrupt. Claims arising out of personal services rendered within two years of the filing of a petition in bankruptcy are entitled to a preference, and such claims must be paid in full before other debts may be paid.

Preferred Stock. Stock in a corporation, which confers upon the holder a prior right to dividends or to payment out of the assets of the corporation, in the event that the corporation is dissolved.

The usual preference given to holders of preferred stock is one entitling the holders to dividends of a certain per cent upon the par value of their stock in each year, before any dividends shall be paid to holders of the common stock. This preference as to dividends may be either cumulative or noncumulative. If the dividend preference is cumulative, then, if no dividends, or dividends less than the amount of the dividend preference, are paid in any year upon the preferred stock, the amount unpaid must be paid to the holders of the preferred stock before any dividends can be paid upon the common stock in any subsequent year. If the preference as to dividends is noncumulative, then, if no dividends are paid upon the preferred stock in any year, such omission of dividends does not affect the relative rights of the holders of preferred and common stock in any subsequent year, the prior omission of payment of dividends to the preferred stockholders being entirely disregarded.

Generally, the dividends which holders of preferred stock may receive from the corporation are limited to a definite rate or amount. Thus, if the preferred stock entitles the holder to dividends of 7 per cent upon the par value of the stock, all of the profit in any year, in excess of the dividends to which the preferred stock is entitled, goes to the holders of the common stock. This, however, is not necessarily the case. For, in the absence of a provision limiting the holders of preferred stock to dividends of a certain per cent, preferred stockholders are entitled to share equally with the common stockholders in any excess profits distributed by the corporation, after the common stockholders have received dividends at a rate equal to that paid to the holders of the preferred stock. See *Common Stock.*

Premium. When any security having a par value sells at a price above par, it is said to be quoted at a premium.

The term is used also in transactions in international or foreign exchange, with reference to the amount above the normal exchange rate at which any particular currency is quoted. And where different kinds of money, such as gold and silver, or gold and paper, are used simultaneously within a country, gold will be quoted at a premium whenever the paper currency, or the currency having a lower intrinsic value, is issued in such a quantity as to cause the public to lose confidence in it. In such a case, gold is driven out of monetary uses, and gold coin is bought and sold as a commodity rather than dealt in as mere money or currency. See *Gresham's Law.*

Principal. The capital sum due upon a bond or other obligation as distinguished from the interest which accrues or becomes due upon the principal from time to time.

Profiteering. Selling goods or services at a price yielding an unusually large profit. In 1918, Congress passed a law designed to prevent and punish profiteering in certain businesses. This law, however, was held unconstitutional.

Promissory Note. An instrument containing an unconditional promise to pay a definite sum of money to a particular person or to his order, or to bearer, either on demand or at a definite future time. A promissory note may be either negotiable or nonnegotiable. It is nonnegotiable when it is payable to a definite person only, and not to his order or to bearer.

Promoter. One who makes a business of floating or financing new enterprises or of obtaining additional capital for already existing enterprises.

Pro Rata. In proportion to their respective rights or liabilities. Thus, it is the policy of the law that creditors of an insolvent debtor shall share pro rata in his assets; that is, in proportion to their respective claims. Conversely, where several persons are engaged in a joint enterprise, it is the policy of the law that they shall, as among themselves, be liable pro rata for any obligations incurred; that is, they share the burden in proportion to their interests in, or contributions to, the enterprise.

Protest. The formal step necessary to fix the liability of the endorsers of a check, note, or other instrument which has been presented to the maker or acceptor for payment and has been refused. In the case of a note or of a draft or bill of exchange payable at a definite future date, the instrument must be presented formally to the maker or acceptor during business hours upon the date of maturity. If the instrument is not paid before the close of business on that day, the one who made the formal presentation of the instrument for payment certifies over his seal and signature that the instrument was presented and payment was refused. This certification is the "protest" of the instrument.

It is not necessary, in order that the maker of a note shall remain liable upon the instrument, that the note be presented and protested for nonpayment.

Proxy. An authorization from one person to another to act in his place and on his behalf. It is customary for stockholders of a corporation to vote their stock by proxy; that is, by executing a written authority authorizing another to act on their behalf at a meeting of the stockholders. Persons who occupy positions of trust, such as directors of a corporation, cannot act as such by proxy.

Put. An agreement to accept and pay for a certain amount of a stock, or of a commodity, at a fixed price at any time before the expiration of a designated period.

Pyramiding. Buying additional blocks of a particular stock or commodity upon margin, with the book profits yielded by a rise in prices. Thus, a customer requests a broker to buy 100 shares of a particular stock at 25 dollars a share, on a five-point margin, that is, a margin of 20 per cent, and gives directions to the broker to buy additional stock upon the same margin upon each advance in the market price of the stock. If the stock advances five points, the broker, under his instructions, will buy another hundred shares upon a similar margin upon the basis of the five-point paper profits yielded by the first purchase. As the stock continues to rise in price, the paper profits furnish additional margin for further purchases, until a large quantity of the stock has been purchased; and, if the stock so purchased is unloaded before a fall in the price of the stock, a very handsome profit upon the original investment will result.

Quotation. A price bid or asked for a stock, bond, or commodity. Sometimes a quotation may represent an actual market price based upon actual sales.

Rate of Exchange. The rate at which a unit of currency of one country exchanges for a unit of currency of another country. Under normal conditions, the monetary unit of one country has a definite value in terms of the currency of any other country, generally based upon the amount of pure gold represented by the respective monetary units. When exchange is at par, then the currency of one country has a value, in transactions with persons of the other country, equal to the relative amount of gold represented by the monetary units.

Where paper currency which is not redeemable in gold, circulates within a country, a new element is introduced. The currency of such a country will be exchangeable for the currency of other countries, not at a rate based upon the relative amount of gold nominally represented by the respective monetary units of the countries, but rather at a rate established by other factors. Under "managed currencies," such as Great Britain's became in 1931 and that of the United States became in 1933, the rate may be set by tacit agreement and with an eye to its effect on internal prices. Each government, in such cases, uses a large "stabilization fund" to support at a definite level the value of its own currency through buying or selling those of other countries.

Rating. The credit worth of an individual, firm, or company, as estimated by Dun and Bradstreet, Inc., or any other recognized mercantile agency.

Real Property. Land and all things permanently attached to the land. Thus, real property includes structures erected upon the land and intended to remain affixed for an indefinite time, minerals, water flowing through the land, trees and other issues of the soil (excepting crops which are planted and reaped yearly or more frequently), rights of way and other easements, and rights of every nature in land and in waters, not including, however, leases for years or mere licenses.

Rebate. A return of part of a sum received for goods or for services rendered. At one time it was customary for railroads to make rebates to large or favored shippers. The result of this practice was that certain large corporations were able to save sufficiently upon their transportation costs to undersell their smaller or less favored competitors. The result of this was to crush the smaller concerns out of existence. The Interstate Commerce act of 1887 and the amendments which have since been made to that act have had, as one of their chief objects, the prevention of this practice. Under this act, the giving of a rebate by any railroad or other common carrier in interstate commerce was made a crime.

Receiver. Person appointed by a court to manage the property of a person or a company, pending the termination of legal proceedings affecting the property or its owner. Thus, a receiver may be appointed to receive the rents and profits of a property with respect to which mortgage foreclosure proceedings have been instituted. Similarly, a receiver may be appointed to receive the rents and profits of property the ownership of which is disputed.

The type of receiver that is most common, however, is the receiver who is appointed ostensibly to take over the assets and continue the business of a corporation, pending its dissolution. Frequently this means of preserving the property of a corporation until its affairs can be liquidated is abused by those in charge of the affairs of the corporation. Thus, the receiver may be appointed at the behest of friendly creditors, with the sole purpose of preventing unfriendly creditors from pressing their claims and levying execution upon the property of the company. No bona fide purpose to dissolve the corporation or to liquidate its affairs then exists; but the protection which receivership proceedings provide against the collection of claims by creditors is obtained. In these cases, therefore, a receivership merely grants the corporation a moratorium—a suspension of payment of its debts—and serves no other purpose than to carry the corporation through temporary financial straits.

Refunding. Floating a new issue of securities to replace outstanding issues which are about to mature.

Registered Bonds. Bonds payable to a definite person designated in the face of the bond, and transferable only by endorsement properly witnessed and by an entry of the transfer upon the books of the issuing corporation. Where the bond is registered not merely as to principal but also as to interest, the interest is paid by check to the record holder of the bond, without the necessity of the transmission of any coupons to the corporation. When the bond is registered as to principal only, and not as to interest, it usually bears coupons representing the interest due or to accrue upon the bond, the coupons being payable to bearer and cashed upon presentation as they mature.

Registrar. One who records original issues and transfers of stock or bonds of a corporation. The functions of the registrar generally include the duty of safeguarding against a fraudulent or erroneous overissue of stock or bonds by the officers of the corporation. The registrar must then make certain that no certificates of stock or bonds are issued unless they are part of a duly authorized original issue or are issued in place of surrendered and canceled certificates of like amount.

Reserve. Funds set aside to meet a contingent or definite future expenditure.

Most corporations have a reserve for obsolescence and depreciation, the purpose of which is to provide a fund with which to replace capital assets when they have become worn out or useless. Where a company carries its own insurance—that is, does not take out insurance with regular insurance companies, but carries its own risks as to fire loss or other damage—a reserve will be accumulated from year to year so that, in the event of a loss by fire or otherwise, there will be sufficient funds set aside to cover the loss. It is also customary for companies that have issued bonds or other long-term notes to set aside annually a certain amount as a so-called reserve, with which to fund or pay the bonds or notes when they become due. Banks are required by law to maintain a reserve consisting of cash or its equivalent, amounting to a certain proportion or percentage of their deposits. See *Bank Reserves*.

Rights. The term applied to the privilege given to existing stockholders of a corporation to purchase a proportionate number of shares of any new issue of the company's stock.

Under the law which has grown up with respect to the rights of stockholders in corporations, a stockholder is entitled to subscribe to any new issue of stock that the corporation may make, in proportion to his holdings in the corporation, before the stock may be offered to the general

public. Where the outstanding stock of the corporation has a market value higher than par, this privilege of purchasing stock of the new issue, at par or at any price lower than the market quotation for the outstanding stock, is a valuable one. Thus, assuming that there are 10,000 shares of the stock of a corporation outstanding, the shares having a par value of $100, but selling on the market at $150, if a new issue of 5000 shares is to be offered at $100 per share, each stockholder would be entitled to purchase one share of the new issue for each two shares which he already owns in the corporation. The holder of 100 shares would then be the owner of 50 so-called "rights," a right being the privilege of purchasing one share of stock of the new issue. If the new stock is issued at $100 and the stock outstanding is quoted at $150, then the value of a right would be something less than $50. These rights may be bought and sold and, in the case of stocks having a wide market, are sometimes the subject of considerable speculation.

Savings Banks. Banks organized for the purpose of receiving deposits from small savers, and utilizing these savings in the form of investments in high-grade bonds and in loans upon real estate. Savings banks are very strictly regulated by statute in nearly all states, with the purpose of insuring the utmost safety to depositors. Thus, savings banks are generally prohibited by law from investing their funds in other than Federal, state, or municipal bonds and bonds of certain designated railroads, and in loans secured by first mortgages upon real estate, where the loan is not in excess of 60 per cent of the value of the property. Generally, deposits in savings banks are not subject to check or to withdrawal upon demand, although banks frequently waive the requirement that they receive a certain period of notice of an intended withdrawal.

Scalper. One who obtains inside information of events likely to affect the price of securities, and utilizes this information to his own profit by buying or selling upon the basis of his advance information. This practice is called "scalping the market."

Scrip. A form of promissory note or certificate of indebtedness, issued by a corporation to its stockholders in lieu of cash dividend payments. A corporation will resort to the use of scrip dividends when, although the profits of the company are such as to warrant some return being made to the stockholders upon their holdings in the company, the amount of actual cash on hand is not enough to permit immediate payment of cash to the stockholders.

Second Mortgage. A mortgage upon property which is already subject to a prior or first mortgage. Mortgages are called first, second, third, or fourth mortgages, according to the order in which they have been placed upon the property, and they are entitled to payment out of the property in order of their priority. Thus, if a second mortgage is foreclosed on default in the payment of interest or principal, the property can be sold only subject to the first mortgage. In other words, only the equity of the owner above the first mortgage can be relied upon to pay the amount of the second mortgage. In the event that the interest or principal due upon the first mortgage is not paid when due, the first mortgage may be foreclosed, and, in that event, the amount of the first mortgage must be paid out of the proceeds before any sum will be paid to the holders of the second or subsequent mortgages. If, after payment of the amount of the first mortgage and the expenses of the foreclosure sale, there is any residue, this will be paid to the second and subsequent mortgagees or lienors, in order of their priority.

Secured Creditor. A creditor who has security or collateral, in the form of personal or real property, for a sum due him from a debtor.

Securities. Stocks, bonds, and other evidences of indebtedness or of ownership in a corporation.

Seigniorage. Charge made by a government for coining bullion into money.

Sellers' Option. A contract entered into in a stock or commodity exchange, whereby the seller is given the option of delivering at any time during a specified period upon one day's notice to the buyer. Under New York Stock Exchange rules, the period of a sellers' option cannot be less than four days nor longer than sixty days. "Sellers' option four" or "sellers' option ten" designates the period during which delivery may be made. See *Bids and Offers, Buyer's Option.*

Selling Short. Selling for "future delivery." One who sells short makes an agreement whereby he agrees to deliver at a future time, a stock or commodity which he does not possess at the time he enters into the contract to deliver, with the expectation that he will be able to purchase the stock or commodity, before delivery is due, at a lower price than he sold for. One who habitually sells short is called a "bear." See *Bear*

Shave. The fee or commission taken by a broker or by a lender of money for obtaining or granting a loan. Generally, where the shave goes to the lender, it is merely a device to cover a usurious rate of interest. Thus, if one goes to a money lender and desires to borrow $900 in cash, the money lender will sometimes require, not a note for $900, bearing the legal rate of interest of 6 per cent, but a note for $1000. The difference between the amount given to the borrower and the amount named in the note is the amount of the "shave" taken by the lender. To avoid possible penalty for making a usurious loan, notes given by borrowers are frequently "purchased" by the lender from a third party, who is in fact a straw man in the transaction. By this device, what is in fact a direct loan is made to appear to be a "purchase," it being perfectly lawful to purchase a note, at any discount, however large.

Shoe String. When a person trades in stocks or commodities on margin, with a very limited capital, he is said to be "trading on a shoe string."

Sight Draft. A draft due and payable upon presentation to the person upon whom it is drawn. The ordinary bank check is, in effect, a sight draft. See *Draft.*

Silent Partner. One who has money invested in the business of a partnership and shares in its profits and losses, but whose interest in the business is not known to the general public. A silent partner is usually liable without limit for all of the debts of the partnership but only for those incurred while he maintained his interest in the business. He may, however, retire from the partnership at any time without giving notice to the public. See *Limited Partnership.*

Silver Certificate. Paper currency issued by the government of the United States as a substitute for, and representative of, silver dollars deposited with the United States treasury. The Bland-Allison act of 1878 authorized the purchase of silver bullion by the secretary of the treasury and the coining of the bullion into silver dollars. The act further provided that the silver dollars so coined could be deposited with the United States treasury, and that silver certificates, redeemable on demand in silver dollars, should be issued in their place.

In 1933, the Treasury was directed by Congress to purchase silver for monetary purposes until the Treasury's stock, valued at $1.29 an ounce, formed one-fourth of the value of the total money stock held or until silver reached a market price of $1.29 an ounce. The purpose was ultimately to induce other important nations to use two metals for the settlement of international payments, silver and gold exchanging at a fixed ratio with each other. This policy was based on the theory that world prices had fallen too low on account of the scarcity, and consequent dearness, of gold, and that an increase in the money base would permit a rise in the price level.

Simple Interest. Interest computed on the principal only. Simple interest is to be distinguished from compound interest. In the latter, at regular intervals, interest due or accrued is added to the principal, and interest is computed thereafter upon the principal plus the interest so credited.

Single Standard. A phrase used to describe a monetary system in which one metal is used as the sole standard of value. Formerly, nearly all countries had a bimetallic system, or double standard, in which both silver and gold were freely coined at a certain ratio. Values were then determined in terms of either silver or gold. England was the first country formally to adopt the single gold standard, the act accomplishing this reform having been passed in 1816. The single gold standard was formally adopted by the United States in 1900. See *Silver Certificate.*

Sinking Fund. A fund created by setting aside periodically, out of earnings or revenue, sums with which to pay bonds or other long-term obligations when they mature. A sinking fund may be created also for the purpose of replacing worn-out machinery or other capital assets. See *Amortization.*

Specie. Coin, or metallic money.

Spot. A term used in quotations on commodity exchanges to indicate that the price is for immediate delivery and cash payment.

Standard Weight and Fineness. A phrase referring to the weight and purity of the metal in a monetary unit established by law. Thus, the gold dollar, existing since 1934 only in the form of bullion, has a standard weight of $15\frac{5}{7}$ grains, $\frac{9}{10}$ fine, that is, $\frac{9}{10}$ pure gold and $\frac{1}{10}$ copper alloy, or $13\frac{5}{7}$ grains of pure gold.

State Banks. Banks organized under the laws of a particular state and subject to state regulation. Savings banks, trust companies, and all types of commercial banks, except national banks, Federal Reserve banks, and farm loan banks, are "state banks."

Sterling. Abbreviation for the pound sterling, the unit of the English monetary system. For nearly a century the pound sterling was equivalent to $4.86. After devaluation of the American dollar in 1934, the pound became nominally worth $8.24. In actual practice, the pound sterling fluctuates around $5.00 but after World War II it dropped to about $4.00. Since 1931 its convertibility into gold was terminated.

Sterling Exchange. Bills of exchange payable in pounds sterling, and drawn upon London banking houses.

Stock. The capital stock of a corporation represents the amount invested by stockholders in the business of a corporation. From the point of view of the law, the capital so invested represents a fund to which creditors may look for payment of debts incurred by the corporation.

The capital stock of a corporation is usually divided into a number of shares which are held by the various stockholders of the company. These shares, evidenced by certificates of stock, represent the proportionate interest which each stockholder has in the corporation.

Stock Certificate. A printed or engraved certificate issued as an evidence of ownership of stock in a corporation. This certificate must be signed by authorized officials of the company; sometimes also by a "registrar of transfers."

Stock certificates may be transferred by endorsement upon the reverse side of the certificate, or by a separate instrument of transfer. The transfer, however, vests no rights in the one to whom the transfer is made, as against the corporation, until a record of the transfer has been made on the books of the corporation.

Under these statutes, if a certificate is endorsed in blank by the holder of record, it becomes similar to a negotiable instrument, the ownership of which can be transferred by mere delivery from one person to another. Under the Uniform Stock Transfer act, which has been adopted in a majority of states, one who, in good faith, purchases a certificate which bears a valid endorsement may obtain a good title even though the certificates have been stolen from, or lost by, the true owner.

Stock Dividend. Nominally, a distribution of surplus or earnings to stockholders, in the form of additional stock, rather than in the form of cash. The use of the term distribution, in connection with stock dividends, is, however, misleading. For, in a stock dividend no property is turned over by the corporation to its stockholders. The stockholders merely receive additional evidences of their ownership or interest in the company. Thus, if a stock dividend of 100 per cent has been declared and made by a corporation, each stockholder merely holds two shares of stock where he formerly held one. The net assets of the company remain unchanged, and the proportionate interest of each stockholder in the net assets of the company remains the same. His interest in the company, however, is evidenced by a greater number of shares of stock.

Where the stock has a par value, a stock dividend operates to convert surplus on the books of the company into capital.

Stockjobber. A dealer in stocks of doubtful character.

Stop-loss Order. An order left by a customer with his broker directing the broker to sell stock owned by the customer in the event of a fall in the price of the stock below a certain point. The object of such an order is to check further loss where there appears a definite tendency to a decline in the price of the stock.

Where a stock or commodity has been sold short by the customer, an order would be placed with the broker to buy as soon as the price had risen to a definite point, in order to avoid greater losses, which would be incurred if the customer were compelled to cover at a still higher price.

Stop Payment. An order by a customer to a bank, directing it to refuse payment of a check or other instrument drawn by the customer upon the bank, or made payable at the bank.

A bank owes no obligation to the holder of a check drawn upon the bank by a customer, in the absence of a certification of the check by the bank. The bank may, therefore, with entire impunity, refuse payment of a check upon which the drawer has stopped payment. If the check, however, has been transferred by the payee or any other holder to a bona fide purchaser, either by endorsement or, if payable to bearer, by delivery, then the drawer of the check may be held liable to such a transferee for the amount of the check. No claim, however, can be made against the bank by any holder or transferee of the instrument.

Subpœna. A writ issued by a court of law commanding a person to appear on a certain day and at a place designated under a penalty for nonappearance or default.

Subpœna Duces Tecum (*sŭb-pē'nà dū'sēz tē'kŭm*). A court order in an action, directing a witness to bring with him any books, documents, or other papers in his possession or control which may or can be used as evidence. Such an order must describe with reasonable clearness what is wanted.

Supplementary Proceedings. A statutory remedy brought against a judgment debtor in aid of execution, for the purpose of locating and setting apart property of his to be applied in satisfaction of the judgment.

Surplus. The net worth of a firm or corporation, above its capital or capital stock. The term nominally includes both earnings from business operations and increases in the value of capital assets.

Tare. The difference between the gross and the net weight of an article in a container or vehicle. The gross weight of a barrel of flour is the total weight, including the container. The net weight is the weight of the flour itself. The difference between the gross and the net weight is the "tare."

Teller. A paying teller is an officer of a bank who pays out cash over the counter upon checks and other instruments made payable at the bank.

A receiving teller is a bank officer who receives and counts sums deposited with the bank, giving receipts for the funds deposited.

Ticker. An instrument, operated by telegraph, which automatically types messages transmitted from a central station. The instrument is used in brokers' offices, primarily for receiving prompt information with regard to stock transactions.

Time Deposit. A deposit of funds with a bank, under an agreement that the bank shall be entitled to the use of the funds for a definite period, or until a certain number of days have elapsed after notice has been given of an intention to withdraw the deposit. Deposits in savings banks are normally "time deposits."

Trade Acceptance. See *Acceptance.*

Trade Discount. A deduction, usually on a percentage basis, from the retail or "list" price of goods, allowed to a merchant by the manufacturer or jobber.

Trade-Mark. A special mark or symbol used for the purpose of identifying a certain product, or the products of a certain merchant or manufacturer. A trade-mark is protected under the law against use or appropriation by others than the one first to use the particular mark. The purpose of this protection given by the law is chiefly to prevent fraud upon the public.

Trade-marks may be registered at the United States patent office. Such registration does not add to the rights already possessed, without registry, by the owner of a trade-mark. Registration, however, provides conclusive evidence of a time since which the trade-mark has been used, and may prove of considerable value in the event of any litigation respecting the particular trade-mark.

Transfer Agent. Custodian of the stock book of a corporation, whose duty is to record transfers of stock and to issue new stock certificates in place of the surrendered certificates.

Transfer in Blank. Normally, stock is transferred by delivery, accompanied by an endorsement upon the reverse side of the stock certificate, made by the one in whose name the certificate has been issued. Where the name of the person to whom the stock is transferred is left blank, the stock certificate is said to be endorsed "in blank," and may then be transferred from one person to another by mere delivery, without further endorsement.

The stock is not effectually transferred, as against the corporation, however, until an entry of the change of ownership has been made upon the books of the corporation. And all rights of participation in benefits accruing to stockholders, including the right to dividends and the right to vote at stockholders' meetings, are determined by the record of stock ownership kept by the corporation.

Treasury Certificates. Short-term obligations bearing interest, issued by the United States government.

Treasury Notes. Currency issued by the United States government, pursuant to the Sherman act of July 14, 1890. This act directed the purchase, by the secretary of the treasury, of 4,500,000 ounces of silver monthly, the silver to be paid for with treasury notes redeemable on demand in gold or silver. These notes were legal tender for all public and private debts. The total amount of notes so issued was $155,931,002. In 1900, Congress passed a law providing for the cancellation and retirement of these notes as rapidly as the bullion which had been purchased with the notes was coined into silver dollars and subsidiary silver. As rapidly as treasury notes have been retired, pursuant to the provisions of this act, silver certificates have been issued in their place.

Trust Companies. Corporations organized under state laws, usually with powers to carry on a general commercial banking business and to act in various fiduciary capacities. These fiduciary capacities include acting as an executor under a will; administrator of the estate of a deceased person; trustee under a will, a deed of trust, or a mortgage

indenture; guardian of the estate of an infant; committee of the estate of an incompetent; registrar and transfer agent of a corporation; and fiscal agent for a person, a corporation, or a municipality.

Trustee. One to whom property or rights are transferred, to be administered for the benefit of a certain person or group of persons known as the beneficiaries of the trust, or the *cestuis que trustent*.

A trustee under a will or a deed of trust is usually given the custody of property or securities, for the purpose of collecting and distributing the income for a designated period—during the minority of an infant or during the life of the beneficiary—the principal to be preserved intact by the trustee and distributed to certain persons at the termination of the trust.

A trustee under a corporate mortgage is appointed to safeguard the interests of numerous bondholders scattered throughout the country. It is the duty of such a trustee to see that the corporation which has given the mortgage does nothing to lessen the value of the property which forms the security for the bonds issued.

Underwriting. An agreement to share in the risk of a proposed venture or undertaking. Before the rise of the large insurance corporation, it was customary for a group of capitalists to underwrite a policy of fire, marine, or other insurance, each underwriter, or person who subscribed his name to the agreement, undertaking to pay a definite proportion of the loss.

The term is now frequently applied to an agreement by private banking houses, or by other dealers in securities, to provide a market for a proposed issue of bonds or other securities. Such an underwriting agreement normally contains a promise by the underwriters that they will dispose of a certain proportion of the securities to the general public on or before a certain date, and, if all of the securities are not taken up by the general public, that the underwriter will himself purchase the remainder. Where the proposed issue is large, a number of private banking houses form a "syndicate" and together underwrite the issue. They then proceed to use their joint efforts to dispose of the stock to the public. A generous commission is usually paid to the underwriters for the service rendered.

Unearned Increment. The increase in the value of land, resulting from an increase in population or from any other cause not traceable to the expenditures or efforts of the individual owner.

United States Notes. Paper money of the United States, originally issued under the act of February 25, 1862. This currency was merely a promise by the government to pay the bearer, on demand, the face amount of the note in gold. In fact, however, the notes were not redeemable until 1879, when specie payments were resumed by the government. These notes, when issued, were expressly made legal tender for all debts, and were received in payment for all public dues except customs and excise taxes. By reason of their legal-tender quality, they were popularly called "legal tenders." They were also called "greenbacks," from the color of the reverse side of the notes.

Unlisted Securities. Stocks and bonds not listed upon the recognized stock exchanges. Frequently the term is applied to any security not listed upon the New York stock exchange. See *Listed*.

Upset Price. The price below which a security or a commodity will not be offered; as, for example, by an auctioneer at a public sale.

Voucher. A receipt, evidencing a payment of money, together with a statement of the items for which the payment was made.

Wall Street. Name popularly given to the financial district of New York City, of which Wall street itself forms the center. At the corner of Broad and Wall streets are the New York Stock Exchange, the banking house of J. P. Morgan and Company, the Bankers' Trust Company, and the United States Branch Treasury.

War Baby. A corporation engaged in the sale of war materials, which sprang into existence, or came out of obscurity, and made large profits as a result of the war. The stock of such a corporation was also sometimes referred to as a "war baby."

Warehouse Receipt. A receipt issued by a warehouseman, evidencing a deposit of certain goods with him. The warehouse receipt may be negotiable; that is, it may run to the bearer or to the order of the depositor of the goods, in which case it may be transferred by delivery or by endorsement from one holder to another. When a negotiable receipt has been issued, the goods will be surrendered by the warehouseman only upon a surrender of the receipt. For many purposes, such a receipt may then be dealt with in commerce as though it were the goods themselves, since the possession of the receipt gives control over the goods. Thus, banks frequently make loans upon these negotiable receipts as collateral, and the goods themselves are bought and sold in the market by mere negotiation or delivery of the receipt.

The Uniform Warehouse Receipt act, which has been passed in most states, is designed to further the commercial dealing in negotiable warehouse receipts as the representatives of the goods. This act, however, differs from that governing negotiation of "order bills of lading," in that a pledgee or purchaser of a warehouse receipt from or through a thief or a finder gets no title to the receipt or to the goods represented by it.

Warrant. In law, a warrant is a precept, or writ, issued by a court, authorizing a public official to do some special act; as, for example, to make an arrest. In business, a warrant is a written authorization proceeding from a competent source to a proper individual, conveying power to receive either money, its equivalent, or other personal property, or to pay money to one who is entitled to receive it. In England, the term is in general use to designate a receipt for goods which have been deposited in a warehouse, showing the date of entry, the person or persons to whom the goods are deliverable, the date upon which rent commences, and all other details necessary to identify the particular parcels for which the warrant is issued. The warrant is transferable by endorsement.

Warrant, Bench. A warrant issued by a court "in bench," authorizing an officer to arrest and bring before the court persons who are in contempt, or who have disobeyed a court order, or who have been indicted. The name distinguishes this writ from warrants issued by inferior judicial officials.

Warrant, Search. A written authority of state, issued by a court, directing some judicial officer to examine a named place for articles alleged to be unlawfully concealed there. The articles most commonly searched for are stolen and embezzled goods, counterfeit money, gambling implements, and other unlawful possessions.

Wash Sales. Fictitious sales made for the purpose of creating an artificial market price for a stock or commodity. Wash sales on national exchanges are now forbidden under penalty of law. See *Pool*, *Bear*.

Watered Stock. Where stock has been issued, having a total nominal or par value in excess of the capital actually invested in a corporation, the stock is said to be "watered." And the amount of stock issued in excess of the actual assets held by the corporation is called "water." The result of watering stock is to mislead creditors of the corporation and the general public who form a market for the sale of the stock of the corporation.

When, As, and If Issued. Frequently, when a corporation plans to issue stock or bonds to the public, a campaign for the sale of the securities will be undertaken before the necessary legal steps involved in creating the new issue of securities have been completed. The corporation, or the banking house through which it has arranged to dispose of the securities, in order to safeguard itself against the possibility of some legal obstacle preventing the proposed issue, will then offer the securities to the public "when, as, and if issued." In the event that, for any reason, the securities are not issued, the corporation or the banking house through which it operates will then not be liable to those who have given orders for the proposed stock or bonds.

Will. A formal, written instrument executed pursuant to provisions prescribed by law, providing for the distribution of the property of the testator—the person making the will—at his death. Normally, a will may be revoked or amended by the testator at any time before his death.

Under the laws of most states, a will is invalid unless it is subscribed by the testator and declared by him to be his last will and testament, in the presence of two witnesses who, at his request, also subscribe their names to the will in the presence of the testator and in the presence of each other. In some states, three witnesses are necessary. Under exceptional circumstances, as in the case of a soldier dying on the field of battle, the ordinary formalities necessary to render a will valid may be dispensed with.

Without Recourse. One who endorses a note, check, or other commercial instrument is usually liable to subsequent holders of the instrument, in the event of the nonpayment of the instrument at maturity, if proper presentation and protest of the instrument is made. If one desires to relieve himself from this liability, he must prefix or append to his endorsement the words "without recourse." His endorsement then merely operates to transfer such title as he has to the instrument, and carries with it no implied promise to pay the instrument in the event that the maker does not pay it at maturity.

Woman's Signature. The proper signature of a married woman is that of her legal name, which is made up of her given name followed by the surname of her husband. It is not unusual, and is generally regarded as lawful, for a woman to use her maiden name followed by the surname of her husband. The prefix "Mrs." forms no part of the legal name of a married woman.

AGRICULTURE

THE story of agriculture, like the story of the human race, begins in prehistoric times. Nevertheless, to a certain limited extent, it can be told. Through the discovery of various tools used by the ancient races, scientists have been able to trace the development of man, from the stone ages, through the periods when bronze implements were substituted for stone and when iron displaced bronze. By a somewhat similar method, the story of prehistoric agriculture has been pieced together.

Emerson has written that "the first farmer was the first man," but, according to archeological records, the earlier man knew nothing of agriculture. He was a hunter who was probably forced by hunger to eat wild fruits, grasses, and roots, when he could capture no game. Such was the condition of the men of the Paleolithic or Old Stone age. They were hunters and fishers who had fire and probably the bow and arrow, but no domestic animals, with the possible exception of the dog.

Prehistoric Agriculture. Sometime during the Paleolithic period, possibly some 25,000 to 50,000 years ago, man acquired his first ideas of planting the edible seeds from wild plants, thus producing crops of grain. The men of the next period, the Neolithic or New Stone age, not only polished their stone tools and kept dogs, sheep, goats, and oxen, but also learned to raise wheat, barley, and millet. Where wheat was first found is an unsolved question that has provoked much discussion. Many scientists now believe that it originated as a wild grass, somewhere in the region of the eastern Mediterranean. The grain was gradually improved and ultimately carried to all parts of the earth. It did not reach the American continent until after Columbus' voyage, nor was it known in Australia until 1788.

Although Neolithic man had learned some of the benefits of keeping domestic animals and of planting grain, he nevertheless depended on hunting and fishing for a large part of his food and clothing. But the hunters slowly changed their modes of living to those of shepherds or farmers. Some tribes increased their herds of cattle and sheep, and adopted the nomadic life necessary to guarding their animals and leading them to new pastures. Others found that in certain rich valleys food was most easily obtained by erecting permanent dwellings and devoting their energies to tilling the soil. From farming settlements of this kind, made in Mesopotamia and Egypt, came the first civilized communities of which any record can be found.

Ancient Agriculture. Five thousand years before Christ, both in the valley of the Nile and in the rich country between the Tigris and Euphrates rivers, crops of bearded wheat, six-rowed barley, millet, flax, and durra, which is a variety of sorghum, were raised by tillage and irrigation. The earliest Egyptians seem to have known onions, garlic, radishes, beans, chick-peas, lentils, and the castor bean. Cattle grazed on the grass covered range; poultry and swine were well known; sheep were raised for their wool, goats for their milk, and camels and donkeys for burden bearers. Horses were not introduced until 1900 B. C., when the nomadic shepherd kings from Asia conquered the country. For fruit the Egyptians had watermelons, grapes, olives, figs, pomegranates, and dates.

On coming further down the scale of time, we find that the Greeks raised wheat and barley as their chief cereals, and that they had hemp as well as flax. They had mules and commonly kept swarms of bees. To the vegetables known to the Egyptians, the Greeks added beets, cabbage, lettuce, turnips, kidney beans, and garden peas. Naturally they did not have the date palm, but they had the almond tree, and also apples, quinces, cherries, pears, and plums. The Greeks are said to have been the first to apply manure to the fields, and to plow under a growth of green lupine in order to enrich the land.

The Romans gave much attention to agriculture, and fortunately left many accurate records telling of their crops and the methods used to produce them. They carefully plowed and harrowed their fields and were acquainted with methods of drainage. Oxen were used as work animals on the Roman farms, and mules as beasts of burden. Much attention was given to breeding fine horses, sheep, swine, cattle, many kinds of poultry, and even hares, fish, snails, and dormice. Oats and rye, celery, peaches, apricots, and melons were added to the list of products known to the older nations, and alfalfa was raised for fodder. Milk was obtained chiefly from sheep and goats, and was made into cheese by curdling with lamb's or kid's rennet. As the Romans came into possession of great tracts of land taken from vanquished nations, they developed an extensive system of working large foreign estates by means of slaves. The popular demand for the division among the common people of these great holdings of state-owned land was resisted by the aristocratic possessors, and this dispute led to one of the greatest internal struggles in the history of Rome.

Medieval Period. During the dark ages which followed the conquest of Rome, agriculture made very little progress, for the conquerors were a warlike people who had reached a stage of development not far above the pastoral. There were, however, two agencies that carried on agricultural work with great activity. In Spain, the Moors, or Arabs, who were also great engineers, brought in rice, cotton, and sugar, and when necessary used irrigation to bring the land to a high degree of cultivation. At the same time, in western Europe, the members of many religious brotherhoods studied the manuscripts left by the Romans, and worked with great energy to improve on the crops and the methods of producing them. Much later, toward the end of the middle ages, the people of the Low Countries—the Netherlands and Belgium—gained a great reputation as farmers and dairymen, and northern Italy was so intensively cultivated during the 13th and 14th centuries that it not only supported a large population, but it also exported much grain.

Contemporary with the development in Europe, the Chinese, and the Incas of Peru had reached a very high state of agricultural production. Both nations understood the use of fertilizers and of methods of irrigation. The important crops of the Chinese have for centuries been wheat, rice, tea, cotton, and silk for which large amounts of mulberry leaves are required. The ancient Peruvians terraced the hillsides in order to make use of all available ground. Their principal crops were corn, potatoes, and cotton; much coca also was grown for the alkaloid contained in its leaves. The chief beast of burden was the llama, and the alpaca was raised for its hair. Neither of these nations has made any permanent impression on modern methods of agriculture. The civilization of the Incas is extinct, and the typical Chinese farmer of today still prefers the methods of cultivation used by his ancestors of one or two thousand years ago.

Modern Improvements. The two greatest improvements in modern agriculture may be said to be due to the proper rotation of crops and a chemical knowledge of fertilizers. The value of the first was demonstrated when Lord Townsend established in England the Norfolk system, consisting in the annual rotation of wheat, turnips, barley, and clover. This permitted half of the land to be used for grain, while the other half produced fodder with which to fatten cattle. Under this system, the land was neither exhausted by the continuous growth of one crop nor unproductive from lying fallow, cattle raising was promoted, and much of the product of the land was returned to it as manure.

A knowledge of the chemical composition of plants and of soils came at first from the work of Liebig in the beginning of the 19th century. This led to the scientific use of artificial fertilizers containing potash, phosphorus, and nitrogen. Breeding experiments have led to better types of all farm animals, and, by means of modern methods of transportation, the most satisfactory breeds of plants or animals can be quickly sent to any part of the world.

Investigations in agricultural science are promoted by the governments of practically every civilized nation, with the result that modern agricultural practice is based on knowledge rather than on the Chinese system of adherence to the ways of their ancestors.

AGRICULTURE IN THE UNITED STATES

The first farmers of North America were the Indians, who, long before the coming of the white race, were accustomed to raise beans, pumpkins, squashes, peppers, onions, sunflowers, tobacco, and, most important of all, maize or Indian corn. This was most fortunate for those pioneers who arrived in 1607 and 1620, for, without the corn which they obtained from the Indians, the settlers both of Jamestown and of Plymouth would have starved during their first winters in America.

First Experiments. The early history of agriculture after the arrival of the settlers is one of adaptation and adjustment. The summers at Jamestown were so warm that it seemed that semitropical vegetation should be successful. Consequently, pineapples, French grapes, olives, figs, ginger, and sugar cane were planted, and attempts were made to raise silkworms. Naturally these undertakings, begun in ignorance of the colder winters, were failures. Furthermore, because of the high summer temperature and very rich earth, the wheat plant grew luxuriantly but failed to produce much grain. Tobacco was an early success and proved so profitable that all other crops were neglected until laws were made requiring each planter to raise a certain amount of corn and other food products.

In New England, a friendly Indian named Squanto taught the newcomers to plant corn. The earth was exposed to the sun by girdling the trees and burning the branches and underbrush. Four grains of corn and two beans were then dropped at four-foot intervals into openings made with an ax or hoe. If possible, a fish was placed in each hill for fertilizer. Later, when the plants were high enough, the ground was piled up around the base of the stalks. White potatoes, which are native to South America, were brought from England by the settlers and were not previously cultivated by the Indians, although the natives in the South were well acquainted with the sweet potato. Cattle and hogs, both in the North and in the South, were allowed to run wild in the woods, where they developed rapidly and often formed large herds.

Experiments gradually taught what crops were most satisfactory and profitable in each section. Buckwheat was introduced into New York by the Dutch in 1625. Apples were planted on Governors island in Boston harbor, and the first fruit was picked October 10, 1639. Cherries were brought first to Virginia, in 1641. Rice, which in 1647 had been a failure in Virginia, was tried at Charleston in 1693, and, together with indigo, soon became the principal crop of South Carolina and Georgia. Long fiber or sea-island cotton was introduced into these states in 1786, and, by this time, the best crops were so well established that, except for sorghum and alfalfa, nothing new was introduced during the next century.

Regional Differences. Agriculture as practiced in the southern colonies soon became differentiated from that in the North.

In New England the growing season was shorter. Land was harder to prepare for use because of its stony character and the extensive forests. Help was hard to obtain and the climate did not lend itself to any one highly profitable crop. Consequently each family raised most of the products necessary for its subsistence—grain, vegetables, fruit, cattle, swine, and other farm animals. Lumbering, fishing, and shipbuilding sometimes provided auxiliary sources of income.

In the South, however, the land was richer and the growing season was long and warm. Rice, indigo, sugar cane, and cotton proved highly profitable, especially when cultivated on a large scale with the help of cheap labor. This was supplied by indentured servants, convicts, and, later, by Negro slaves. The typical farm, or plantation, was about 5000 acres, about 50 times the size of the Northern farm. It was operated as a source of profit for the owner rather than as a means of family subsistence.

Cotton. The use of the newly invented spinning jenny and power loom between 1767 and 1790 produced a large demand in England for American cotton. In 1793 the difficult problem of separating the cotton fiber from the seeds was solved by Eli Whitney's invention of the cotton gin. The result was a vast increase in cotton production, exports rising 200 fold between 1791 and 1803. Its cultivation, formerly confined to Georgia and North Carolina, had, by 1815, spread north to Virginia and west and south to Alabama and Mississippi. As the soil became exhausted under this one-crop agriculture, new land was brought under cultivation in Louisiana, Texas, and Oklahoma. The United States instantly assumed and maintained a position of dominance in the world's cotton production. The cotton crop was admirably adapted to Negro labor, a fact which made Negro slavery the outstanding feature of Southern economic life until the Civil War.

Wheat and Corn. While the South was devoting all its energies to the production of cotton, settlers were moving west across the northern and central states. By its policy in granting small homesteads, the government encouraged family-sized holdings. Labor was difficult to obtain, since few men cared to work for others when they could take up new government land at a very small cost and work for themselves. The farmers produced principally corn, wheat, and other grains, besides potatoes, fruit, and live stock. Much of the grain was fed to live stock, which commanded a ready and profitable market. Excess production was sold in the South.

In the meantime the cultivation of corn in the region lying roughly between the winter wheat area and the spring wheat area increased rapidly. This region became known as the corn belt. It included chiefly western Ohio, Indiana, Illinois, Iowa, Missouri, eastern Nebraska, and southeastern South Dakota. The corn was partly exported, but principally it was used to fatten hogs. The United States thus became the largest producer of corn and of hogs.

Farm Animals. Cattle and hogs were first brought to Florida from the West Indies in 1638; to Newfoundland by the Portuguese in 1553; and to Canada and Virginia in 1608. Although horses were taken to Florida in 1527, all of these were killed, and it was not until 1838 that others were imported. In the early days the sheep were small, with a light coat of coarse wool, the hogs were long-legged and thin, the cattle were light and wiry, and the cows produced only enough milk for their calves. Gradually, however, fine animals were imported from Europe, and, from these, careful breeding produced the splendid present-day herds of dairy and beef cattle, the enormous short-legged pork- and lard-producing hogs, sheep that yield from 15 to 30 pounds of wool at a clip, and flocks of hens that average at least 120 eggs a year instead of one or two dozen.

POPULATION: TOTAL AND FARM, UNITED STATES, 1910-1951

Year	Total Population 000 omitted	Farm Population		Year	Total Population 000 omitted	Farm Population	
		Number 000 omitted	% of total			Number 000 omitted	% of Total
1910	91,885	32,077	34.9	1931	123,841	29,723	24.0
1911	93,502	32,110	34.3	1932	124,658	30,229	24.2
1912	94,965	32,210	33.9	1933	125,401	31,198	24.9
1913	96,753	32,270	33.4	1934	126,192	31,071	24.6
1914	98,645	32,320	32.8	1935	127,057	30,887	24.3
1915	100,191	32,440	32.4	1936	127,886	30,420	23.8
1916	101,612	32,530	32.0	1937	128,649	29,903	23.2
1917	103,052	32,326	31.4	1938	129,589	29,573	22.8
1918	104,266	31,741	30.4	1939	130,642	29,388	22.5
1919	104,935	30,886	29.4	1940	131,820	29,047	22.0
1920	106,089	31,556	29.7	1941	133,076	28,786	21.6
1921	108,023	31,638	29.3	1942	134,483	27,895	20.7
1922	109,676	31,558	28.8	1943	136,278	25,757	18.9
1923	111,476	30,873	27.7	1944	138,016	24,647	17.9
1924	113,573	30,493	26.8	1945	139,584	24,342	17.4
1925	115,402	30,440	26.4	1946	141,032	25,543	18.1
1926	117,007	30,162	25.8	1947	143,478	26,147	18.2
1927	118,628	29,647	25.0	1948	146,044	25,093	17.2
1928	120,135	29,599	24.6	1949	148,562	25,134	16.9
1929	121,453	29,564	24.3	1950	151,132	24,335	16.1
1930	122,775	29,447	24.0	1951	153,699	23,276	15.1

FARM POPULATION BY STATES, 1950

State	Population	State	Population	State	Population
Alabama	966,000	Maine	132,000	Ohio	870,000
Arizona	90,000	Maryland	185,000	Oklahoma	555,000
Arkansas	805,000	Massachusetts	92,000	Oregon	231,000
California	617,000	Michigan	703,000	Pennsylvania	716,000
Colorado	200,000	Minnesota	746,000	Rhode Island	12,000
Connecticut	69,000	Mississippi	1,100,000	South Carolina	704,000
Delaware	35,000	Missouri	869,000	South Dakota	254,000
Florida	238,000	Montana	136,000	Tennessee	1,021,000
Georgia	967,000	Nebraska	393,000	Texas	1,304,000
Idaho	167,000	Nevada	14,000	Utah	90,000
Illinois	773,000	New Hampshire	53,000	Vermont	82,000
Indiana	670,000	New Jersey	120,000	Virginia	735,000
Iowa	790,000	New Mexico	134,000	Washington	280,000
Kansas	445,000	New York	591,000	West Virginia	413,000
Kentucky	978,000	North Carolina	1,381,000	Wisconsin	733,000
Louisiana	571,000	North Dakota	255,000	Wyoming	57,000

NUMBER, ACREAGE, AND VALUE OF FARMS BY STATES

State	Number of Farms				All land in Farms (thousands of acres)			
	1935	1940	1945	1950	1935	1940	1945	1950
Alabama	273,455	231,746	223,369	211,512	19,661	19,143	19,068	20,889
Arizona	18,824	18,468	13,142	10,412	14,019	25,651	37,856	39,916
Arkansas	253,013	216,674	198,769	182,429	17,742	18,045	17,456	18,871
California	150,360	132,658	138,917	137,168	30,438	30,524	35,054	36,613
Colorado	63,644	51,436	47,618	45,578	29,978	31,527	36,218	37,953
Connecticut	32,157	21,163	22,241	15,615	2,080	1,512	1,593	1,272
Delaware	10,381	8,994	9,296	7,448	921	896	923	851
Dist. Col.	89	65	40	28	3	2	2	1
Florida	72,857	62,248	61,159	56,921	6,048	8,338	13,084	16,528
Georgia	250,544	216,033	225,897	198,191	25,297	23,684	23,676	25,751
Idaho	45,113	43,663	41,498	40,284	9,952	10,298	12,503	13,224
Illinois	231,312	213,439	204,349	195.268	31,661	31,033	31,602	30,978
Indiana	200,835	184,549	175,970	166,627	20,519	19,801	20,801	19,659
Iowa	221,986	213,318	208,934	203,159	34,359	34,149	34,454	34,265
Kansas	174,589	156,327	141,394	131,394	48,010	48,174	48,589	48,611
Kentucky	278,298	252,894	238,501	218,476	20,699	20,294	19,725	19,442
Louisiana	170,216	150,007	129,295	124,181	10,444	9,996	10,040	11,202
Maine	41,907	38,980	42,184	30,358	4,722	4,223	4,613	4,182
Maryland	44,412	42,110	41,275	36,107	4,384	4,198	4,200	4,056
Massachusetts	35,094	31,897	37,007	22,220	2,196	1,938	2,078	1,660
Michigan	196,517	187,589	175,268	155,589	18,460	18,038	18,392	17,270
Minnesota	203,302	197,351	188,952	179,101	32,818	32,607	33,140	32,883
Mississippi	311,683	291,092	263,528	251,383	19,655	19,156	19,617	20,711
Missouri	278,454	256,100	242,934	230,045	35,055	34,740	35,278	35,123
Montana	50,564	41,823	37,747	35,085	47,512	46,452	58,787	59,247
Nebraska	133,616	121,062	111,756	107,183	46,616	47,344	47,753	47,467
Nevada	3,696	3,573	3,429	3,110	3,622	3,785	6,178	7,064
New Hampshire	17,695	16,554	18,786	13,391	2,116	1,809	2,017	1,714
New Jersey	29,375	25,835	26,226	24,838	1,914	1,874	1,818	1,725
New Mexico	41,369	34,105	29,695	23,599	34,397	38,860	49,608	47,522
New York	177,025	153,238	149,490	124,997	18,686	17,170	17,568	16,017
North Carolina	300,967	278,276	287,412	288,508	19,936	18,845	18,618	19,318
North Dakota	84,606	73,962	69,520	65,401	39,118	37,936	41,001	41,194
Ohio	255,146	233,783	220,575	199,359	22,858	21,908	21,928	20,969
Oklahoma	213,325	179,687	164,790	142,246	35,335	34,803	36,162	36,007
Oregon	64,826	61,829	63,125	59,827	17,358	17,988	19,754	20,328
Pennsylvania	191,284	169,027	171,761	146,887	15,855	14,594	15,020	14,113
Rhode Island	4,327	3,014	3,603	2,598	308	222	265	191
South Carolina	165,504	137,558	147,745	139,364	12,230	11,239	11,022	11,879
South Dakota	83,303	72,454	68,705	66,452	37,102	39,374	43,032	33,786
Tennessee	273,783	247,617	234,431	231,631	19,086	18,493	17,789	18,534
Texas	501,017	318,002	384,977	331,567	137,597	137,683	141,338	145,389
Utah	30,695	25,411	26,322	24,176	6,239	7,302	10,309	10,865
Vermont	27,061	23,582	26,490	19,043	4,043	3,667	3,931	3,527
Virginia	197,632	174,885	173,051	150,997	17,645	16,445	16,358	15,572
Washington	84,381	81,686	79,887	69,820	14,680	15,182	16,720	17,369
West Virginia	104,747	99,282	97,600	81,434	9,424	8,909	8,720	8,215
Wisconsin	199,877	186,735	177,745	168,561	23,459	22,876	23,615	23,221
Wyoming	17,487	15,018	13,076	12,614	28,162	28,026	33,117	34,421
Total	6,812,350	6,096,799	5,859,169	5,382,162	1,054,515	1,060,852	1,141,615	1,158,566

NUMBER, ACREAGE, AND VALUE OF FARMS BY STATES

State	Average Acreage per farm		Total (thousands of dollars)			Average Value per Farm $		Average Value per Acre $	
	1945	1950	1940	1945	1950	1945	1950	1945	1950
Alabama	85.4	98.8	408,782	559,743	1,016,866	2,506	4,624	29.36	48.08
Arizona	2,880.6	3,833.7	153,677	289,876	637,466	21,905	47,040	7.60	15.97
Arkansas	87.8	103.4	456,848	622,770	1,151,146	3,334	6,151	37.97	61.00
California	252.3	266.9	2,166,453	5,484,549	5,907,555	25,084	40,543	99.40	161.35
Colorado	760.6	832.7	388,344	564,504	1,234,994	11,855	26,164	15.59	32.54
Connecticut	71.6	81.5	204,761	263,023	315,251	11,826	20,011	105.09	247.77
Delaware	99.3	114.3	54,899	72,694	97,141	7,820	12,569	78.73	114.11
Dist. Col.	46.4	45.2	5,943	4,961	.....	124,034	4,871	2,676.02	3,688.41
Florida	213.9	290.1	324,378	498,400	905,658	8,149	15,081	38.09	54.85
Georgia	104.8	129.9	480,345	654,244	1,114,506	2,896	5,336	27.63	43.28
Idaho	303.1	328.3	339,194	493,331	965,498	11,888	22,475	39.46	73.01
Illinois	154.7	158.6	2,537,117	3,662,545	5,394,905	10,197	16,550	89.59	136.90
Indiana	113.8	118.0	1,251,492	1,868,351	2,858,969	8,470	14,575	85.20	136.34
Iowa	164.9	168.7	2,690,744	3,611,140	5,506,670	17,284	27,566	104.81	160.71
Kansas	344.1	370.0	1,421,387	1,971,331	3,198,628	13,962	24,756	40.57	65.80
Kentucky	82.7	89.0	776,494	1,015,796	1,572,256	4,259	7,192	51.50	80.87
Louisiana	77.6	90.2	353,874	472,328	920,939	3,653	7,011	47.05	82.21
Maine	109.4	137.7	124,083	159,681	226,518	3,785	7,587	34.61	54.17
Maryland	101.8	112.3	273,980	354,807	507,225	8,596	4,212	84.48	125.0
Massachusetts	56.2	74.7	212,014	265,232	314,710	7,167	13,683	127.62	189.54
Michigan	104.9	111.0	912,545	1,199,290	1,704,440	6,843	10,965	66.21	98.52
Minnesota	175.4	183.6	1,443,021	1,833,761	2,777,316	9,705	15,749	55.33	84.46
Mississippi	74.4	82.4	474,986	647,562	1,147,791	2,457	4,421	33.01	55.42
Missouri	145.2	152.7	1,107,303	1,526,961	2,235,939	6,285	9,776	43.28	63.66
Montana	1,557.4	1,688.7	350,178	517,891	1,007,206	13,720	2,766	8.81	17.00
Nebraska	427.3	442.9	1,137,808	1,699,210	2,735,039	15,205	25,960	35.58	57.62
Nevada	1,801.7	2,271.2	47,594	71,956	160,342	20,985	36,078	11.65	22.70
New Hampshire	107.4	128.0	62,206	80,395	124,845	4,280	8,921	39.86	72.85
New Jersey	69.3	69.5	227,806	292,981	505,278	11,171	19,635	161.15	292.84
New Mexico	1,670.6	2,013.7	187,526	326,751	765,101	11,040	26,837	6.59	16.10
New York	117.5	128.2	947,074	1,087,522	1,467,452	7,275	11,847	61.90	91.62
North Carolina	64.8	67.0	736,708	1,002,983	1,905,714	3,490	6,490	53.87	98.65
North Dakota	589.8	629.9	490,197	708,322	1,188,860	10,189	18,014	17.28	28.86
Ohio	99.4	105.2	1,443,917	1,868,351	2,858,969	8,470	14,575	85.21	136.34
Oklahoma	219.4	253.1	831,141	1,106,154	1,851,460	6,713	13,045	30.59	51.42
Oregon	312.9	339.8	476,817	697,775	1,275,156	11,054	19,963	35.32	62.73
Pennsylvania	87.4	96.1	864,200	1,008,574	1,509,651	5,872	10,349	67.15	106.97
Rhode Island	73.5	73.5	26,334	35,610	44,328	9,883	16,941	134.51	232.02
South Carolina	74.6	85.2	338,495	440,632	830,349	2,982	5,648	39.98	69.06
South Dakota	626.3	674.0	505,452	764,300	1,402,235	11,124	20,830	17.76	31.31
Tennessee	75.9	80.0	664,474	870,948	1,431,966	3,715	6,154	48.96	77.26
Texas	367.1	438.5	2,589,979	3,574,998	6,718,426	9,286	20,269	25.29	46.21
Utah	391.7	449.4	154,358	261,818	525,657	9,947	19,146	25.40	47.67
Vermont	148.4	185.2	111,109	134,576	196,405	5,080	10,343	34.24	55.68
Virginia	94.5	103.1	674,975	868,806	1,277,240	5,021	8,449	53.11	82.02
Washington	209.3	248.8	593,366	900,184	1,499,140	11,268	20,744	53.84	86.78
West Virginia	89.3	100.9	269,827	341,008	487,209	3,494	5,852	39.11	59.31
Wisconsin	132.9	137.8	1,188,559	1,434,295	2,056,925	8,069	12,220	60.74	88.58
Wyoming	2,532.6	2,727.1	158,971	232,043	473,287	17,746	33,352	7.01	13.75
Total	194.8	215.3	33,641,739	46,388,926	75,829,925	7,917	13,941	40.63	66.64

In the second half of the 19th century the western plains supported huge herds of cattle on unfenced ranges. As the area of cultivation was extended, the ranges were fenced off, but the amount and the quality of beef production increased as a result of better breeding. The fattening of cattle for market, like the raising of hogs, became especially important in the corn growing regions because, by feeding the grain to animals, a higher-priced product was obtained. For the same reason the combination of grain raising and milk production was profitable near the large cities.

Farm Machinery. In the first half of the 19th century, farming was carried on almost entirely by hand labor with the help of a few simple tools, much as it had been since the dawn of history. From 1830 to 1860, horse-drawn implements were made available in considerable variety, but only after the Civil War was there a sweeping adoption of them. Seeders and cultivators replaced the hoe; mowing machines, the scythe, reapers, the cradle; threshing machines, the flail. Among scores of other important farm machines are cream separators and milkers, corn cutters, hay loaders, and manure spreaders. Illustrative of the economic and human value of such devices is a statement issued by the United States department of agriculture, that the human labor required to produce a bushel of grain had decreased on the average from 3 hours and 30 minutes in 1830 to 10 minutes in 1896, the cost of this labor declining from 17¾ cents to 3½ cents. In the 20th century this reduction in cost was carried very much further as the result of the application of power to agriculture.

Power Farming. In 1870, practically the entire non-human power on farms was in the form of farm animals. Even in 1900 they represented about 80 per cent of the available power, the remainder being steam engines, gas engines, and windmills. By 1919, however, the number of horses and mules on farms reached its maximum, 26,436,000, and thereafter declined with increasing rapidity. By 1923, mechanical power exceeded animal power, the principal forms being stationary gas engines, gasoline tractors and trucks, steam engines, electricity, and windmills. In the years from 1920 to 1940, the number of tractors on farms increased over 14-fold, and was approximately 1,400,000 by 1940. The total power available on the farm is approximately equal to that at the service of the combined factories, public utility plants, and mines of the country—over 60 million horse power.

The use of the tractor has made it possible for individuals to work much larger areas than formerly. Plowing and cultivating can be done much more quickly and at the most suitable time. Harvesting wheat with the combine, which cuts and threshes in a single operation, greatly reduces the cost of this process when a sufficiently large area of suitable land is worked. The use of the combine in the United States increased 20-fold from 1923 to 1927. The corn harvester, corn husker, silage cutter, and silo filler eliminate the most laborious and costly part of hand labor in raising corn. Even in the raising of cotton, mechanical methods have made rapid headway, particularly in western Texas and Oklahoma. The tractor-drawn plow, the "sled", which strips the cotton bolls, opened and unopened, at a single operation, and the cotton cleaner, used in connection with the gin, radically reduce the unit cost of production.

Automobiles and trucks effect great saving of time in marketing and in moving about the farm, making possible the cultivation of more land at a greater distance from shipping points. Electricity has been made increasingly available to farms, so that many minor operations can be performed through electric motors, particularly dairying and household operations, by which much of the former domestic drudgery is eliminated. Radio is utilized both as entertainment and for obtaining weather and market reports.

Economic Change. The pressure of demand, the scarcity of labor, and the attractive prices for farm products occasioned by World Wars I and II hastened the adoption of labor-saving devices and the use of power machinery on the farm. The result after World War I was a world-wide surplus, despite Russia's withdrawal from the export market, and prices fell rapidly. War-impoverished importing nations lacked purchasing power and the increasing replacement of the horse by the automobile cut down the market for hay and oats. The productive capacity of Canada, Argentina, Australia, and certain other countries had increased at even faster rate than that of the United States. The result was a market in which only the most efficient producers could make a profit. Road and other improvements increased taxes while farm income decreased. Small-scale farmers were forced, in large numbers, to abandon their farms. The earlier scale of land values was completely upset, with the resulting failure of many banks.

Between 1920 and 1930 there was a net decrease of farm population in the United States of about 3 millions, which was only slightly increased later. Cultivated land also decreased by more than 13,000,000 acres. Yet, in the same period the total crop production increased about 20 per cent and the productivity of each worker increased by about 30 per cent. This situation indicated, after World War I, heightened efficiency of agriculture, but the distress caused by the process made the relief of agriculture a political question of importance.

Todav American farms are outstanding in producing food to feed, not only Americans, but people more or less dependent upon the United States for subsistence since World War II.

CIVILIAN CONSUMPTION OF PRINCIPAL FOODS

(in pounds per capita)

Source: U. S. Bureau of Agricultural Economics

Foods	1935–39 Average	1950	1951
Red meats	126.2	143.5	137.7
Poultry meats	20.5	31.3	34.0
Eggs (number)	298	386	397
Fluid milk and cream	340	385	395
Cheese	5.5	7.7	7.2
Butter	16.7	10.7	9.7
Fats and oils*	31.9	38.3	35.7
Fresh fruits	138.5	108.6	119.4
Processed fruits	25.4	43.2	42.9
Fresh vegetables	235	252	254
Processed vegetables	30.3	45.1	45.6
Potatoes	152.4	116.8	110.5
Sugar	97.0	95.5	96.3
Corn products	37.5	33.2	32.2
Wheat flour	159	133	133
Coffee	14.0	16.1	16.4
Tea	.67	.60	.67
Cocoa	4.4	4.3	4.0

*Excluding butter.

Agricultural Adjustment. The first governmental attack on the problem was an attempt to

FARM TENANCY

Source: U. S. Bureau of the Census

Year	Farms Operated by Tenants	Total Farms	Tenancy as of % of total
1830	1,025,000	4,009,000	25.6
1900	1,295,000	4,565,000	28.4
1910	2,355,000	6,362,000	37.
1920	2,455,000	6,448,000	38.1
1930	2,664,000	6,289,000	42.4
1940	2,361,000	6,097,000	38.7
1950	1,444,000	5,382,000	26.8

support prices of farm products. Tried out in 1929-33, it failed because of uncontrolled production.

The second attack was through the Agricultural Adjustment act of 1933. This law empowered the secretary of agriculture to pay producers for withholding a proportion of their normal acreage from production of certain basic crops. The law was declared unconstitutional by the Supreme Court in January 1936. This act was supplemented by the Agricultural Adjustment Act of 1938, which had the following principal features designed to provide an "ever normal granary":

Acreage allotments are made annually for growing these major crops—corn, wheat, cotton, rice, and tobacco. Farmers who consent to abide by the allotments and who observe specified soil-conserving practices obtain benefit payments based on various factors and preference in access to federal crop loan facilities. If any major crop is estimated to be above normal by a certain amount, marketing quotas are set which, if made effective, may not be exceeded by farmers without payment of a fine. Such quotas become effective only if approved in a referendum by at least two-thirds of the farmers affected. Wheat crops may be insured with the Federal Crop Insurance Corporation on payment of a premium either in cash or wheat. The secretary of agriculture is authorized to make so-called parity payments to producers of the major crops if funds are appropriated for the purpose.

Parity payments are payments designed to raise farm per capita income to the point at which it bears the same relation to non-farm per capita income as farm income bore to non-farm income in the period from August 1909 to July 1914.

Co-operatives. The procedure of pooling farm produce in America for the purpose of selling it to better advantage is carried on voluntarily by farmers through associations known as Co-operatives.

The Capper-Volstead act of 1922 protected these associations at first, when properly conducted, from prosecution under the antitrust laws. They are fostered by a co-operative division of the farm credit administration, which disseminates information concerning supply, demand, prices, and those practices found advantageous by co-operative organizations.

Another form of co-operative enterprise which, in America, has developed chiefly in farm communities is the so-called "consumer" co-operative. Its aim is to secure for members the price benefits of large-scale buying. In many cases, these associations own their own stores, warehouses, and factories. Business done through them by farmers reached a pre-war high of $250,000,000 in 1938. They have been chiefly active in the purchase of gasoline, seed, and fertilizer and in the building and operation of rural electric distribution systems under the encouragement of the rural electrification administration.

The increase in business done by farmers' marketing and purchasing co-operatives since 1915 is shown by the following table:

AGRICULTURAL CO-OPERATIVES
Source: Farm Credit Administration

Marketing Season	Number	Estimated Membership (thousands)	Business (Millions of $)
1915	5,424	651	636
1925	10,803	2700	2400
1930	11,950	3000	2400
1935	10,500	3660	1840
1940	10,600	3400	2280
1941	10,550	3600	2840
1942	10,450	3850	3780
1943	10,300	4390	5160
1944	10,150	4505	5645
1945	10,150	5010	6070
1946	10,125	5436	7116
1947	10,135	5900	8635
1948	10,075	6384	9320
1949	10,035	6584	8726
1950	9,997	7054	10,473
1954	10,058	7608	9462

Of the total for the 1954 season, the marketing co-operatives did $7,486,697,000 worth of business as against $1,976,288,000 by the purchasing co-operatives.

OPERATIONS OF CO-OPERATIVES

Leading State	Associations Number	Membership Number	Business $1000
Minnesota	1,271	535,000	767,900
California	492	119,150	710,300
Illinois	578	583,280	675,180
Ohio	305	319,600	563,540
New York	391	173,900	549,040
Iowa	715	347,730	446,640
Wisconsin	869	370,650	422,950
Texas	559	191,720	367,640
Indiana	159	323,220	351,400
Missouri	280	325,000	349,310
All others	4,416	3,294,750	3,522,100
Total	10,035	6,584,000	8,726,000

Chief Crops for United States 1930-1954

Source: Bureau of Agricultural Economics; Department of Agriculture

Year	All Corn	Oats	Barley	Sorghums for grain	Wheat	Rye	Buckwheat	Rice
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bags
1930	2,080,130	1,274,592	301,619	37,561	886,522	45,383	6,967	20,218
1935	2,299,363	1,210,229	288,667	57,610	628,227	56,938	8,488	17,753
1938	2,548,753	1,089,383	256,620	67,210	919,913	55,984	6,763	23,628
1939	2,580,985	957,704	278,193	53,280	741,210	38,562	5,736	24,328
1940	2,457,146	1,246,450	311,278	85,824	814,646	39,725	6,476	24,495
1941	2,651,889	1,182,509	362,568	113,543	941,970	43,878	6,038	23,095
1942	3,068,562	1,342,681	429,450	109,653	969,381	52,929	6,636	29,082
1943	2,965,980	1,139,831	322,913	109,536,	843,813	28,680	8,830	29,264
1944	3,087,982	1,149,240	276,275	184,978	1,060,111	22,525	8,956	30,974
1945	2,868,795	1,523,851	266,994	96,063	1,107,623	23,708	6,467	30,668
1946	3,217,076	1,477,573	265,059	106,025	1,152,118	18,487	6,812	32,497
1947	2,354,739	1,176,142	281,868	93,217	1,358,911	25,497	7,177	35,217
1948	3,605,078	1,450,186	315,537	131,384	1,294,911	25,886	6,085	38,275
1949	3,238,618	1,254,855	237,071	148,299	1,098,415	18,102	4,956	40,737
1950	3,057,803	1,410,464	303,533	233,278	1,019,389	21,257	4,439	38,689
1951	2,941,423	1,316,396	254,668	159,265	987,474	21,410	3,340	43,805
1952	3,279,403	1,260,127	226,014	83,024	1,298,957	16,046	3,205	48,107
1953	3,192,491	1,209,458	242,544	109,353	1,169,484	18,163	3,193	52,607
1954	2,964,639	1,499,579	370,126	204,087	969,781	23,688	2,719	58,853

Chief Crops for United States 1930-1954—Cont.

Year	Flaxseed	Cotton		Tobacco	Hay	Sorghums for forage	Sorghums for silage	Beans dry edible
		Lint	Seed					
	1,000 bushels	1,000 bales	1,000 tons	1,000 pounds	1,000 tons	1,000 tons	1,000 tons	1,000 bags
1930	21,673	13,932	6,028	1,648,037	74,527	6,326	572	14,341
1935	14,914	10,638	4,634	1,302,041	90,364	12,052	3,133	14,335
1938	8,032	11,943	4,950	1,385,573	91,420	12,553	4,512	15,704
1939	19,606	11,817	4,869	1,880,629	86,533	11,716	4,364	15,045
1940	30,924	12,566	5,286	1,460,441	96,050	16,110	6,217	16,945
1941	32,133	10,744	4,553	1,261,839	95,754	17,069	7,896	18,556
1942	40,976	12,817	5,202	1,408,394	107,717	13,640	6,032	18,987
1943	50,009	11,427	4,688	1,406,190	103,128	10,982	4,733	21,002
1944	21,665	12,230	4,902	1,950,940	102,889	11,552	5,644	16,147
1945	34,557	9,015	3,664	1,991,108	107,438	9,543	3,570	13,091
1946	22,588	8,640	3,513	2,314,807	99,518	8,181	3,587	15,840
1947	40,618	11,857	4,681	2,107,160	100,576	5,666	3,338	17,268
1948	54,803	14,877	5,945	1,979,581	96,172	3,633	4,318	20,816
1949	42,976	16,128	6,559	1,969,100	95,055	5,729	3,626	21,379
1950	40,236	10,012	4,105	2,030,645	102,340	6,592	4,926	16,886
1951	33,802	15,290	6,186	2,282,386	108,351	6,410	5,622	17,446
1952	30,174	15,139	6,109	2,254,271	104,345	4,358	3,821	16,235
1953	36,668	16,465	6,748	2,055,370	105,530	6,191	5,912	18,171
1954	41,534	13,569	5,568	2,200,134	104,380	6,431	6,890	18,899

Year	Peas dry field	Peanuts picked and threshed	Soybeans	Potatoes	Sugar cane		Sugar beets	Oranges and Tangerines
					Sugar and seed	Sirup		
	1,000 bags	1,000 pounds	1,000 bushels	1,000 bushels	1,000 tons	1,000 gallons	1,000 tons	1,000 boxes
1930	2,114	697,350	13,929	343,817	3,153	16,602	9,199	55,060
1935	3,385	1,152,795	48,901	378,895	4,954	24,509	7,908	52,073
1938	1,778	1,288,740	61,906	355,848	7,157	20,524	11,497	78,531
1939	1,909	1,213,110	90,141	342,372	6,244	22,264	10,781	75,742
1940	2,192	1,766,590	78,045	376,920	4,218	13,360	12,194	85,510
1941	3,934	1,475,205	107,197	355,697	5,471	18,638	10,342	85,163
1942	7,402	2,192,800	187,524	368,899	5,840	18,416	11,685	89,349
1943	10,903	2,176,420	190,133	458,887	6,485	21,027	6,547	106,651
1944	8,894	2,080,825	192,121	383,926	6,144	19,897	6,718	113,210
1945	5,915	2,042,235	193,167	419,399	6,707	28,251	8,616	104,350
1946	6,679	2,038,005	203,395	487,315	5,962	23,335	10,560	118,540
1947	6,322	2,181,695	186,451	388,985	5,289	18,545	12,503	114,510
1948	3,640	2,335,840	227,217	449,895	6,768	11,245	9,424	104,120
1949	3,212	1,864,780	234,194	402,353	6,541	9,745	10,196	108,465
1950	3,206	2,021,730	299,279	429,896	6,944	9,230	13,535	121,610
1951	3,763	1,595,025	280,512	325,708	5,601	5,140	10,584	122,900
1952	2,610	1,366,225	298,052	349,098	7,605	6,005	10,169	125,080
1953	3,350	1,366,225	268,528	380,075	7,619	5,575	12,084	130,930
1954	3,484	1,043,560	342,795	355,099	6,940	4,795	14,027	141,475

Year	Grapefruit	Lemons	Apples	Peaches	Pears	Grapes	Cranberries	Strawberries
	1,000 boxes	1,000 boxes	1,000 bushels	1,000 bushels	1,000 bushels	1,000 tons	1,000 barrels	1,000 crates
1930	18,690	7,950	...	56,392	27,167	2,458	584	9,143
1935	18,347	7,787	140,398	55,440	25,943	2,477	516	10,811
1938	43,594	11,106	105,718	53,922	31,704	2,671	474	9,973
1939	35,192	11,983	139,247	64,222	29,279	2,449	704	11,786
1940	42,883	17,236	111,436	57,832	29,590	2,466	570	12,319
1941	40,261	11,720	122,217	75,363	29,129	2,725	725	12,506
1942	50,481	14,880	126,707	66,720	30,244	2,396	812	12,870
1943	56,090	11,050	87,310	42,761	24,239	2,965	688	6,459
1944	52,180	12,550	121,266	78,191	31,337	2,712	376	4,366
1945	63,450	14,450	66,796	81,548	33,042	2,781	656	5,201
1946	59,520	13,800	119,410	86,643	34,447	3,160	856	7,004
1947	61,630	12,870	113,041	82,270	35,312	3,036	790	8,895
1948	45,530	10,010	88,407	65,352	26,334	3,078	968	10,224
1949	36,500	11,360	133,742	74,818	36,404	2,650	840	8,795
1950	46,580	13,400	123,126	53,485	31,140	2,707	984	11,295
1951	40,400	12,900	112,935	70,265	32,687	3,281	932	11,846
1952	38,360	12,590	92,489	62,560	30,947	3,164	804	11,794
1953	48,370	16,130	93,307	64,473	29,081	2,700	1,203	12,435
1954	46,120	14,600	103,773	60,794	30,077	2,607	1,012	11,874

HORTICULTURE

Originally the term horticulture meant the cultivation of a garden. It now includes the art and science of vegetable growing or *olericulture*, fruit growing or *pomology*, flower growing or *floriculture*, and landscape gardening. Horticulture, therefore, might justly be called applied botany, and it bears much the same relationship to botany as do any of the branches of engineering to mathematics and physics.

In a new and undeveloped country, horticulture, as a branch of agriculture, usually receives comparatively little attention. But it increases rapidly in importance as the primary problems of producing a sufficient supply of grain, potatoes, and live stock are gradually solved. The phenomenal development of horticulture in America is shown by the great and increasing number of horticultural publications, by the extent to which the subject is taught in the schools, by the obvious importance of the canning and preserving industries, greenhouses, nurseries, and seed raising, and by the accompanying tables. Factories devoted to the manufacture of boxes, baskets, barrels, glass jars, and tin cans depend for their existence largely on the success of horticultural enterprises.

Robert Squibbs's *Garden Kalendar*, published at Charleston, South Carolina, 1787, was probably the first separate book on horticulture printed in America. Since that time, more than 1400 books have been published and more than 500 horticultural journals started, of which about 65 are still in circulation. In the United States and Canada, there are approximately 30 national or sectional horticultural societies, together with numerous local organizations.

Elementary instruction in horticulture is usually given in the primary schools of the cities, as well as in the rural districts. Wherever possible, theory is coupled with practice in the school garden. This training is given not only to teach horticulture, but because it has been found one of the best methods of developing a growing mind. Advanced courses in horticulture are given by 67 colleges and universities located in every state and territory except Alaska. Similar courses are given by 6 universities and various colleges of Canada.

Vegetables. The chief sources of vegetables are: market gardens and greenhouses located near large cities, where, by intensive cultivation, $1000 to $2000 worth of crops may be taken from a single acre; farms devoted to raising green vegetables for commercial canning; and home gardens. The importance of the home garden was recognized during World War I, when many people learned by experience that a piece of ground no larger than 25 by 50 feet can be made to produce all of the vegetables required by a family of five.

Modern transportation facilities and refrigeration have made possible large-scale truck farming at a distance from cities. For some time the South and West have specialized in supplying the North with out-of-season vegetables. A great deal of the marketing is done co-operatively, shipments in carload lots being made up with the produce of a number of growers, who might separately have difficulties in filling a freight car as their crops are harvested.

COMMERCIAL TRUCK CROPS

Crop	Acreage		Production (tons)			Value (1,000 dollars)	
	1940–49 Average	1951	1940–49 Average	1951	States Leading	1940–49 Average	1951
Artichokes	8,060	7,400	15,200	12,600	Calif.	2,202	2,516
Asparagus	127,360	134,440	154,000	165,600	Calif., N. J.	27,206	42,194
Beans, green, lima	88,090	118,560	67,800	101,500	Calif., N. J.	9,015	16,237
Beans, snap	293,980	290,110	457,800	532,500	Calif., Fla.	53,350	69,376
Beets	27,640	23,180	184,300	227,400	Wis., N. Y.	4,087	4,739
Cabbage	192,300	155,950	1,404,800	1,366,800	N. Y., Fla.	36,861	51,835
Cantaloupes	108,520	110,350	374,900	450,200	Calif., Ariz.	29,443	41,169
Carrots	72,860	66,820	615,000	654,500	Calif., Ariz.	32,419	49,429
Cauliflower	34,780	32,200	198,100	220,500	Calif., N. Y.	13,803	15,848
Celery	41,380	36,810	644,300	820,100	Calif., Fla.	43,916	53,749
Corn, sweet	525,970	495,030	1,256,300	1,342,300	Wis., Minn.	27,420	37,804
Cucumbers	160,120	191,940	341,500	451,000	Mich., Fla.	21,307	33,397
Eggplant	5,450	4,550	21,100	20,500	Fla., N. J.	1,781	2,158
Escarole	2,140	4,700	13,300	29,700	Fla.	933	2,419
Garlic	3,740	3,100	8,200	7,200	Calif., La.	1,910	1,247
Honeyball melons	1,870	300	6,600	900	Calif.	602	108
Honeydew melons	13,140	10,000	54,700	52,900	Calif., Ariz.	5,438	6,247
Kale	1,740	2,200	5,900	7,700	Va.	403	729
Lettuce	173,250	202,070	1,005,300	1,235,000	Calif., Ariz.	79,252	111,157
Mint for oil	52,190	56,200	82.8	100.0	Ind., Oreg.	8,485	12,518
Onions	130,380	101,750	947,300	975,800	N. Y., Calif.	48,272	54,072
Peas, green	476,090	466,510	488,700	541,200	Wis., Wash.	41,565	49,999
Peppers, green	27,750	34,700	76,800	105,600	Fla., N. J.	10,626	16,839
Pimientos	12,890	18,000	13,400	15,300	Ga.	753	1,148
Potatoes, early	336,580	203,600	1,867,600	1,637,200	Calif., N. J.	83,581	74,088
Shallots	4,730	5,000	6,500	6,500	La.	757	1,022
Spinach	99,480	77,290	207,200	206,300	Calif., Tex.	14,440	16,433
Strawberries	121,400	159,850	159,600	213,200	Calif., Mich.	49,978	77,491
Tomatoes	737,480	683,800	3,653,900	5,472,600	Calif., Ind.	147,407	259,839
Watermelons	249,690	270,070	880,700	1,041,200	Fla., Ga.	21,598	30,487

Fruits and Nuts. In the production of fruit, North America leads the world, and, of all fruits, the apple comes first both in quantity and in value. The raising of oranges, lemons, and grapefruit has become the most highly organized branch of the orchard industries. The annual crop of nuts is increasing rapidly, English walnuts, pecans, and almonds, in the order named, being the most important.

Flowers. In the commercial production of flowers the rose takes first place, the carnation second, and the violet third. An important branch of this industry is the forcing of bulbs and plants in order to produce potted flowers for sale at Christmas and Easter. Although it has been demonstrated that bulbs of first quality can be produced in America, they are practically all imported, chiefly from Holland, Japan, Formosa, and Bermuda.

Landscape gardening consists in the arrangement of growing trees, shrubs, and other ornamental plants in connection with walks, drives, and other features of the landscape, so that together they form an artistic and pleasing view.

THREE LEADING FIELD CROPS OF EACH PROVINCE IN CANADA

Province and Crop	Yield	Value
CANADA		
Wheat . . . . . bu.	551,390,000	$283,269,000
Hay and Clover . . tons	14,070,000	110,287,000
Oats. . . . . bu.	380,526,000	98,800,000
ALBERTA		
Wheat . . . . . bu.	187,000,000	89,760,000
Oats. . . . . bu.	103,000,000	18,540,000
Barley . . . . . bu.	32,000,000	7,680,000
BRITISH COLUMBIA		
Hay and Clover . . tons	333,000	3,580,000
Potatoes . . . . . cwt.	2,440,000	2,928,000
Oats. . . . . bu.	5,912,000	2,128,000
MANITOBA		
Wheat . . . . . bu.	66,000,000	34,980,000
Barley . . . . . bu.	27,500,000	7,425,000
Oats. . . . . bu.	33,000,000	6,930,000
NEW BRUNSWICK		
Hay and Clover . . tons	944,000	9,440,000
Potatoes . . . . . cwt.	6,896,000	3,448,000
Oats. . . . . bu.	6,507,000	3,254,000
NOVA SCOTIA		
Hay and Clover . . tons	649,000	7,139,000
Potatoes . . . . . cwt.	2,313,000	2,082,000
Oats. . . . . bu.	3,265,000	1,828,000
ONTARIO		
Hay and Clover . . tons	5,021,000	31,733,000
Oats. . . . . bu.	86,554,000	27,697,000
Wheat . . . . . bu.	23,400,000	14,768,000
PRINCE EDWARD ISLAND		
Hay and Clover . . tons	344,000	3,096,000
Potatoes . . . . . cwt.	4,579,000	1,923,000
Oats. . . . . bu.	4,998,000	1,499,000
QUEBEC		
Hay and Clover . . tons	5,223,000	46,373,000
Oats. . . . . bu.	44,290,000	19,254,000
Potatoes . . . . . cwt.	13,125,000	10,416,000
SASKATCHEWAN		
Wheat . . . . . bu.	272,000,000	141,440,000
Oats. . . . . bu.	93,000,000	17,670,000
Barley . . . . . bu.	23,500,000	5,640,000

DRAINAGE AND RECLAMATION

In agricultural practice the term drainage generally refers to the removal of excess water from the soil by means of ditches or by tunnels formed of porous tile, in which the water collects and is carried away under the action of gravity. When the ground is so low that the water collected by the system must be removed with pumps, the process is usually termed reclamation.

Drainage was used to a certain extent by the Romans, and during the 17th century attention was occasionally called to its advantages; but the methods practiced by James Smith, of Perthshire, England, about 1823, are generally considered to have introduced the modern systems of farm drainage. In America, John Johnson imported tiles from Scotland in 1835 and placed them in the wet ground of his farm near Geneva, New York. The improvement in his crops was so noticeable that the advantages of draining were quickly appreciated.

The most simple way of draining wet soil is to dig ditches from 3 to 5 feet deep, and connect these with a main ditch that is somewhat deeper. Because this method cuts up the surface of the ground, 3-inch porous tile pipes are generally placed at the bottom of the ditches, which are then refilled. The ground waters filter through the tile and then flow through the pipe to six-, eight-, or ten-inch mains and thence to the outlet.

The advantages of such drainage are many. The texture of the soil is improved, and the ground becomes more fertile. Drained ground is usually ten to fourteen degrees warmer than that which is full of water; consequently, it freezes later and thaws earlier, thus giving a longer growing season. A drained region is much more healthful than one where the earth contains stagnant water. Moreover, when drainage is completed, the vegetation is stronger, the plants root more deeply, and the additional crops more than pay for the expense of installation. Drainage is frequently an efficient method of removing the soluble salts from alkaline land.

Drainage in the United States. In the United States 9 per cent of all farmland had drainage in 1940. The number of acres in crop land so served was 16 per cent of all crop land. But since a large part of the drainage in the country operates in land not now being employed as farms or for the raising of crops, the above figures give a very inadequate picture of drainage enterprises.

In order to drain a farm, in many cases an entire district must be embraced in a drainage undertaking, known officially as an enterprise. Such enterprises are organized under state laws and may be undertaken by state governments, counties, or townships. If undertaken and operated by organizations having their own executive officers, enterprises are known as drainage districts. Others are individually owned, being constructed for the purpose of developing and subdividing land for future sale.

Thirty-eight states make provision for drainage enterprises. These include all except Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island,

LEADING AGRICULTURAL PRODUCTS OF CANADA

By Provinces on Basis of Value, 1949

Province	Wheat	Oats	Barley	Rye	Hay and Clover	Potatoes	Corn for Husking	Turnips
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Alberta	144,530,000	37,440,000	44,640,000	2,808,000	10,640,000	4,247,000	21,000	. . . . .
British Columbia .	6,261,000	3,440,000	618,000	17,000	8,904,000	6,686,000	368,000	640,000
Manitoba	88,350,000	40,810,000	56,000,000	892,000	4,148,000	3,477,000	768,000	. . . . .
New Brunswick . .	149,000	6,014,000	552,000	. . . . .	11,832,000	11,298,000	84,000	2,243,000
Nova Scotia . . .	76,000	2,558,000	295,000	. . . . .	11,616,000	4,453,000	62,000	3,123,000
Ontario	45,624,000	60,452,000	8,635,000	2,961,000	78,022,000	20,966,000	24,244,000	8,753,000
Prince Edward Island	278,000	3,614,000	394,000	. . . . .	5,850,000	8,287,000	80,000	4,201,000
Quebec	856,000	33,817,000	3,750,000	336,000	102,098,000	20,053,000	8,864,000	4,978,000
Saskatchewan . .	279,990,000	62,900,000	42,240,000	5,280,000	4,634,000	3,788,000	124,000	. . . . .
Canada	566,114,000	251,045,000	157,124,000	12,291,000	237,744,000	83,255,000	34,615,000	23,938,000

Vermont, and West Virginia. Within the other 38 states, drainage enterprises embrace a total of over 146,000 miles of ditches, 55,700 miles of tile drains, and 6,800 miles of dikes and levees. About 87,000,000 acres are covered by the enterprises, which amounts to nearly 5 per cent of the total land area of the 38 states.

Nearly two-thirds of the lands in drainage enterprises are located north of the Ohio and Missouri rivers. These are usually small enterprises and, with the exception of those draining swampy areas in Wisconsin and northern Michigan, they were undertaken to improve farm land already under cultivation.

The enterprises along the lower Mississippi and in the plains along the southern Atlantic and Gulf of Mexico coast lines are, in the main, large scale undertakings. They have been instrumental in draining huge swamps and making them fit for cultivation.

Drainage enterprises in the arid southwestern states are practically all located on irrigated land. Their purpose is to prevent damage from seepage of water and to carry off harmful alkali dissolved from the soil. Frequently, the water drained off is collected in drainage wells and is pumped from them to be used again for irrigation.

The largest swamp-draining enterprise in the United States is that organized for reclaiming the Everglades in Florida. Some 4.5 million acres are included in that area. Nearly one-eighth has been improved, and about 5 per cent is in occupied farms.

Old World Projects. The Fens on the east coast of England, the valley of the Po, in Italy, the south of France, and Egypt have all benefited by extensive reclamation projects. These are only less famous than those of the Netherlands, where, by an elaborate system of dikes and canals, many marshes have been changed to fertile regions known as "polders." In the Haarlem Meer, 44,724 acres which had been covered with 13 feet of water were surrounded by a dike, and, after 39 months of pumping, the water was removed. Even this project is dwarfed by the reclamation of the Zuider Zee, a branch of the North Sea which was formed in 1170 when a terrific storm broke down the sand dunes on the coast. An 18-mile dike was completed in 1932, which cut off the inland water. The pumping out of this water provides 523,000 acres of reclaimed land, leaving a lake named Ijsselmeer.

DRAINAGE OF FARMS IN THE UNITED STATES

State	No. of Acres Provided with Drainage	Capital Invested in Drainage Enterprises
	Number	Dollars
Arizona	298,633	1,119,242
Arkansas	4,592,738	39,450,754
California	2,667,194	70,144,044
Colorado	468,322	4,890,317
Connecticut†	17,037	.....
Delaware	395,014	454,883
Dist. of Columbia†	251	.....
Florida	5,699,022	43,356,692
Georgia	84,374	2,064,840
Idaho	659,136	7,567,032
Illinois	5,091,364	72,567,174
Indiana	10,121,952	47,540,385
Iowa	6,164,344	75,374,497
Kansas	258,113	3,733,919
Kentucky	465,270	4,947,994
Louisiana	4,219,624	23,361,758
Maine†	10,068	.....
Maryland	183,337	43,914
Massachusetts†	20,741	.....
Michigan	8,978,386	40,412,251
Minnesota	10,990,409	65,576,077
Mississippi	2,890,618	23,259,677
Missouri	3,087,063	49,050,414
Montana	372,661	2,827,839
Nebraska	916,181	7,578,999
Nevada	153,373	1,337,647
New Hampshire†	5,412	.....
New Jersey†	89,896	.....
New Mexico	305,885	5,722,121
New York†	743,823	.....
North Carolina	825,576	5,467,906
North Dakota	1,376,041	3,673,336
Ohio	7,729,267	35,215,586
Oklahoma	197,646	1,971,350
Oregon	348,825	5,482,012
Pennsylvania†	170,419	.....
Rhode Island†	1,043	.....
South Carolina	204,366	1,241,300
South Dakota	676,472	5,078,771
Tennessee	601,592	6,501,750
Texas	4,218,850	14,047,181
Utah	202,058	4,869,273
Vermont†	20,530	.....
Virginia	43,759	611,300
Washington	405,709	5,332,842
West Virginia†	23,276	.....
Wisconsin	761,203	4,254,586
Wyoming	312,662	5,594,856
United States‡	86,967,039	691,724,519

†For 1930; these states were omitted in 1940 census. ‡For 38 states in 1940. In 1950 the total land in drainage enterprise was 102,688,331 acres.

IRRIGATION

The practice of supplying water to the fields by artificial means has been known for thousands of years. The ancient Egyptians, the Babylonians, the Chinese, and the natives of India—all made use of irrigation. In the western hemisphere, the Incas of Peru, the Aztecs of Mexico, and the Pueblo Indians of New Mexico employed artificial methods of watering very similar to those of the Old World.

In many parts of the earth, the soil is extremely fertile, but vegetation is scanty because the annual rainfall either is less than 20 inches or is concentrated in a relatively short season and followed by a long period of drought. In such regions, the ability to obtain water and distribute it to the fields when needed means the difference between a comparative desert and a rich region capable of supporting a large population.

Water is usually obtained from a river having its source in a more humid country, and today, along the banks of the Nile or the rivers of southern China, natives may be seen drawing up water from the river and pouring it into distributing channels just as their ancestors did 3000 years ago. Lakes, wells, and springs also may serve as a source of water, and in India during the rainy season many small reservoirs, called tanks, become filled by the floods.

Irrigation is practiced more extensively in India than in any other country, but in Egypt and in China, as also in Italy, Spain, and France, where irrigation was first introduced by the Romans, millions of acres are artificially supplied with water, and the present extensive systems are being enlarged under governmental direction.

Methods of Irrigation. More than 90 per cent of all irrigated lands receive their moisture from rivers and streams. During the season of flood, these streams usually carry far more water than can be used, while later in the year their volume is much less than is needed by the surrounding country. By means of a dam equipped with control gates, a reservoir can be created which may be filled when the river is high and gradually emptied when the river would otherwise be too low.

Most of the great dams of the world, of which that at Assuan, Egypt, is a notable example, have been constructed as the most important feature of some irrigation project. The force of the falling waters is frequently sufficient to generate electric

UNITED STATES GOVERNMENT IRRIGATED LAND ENTERPRISES

Statistics from Census Bureau, 1950

	Area Irrigated			Capital Invested		
	1939 Acres	1949 Acres	Increase 1939–49 Percent	1940 Dollars	1950 Dollars	Increase 1940–50 Percent
Arizona	653,263	979,014	49.9	83,526,608	137,575,193	64.7
Arkansas	161,601	418,644	159.1	5,766,895	14,365,151	149.1
California	5,069,568	6,618,595	30.6	318,889,318	640,061,505	100.7
Colorado	3,220,685	2,940,502	− 8.7	106,849,343	161,396,063	51.1
Florida	132,362	362,909	174.2	7,055,921	19,489,139	176.2
Idaho	2,277,857	2,168,323	− 4.8	102,585,798	129,973,554	26.7
Kansas	99,980	140,992	41.0	2,153,886	5,882,265	173.1
Louisiana	447,095	598,056	33.8	11,565,513	21,857,050	89.0
Montana	1,711,409	1,809,908	5.8	67,352,505	82,000,490	21.7
Nebraska	610,379	887,505	45.4	39,056,207	56,458,781	44.6
Nevada	739,863	722,896	− 2.3	16,906,790	20,249,426	19.8
New Mexico	554,039	691,429	24.8	32,735,997	61,586,909	88.1
North Dakota	21,615	35,759	65.4	1,755,489	2,957,763	68.5
Oklahoma	4,160	44,189	962.2	272,186	13,076,010	4,704.1
Oregon	1,049,176	1,338,226	27.6	50,961,251	74,360,976	45.9
South Dakota	60,198	84,356	40.1	5,395,610	6,617,914	22.7
Texas	1,045,224	3,148,115	201.2	66,441,376	144,545,556	117.6
Utah	1,176,116	1,166,659	− .8	41,896,532	56,539,436	35.0
Washington	615,013	617,362	.4	56,415,196	178,476,464	216.4
Wyoming	1,486,498	1,475,069	− .8	41,522,801	59,600,358	43.5
Total	21,136,101	26,248,508	24.2	1,059,105,122	1,887,070,003	78.2

	Diversion Dams number	Reservoirs number	Reservoirs with capacity reported		Canals miles	Pipe Lines miles	Wells number	
			Reservoirs number	Total Capacity acre-feet			Flowing	Pumped
Arizona	562	269	237	3,625,629	4,898	316	245	4,361
Arkansas	108	86	74	40,431	684	19	27	3,662
California	4,706	1,687	1,507	8,711,658	20,188	10,091	572	72,163
Colorado	7,713	1,182	1,105	2,021,343	18,833	251	1,451	4,988
Florida	355	180	168	3,343	692	485	4,181	3,381
Idaho	5,108	366	313	5,124,969	15,321	437	490	887
Kansas	127	52	42	25,505	546	14	12	1,340
Louisiana	319	61	56	31,249	3,675	61	844	7,590
Montana	8,134	629	577	1,598,898	15,498	109	100	142
Nebraska	488	117	96	133,934	4,628	90	100	7,176
Nevada	4,046	202	176	687,179	3,390	124	293	254
New Mexico	1,286	476	448	3,186,401	5,769	167	106	3,832
North Dakota	15	11	6	1,101	92	7	—	4
Oklahoma	20	29	27	148,945	355	20	—	160
Oregon	6,218	528	470	2,369,138	8,395	573	148	2,770
South Dakota	281	100	94	204,693	968	7	14	27
Texas	439	570	508	1,402,689	9,892	758	163	15,065
Utah	3,080	511	474	2,424,093	9,622	299	1,920	565
Washington	1,859	224	205	6,436,541	3,977	1,515	87	2,098
Wyoming	5,237	458	415	4,370,844	9,724	59	225	248
Total	50,101	7,738	6,998	45,548,583	137,147	15,402	10,978	130,713

power, which is especially valuable in irrigated regions where fuel is generally very scarce. The water is usually distributed from the river by main canals, from which branch ditches carry it to the fields. Irrigation is accomplished by running the water in shallow channels until it is absorbed by the earth, or by flooding the entire field.

Irrigation in America. In the United States, irrigation was at first carried on by private enterprise, but the capital required was so great and the payments were necessarily spread over such a long period that the work on many projects was finally undertaken by the government. By the terms of the National Reclamation act, which was passed in 1902, a large part of the money received from the sale of public lands in sixteen Western states was to be used for the construction of reclamation projects under the direction of the department of the interior. But, when the equipment has been paid for, the control passes to the owners of the irrigated land.

Alfalfa is the most important field crop raised in the Western irrigated districts. Fruits and vegetables rank highest in total value, being especially important in the Yakima irrigated area in Washington, in the Salt River region in Arizona, and in Grand Valley, Colorado. Cereals amount to only about 10 per cent of the total crops and are produced chiefly because of the expense of transporting grain from the corn and wheat producing states farther east. The Salt River project, Arizona, on which the waters are stored by means of the famous Roosevelt dam, produces important crops of cotton. The true economic value of these investments in irrigation can be best appreciated when it is noticed that, in some instances, the value of the crops for but one year exceeds the total cost of construction. These projects often serve also for flood control and the development of hydroelectric power.

The Arrowrock dam on the Boise project in Idaho built in 1915 was long the highest in the world (350 feet), but the Hoover (Boulder) dam finished in 1936 is more than twice as high (726), and a dozen or more other dams also outrank Arrowrock. Many of these, in addition to irrigation, are used for flood control, power production, and river regulation. The total area of irrigated land in the United States is over 20 million acres. For details, see tables on *United States Government Irrigated Land Enterprises* on the opposite page.

In Canada, the St. Mary River system in Alberta is by far the most important irrigation project. When completed, it will serve approximately 510,000 acres. Construction of the St. Mary dam, key structure of the project, was completed in 1951. It is 195 feet high, 2536 feet wide, and capable of storing 320,000 acre-feet of water.

Old World Irrigation. As already stated, India is the most extensively irrigated country in the world, the total area of projects being approximately 50 million acres, which is about 20 per cent of the total area cropped. The Sukkur barrage in the Sind province is designed to irrigate 5,500,000 acres. It is part of a larger plan for impounding the waters of the Indus river by works estimated to cost 250 million dollars. The annual value of crops on irrigated land in India approximates an average of 1½ times the total cost of the works.

The area in Egypt which can be cultivated is about 7,300,000 acres, all of which is dependent for its fertility on the Nile floods or irrigation. The Assuan dam, constructed in 1902 and more than doubled in storing capacity in 1912, is credited with having saved Egypt from famine and economic disaster in the low-flood year of 1913. Russia and Japan rank ahead of Egypt, however, in the total area of their irrigated soil. France, Italy, and Spain follow in the order named. China has a large area of irrigated land, but no authentic statistics are available by which its extent may be determined.

FORESTRY

Forestry is the art and the science of the economical management of existing communities of trees, and the development of new forests upon land unsuited to agriculture.

Value of Forests. Forests supply fuel and timber; they break the force of strong winds; they are warmer in winter and cooler in summer than open country; they afford parks for amusement; and they protect game for the hunter. Finally, forests exert a very noticeable influence upon the flow and character of neighboring streams. This effect has three principal causes: First, the trees break the direct force of the rainfall so that the earth on wooded hillsides is not cut up and washed into the valley. Second, water accumulates in the porous bed of a forest, and escapes to the stream gradually, thus tending to produce a continuous flow rather than a series of sudden, disastrous floods. Third, trees draw from swampy ground a large amount of water, which is evaporated through their leaves, thereby substantially decreasing the volume to be drained off by streams.

The purpose of forestry is to secure the greatest possible utilization of forests and forest products for the present, and, at the same time, to provide new growth for the future. To attain these results, existing forests must be protected from their chief enemies, fire and insects; lumbering operations must be performed with a minimum of waste; and cut-over areas must be replanted. Replanting may be done by allowing seed trees to remain standing, by artificial distribution of seed, or by setting out young trees which have been raised in nurseries.

Forestry has been practiced in Europe for several centuries, especially by the Germans and the French. England depended largely upon her commercial organizations to provide a supply of timber from foreign lands, but for a time during the World War she could obtain only that wood which France was able to spare. Because of this experience, England, shortly after the war, planned to plant one million acres of forest within forty years, and appropriated 17 million dollars to be used for this purpose within a period of ten years.

Forestry in the United States. During the early days of American history, the entire country, with the exception of the treeless plains of the mid-continent, was heavily wooded. Forestry, therefore, received little attention. Today, it is estimated that 80 per cent of the standing timber which remains is controlled by private owners, and that, if no precautions are taken, all this will have been destroyed within a century.

In recognition of the pressing need for conservation of a dwindling national asset, Congress, in 1891, empowered the president to create forest reserves. Yellowstone Park Timberland reserve, the first to be established under the new law, was created by President Harrison. There are now about 140 national forests, with a total area of approximately 163 million acres, distributed over 34 states and territories. These are under the control of the forest service of the department of agriculture. They are chiefly located in the Western states.

Within the national forests, cutting of mature trees and replanting of new crops is continually going on. Fuel and fencing may be obtained free by local settlers, but most of the timber is sold. Grazing of live stock within the areas of the national forests is a practice of great importance. About one-seventh of the cattle and one-half of the sheep slaughtered annually are fed in the forests during some part of the year.

Possibly the most important function of the national forests is to safeguard the streams which supply water for the famous Western irrigation projects. Without water there can be no irrigation, and without the forests the supply of water would be irregular and uncertain. Forty-two per cent of the power resources of the West are within the national forests.

UNITED STATES NATIONAL FORESTS

State or Dependency and Forest	Net Area Acres
Alabama:	
Black Warrior	177,529
Conecuh	70,684
Talladega	349,592
Total for State	597,805
Alaska:	
Chugach	4,814,218
Tongass	16,049,561
Total for Terr.	20,863,779
Arizona:	
Apache*	679,432
Coconino	1,741,649
Coronado*	1,317,289
Crook	1,422,777
Kaibab	1,773,221
Prescott	1,265,500
Sitgreaves	802,534
Tonto	2,410,610
Total for State	11,413,012
Arkansas:	
Ouachita*	1,333,419
Ozark	820,390
Total for State	2,153,809
California:	
Angeles	643,865
Cleveland	379,632
Eldorado*	600,126
Inyo*	1,521,470
Klamath*	1,503,109
Lassen	927,568
Los Padres	1,777,251
Mendocino	829,494
Modoc	1,541,155
Mono*	796,758
Plumas	1,175,895
Rogue River*	47,401
San Bernardino	594,468
Sequoia	1,110,700
Shasta	1,195,651
Sierra	1,336,514
Siskiyou*	339,051
Stanislaus	852,020
Tahoe*	589,781
Trinity	1,430,430
Total for State	19,192,339
Colorado:	
Arapaho	967,754
Cochetopa	1,175,717
Grand Mesa	653,170
Gunnison	1,284,544
Holy Cross	1,089,765
La Sal*	26,631
Montezuma	757,311
Pike	1,076,164
Rio Grande	1,289,400
Roosevelt	788,140
Routt	984,547
San Isabel	618,007
San Juan	1,256,697
Uncompahgre	786,265
White River	895,339
Total for State	13,649,451
Florida:	
Apalachicola	509,739
Ocala	323,106
Osceola	156,934
Total for State	989,779
Georgia:	
Chattahoochee	629,129
Idaho:	
Bitterroot*	828,663
Boise	1,288,600
Cache*	382,094
Caribou*	838,827
Challis	2,447,080
Clearwater	1,043,045
Coeur d'Alene	704,226
Idaho	1,715,987
Kaniksu*	850,977
Kootenai*	48,851
Lolo*	398,046
Minidoka*	521,970
Nezperce	1,931,124
Payette	1,312,423
St. Joe	789,158
Salmon	2,048,737
Sawtooth	1,204,735
Targhee*	1,022,146
Weiser	583,737
Total for State	19,960,726
Illinois:	
Bellevue-Savannah	10,710
Shawnee	186,627
Total for State	197,337
Kentucky:	
Cumberland	425,632
Louisiana:	
Kisatchie	509,621
Maine:	
White Mountain*	40,590
Michigan:	
Hiawatha	421,449
Huron	377,175
Manistee	255,049
Marquette	252,530
Ottawa	659,201
Total for State	1,965,404
Minnesota:	
Chippewa	579,048
Superior	1,790,683
Total for State	2,369,731
Mississippi:	
Bienville	175,417
De Soto	466,806
Holly Springs	117,933
Homochitto	189,219
Total for State	949,375
Missouri:	
Clark	824,118
Mark Twain	391,702
Total for State	1,215,820
Montana:	
Absaroka	1,005,102
Beaverhead	1,958,125
Bitterroot*	1,072,151
Cabinet	1,114,003
Custer*	1,127,649
Deerlodge	1,125,068
Flathead	2,223,854
Gallatin	864,817
Helena	891,074
Kaniksu*	12,699
Kootenai*	1,751,931
Lewis and Clark	1,812,613
Lolo*	1,294,346
Total for State	16,253,432
Nebraska:	
Nebraska	206,026
Nevada:	
Eldorado*	400
Humboldt	1,059,700
Inyo*	60,576
Mono*	466,015
Nevada	1,234,921
Tahoe*	16,373
Toiyabe	2,152,236
Total for State	4,990,221
New Hampshire:	
White Mountain*	663,606
New Mexico:	
Apache*	889,658
Carson	1,128,913
Cibola	1,641,832
Coronado*	124,988
Gila	2,393,732
Lincoln	1,145,883
Santa Fe	1,233,989
Total for State	8,558,995
North Carolina:	
Cherokee*	327
Croatan	125,211
Nantahala	350,002
Pisgah	464,958
Total for State	940,498
Oklahoma:	
Ouachita*	158,399
Oregon:	
Deschutes	1,474,037
Fremont	1,123,809
Klamath*	8,723
Malheur	1,114,857
Mount Hood	1,103,625
Ochoco	791,626
Rogue River*	858,794
Siskiyou*	1,040,428
Siuslaw	528,489
Umatilla*	989,849
Umpqua	984,753
Wallowa	973,092
Whitman	1,454,942
Willamette	1,648,397
Total for State	14,095,421
Pennsylvania:	
Allegheny	444,456
Puerto Rico:	
Caribbean	21,499
South Carolina:	
Francis Marion	243,536
Sumter	315,338
Total for State	558,874
South Dakota:	
Black Hills*	494,975
Custer*	73,668
Harney*	535,471
Total for State	1,104,114
Tennessee:	
Cherokee*	547,162
Texas:	
Angelina	139,917
Davy Crockett	161,109
Sabine	184,368
Sam Houston	159,543
Total for State	644,937
Utah:	
Ashley*	1,052,664
Cache*	330,796
Dixie	798,378
Fishlake	1,414,430
La Sal*	507,668
Manti	727,904
Minidoka*	70,998
Powell	1,032,510
Uinta	934,437
Wasatch*	835,384
Total for State	7,705,169
Vermont:	
Green Mountain	167,094
Virginia:	
George Washington*	823,811
Jefferson	538,624
Total for State	1,362,435
Washington:	
Chelan	1,813,000
Columbia	1,254,502
Colville	749,586
Kaniksu*	624,022
Mount Baker	1,816,373
Olympic	635,254
Snoqualmie	1,045,815
Umatilla*	313,359
Wenatchee	1,000,061
Total for State	9,251,972
West Virginia:	
George Washington*	96,836
Monongahela	804,726
Total for State	901,562
Wisconsin:	
Chequamegon	796,760
Nicolet	569,224
Total for State	1,365,984
Wyoming:	
Ashley*	23,703
Bighorn	1,113,670
Black Hills*	165,110
Caribou*	6,670
Harney*	3,676
Medicine Bow	1,059,377
Shoshone	1,566,406
Targhee*	343,428
Teton	1,802,903
Wasatch*	9,912
Washakie	863,677
Wyoming	1,699,653
Total for State	8,658,185
Aggregate for the 160 National Forests	175,723,380

*Forest extending into more than one state. Total area of each of these forests will be found on page 1309.

TOTAL AREA OF NATIONAL FORESTS EXTENDING INTO TWO OR MORE STATES

Forest	States*	Net Area Acres
Apache	Arizona and New Mexico	1,569,090
Ashley	Utah and Wyoming	1,076,367
Bitterroot	Idaho and Montana	1,900,814
Black Hills	South Dakota and Wyoming	660,085
Cache	Idaho and Utah	712,890
Caribou	Idaho and Wyoming	845,497
Cherokee	North Carolina and Tennessee	547,489
Coronado	Arizona and New Mexico	1,442,277
Custer	Montana and South Dakota	1,201,317
Eldorado	California and Nevada	600,526
George Washington	Virginia and West Virginia	920,647
Harney	South Dakota and Wyoming	539,147
Inyo	California and Nevada	1,582,046
Kaniksu	Idaho, Montana, and Washington	1,487,698
Klamath	California and Oregon	1,511,832
Kootenai	Idaho and Montana	1,800,782
La Sal	Colorado and Utah	534,299
Lolo	Idaho and Montana	1,692,392
Minidoka	Idaho and Utah	592,968
Mono	California and Nevada	1,262,773
Ouachita	Arkansas and Oklahoma	1,491,818
Rogue River	California and Oregon	906,195
Siskiyou	California and Oregon	1,379,479
Tahoe	California and Nevada	606,154
Targhee	Idaho and Wyoming	1,365,574
Umatilla	Oregon and Washington	1,303,208
Wasatch	Utah and Wyoming	845,296
White Mountain	Maine and New Hampshire	704,196

*Area of that part of forest in each state may be determined by reference to page 1308 under name of state.

In addition to national forests, there are forested tracts totaling about 8 million acres which have been created as reserves by a number of the states. New York State leads with forest reserves in excess of 2 million acres, chiefly in the Adirondack and Catskill parks. Pennsylvania and Washington have about 1.3 million acres of state forest land each. Other states with forest reserves over 500,000 acres are Montana and Michigan.

A third important classification of forest lands consists of woodlands on farms, which total about 137 million acres, or over 12 per cent of the aggregate farm acreage.

According to estimates made by the United States department of agriculture, about one-third of the total land area of continental United States is forested land and amounts to approximately 630 million acres. Of this total, saw-timber areas cover 212,862,000 acres, of which 100,832,000 acres are old growth and 112,030,000 acres are second growth. Cordwood areas and restocking areas cover 100,791,000 and 148,044,000 acres respectively. Noncommercial scrub areas account for an additional 168,461,000 acres.

Progress of Forestry. By the enactment, in 1924, of the Clarke-McNary forestry law, the United States government became committed to a definite national forestry policy, embracing alike the publicly and the privately owned forest lands of the nation. The provisions of this act insure increased protection to immature forests and a larger measure of Federal assistance in fire prevention. Provision is made for the systematic study of the problems of forest taxation with the specific purpose of developing equable laws to encourage timber growing. Appropriations also are authorized for supplying nursery stocks of young forest trees to the farmer and for aiding him in caring for his tree plantations, the latter work to be carried out in co-operation with the agricultural extension service and forestry department of his own state.

The aim of forestry is to make the forest lands a perpetual source of needed supplies of wood. This will be accomplished when the annual growth equals or exceeds the amount of timber cut, and lost through fire, insects, and disease.

Civilian Conservation Corps. A major step in forestry conservation was taken in 1933, when provision was made for a "forest army," or Civilian Conservation Corps (CCC), employed by the Federal government to plant trees, combat fire and tree diseases, and otherwise to add to the value of the forest domain. A project was begun in 1935 for planting a tree shelter belt 100 miles wide from the Texas Panhandle to Canada to check erosion by the wind, the trees being designed to retard the evaporation of moisture from the soil. Trees are planted in strips 70 feet wide, spaced at one-mile intervals.

The Civilian Conservation Corps, discarded during World War II, served a useful purpose during days of unemployment by training and educating youth throughout the country. It was an instrument for preventing delinquency and providing an opportunity for young men to learn a profession. During World War II credit was given to men who had served in the CCC.

Forestry in Canada. Approximately 94.4 per cent of Canada's forested land is publicly owned. The Dominion government administers about 12,000 square miles of forest within national parks. Apart from these areas, there are no national forests in Canada. The other publicly owned forests belong to the provinces, whose governments administer a total of 97,600 square miles of provincial forest reserves and, in addition, about 13,000 square miles of forested lands within the provincial parks.

Forest reserves are intended to supply timber for local use and to protect the watersheds. The export of unmanufactured timber or pulpwood cut from public lands is prohibited in every province except Nova Scotia.

All the provinces provide means of protection against forest fires, including the patrolling of the forest areas, building of roads and telephone lines, and the maintenance of airplane and motor service for reporting or combating fires. Many millions of trees are distributed annually free of charge from governmental nurseries.

PREVENTION OF SOIL EROSION

Agricultural scientists estimate that farming as it has been carried on in the United States has been instrumental in permitting erosion to ruin permanently 50 million once-fertile acres of land. Twice as much more is declared by department of agriculture specialists to be seriously damaged. The fertility of an additional 570 million acres is said to be in earlier stages of impairment.

The reason given is that removal of the forest and matted grass cover of the soil, as incidents to intensive agriculture, has had this triple effect: First, a large proportion of the rain, instead of being held back and absorbed to form a sub-surface reservoir, runs off, forming gullies and carrying top soil into streams and rivers. Secondly, the soil, containing a smaller amount of permanent moisture, is more susceptible to drought. Thirdly, during dry spells, high winds strip off enormous amounts of top soil, carrying it away as dust.

As compared with plowed land, it is estimated that grass-covered soil retains two to three times as much water from a given rainfall and that forests in turn retain twice as much as do pastures.

Prescriptions to retard the damage include:

1. Plowing parallel with the slopes, instead of running furrows up and down hill.
2. Building brush and log dams across gullies and small streams.
3. Retention of woodlots on farms and planting of trees on unproductive land.
4. Rotation of crops, including in the cycle the raising of grasses and soil-enriching plants, such as clover and other legumes.

Partly to encourage this form of conservation, Congress in 1936 passed a Soil Conservation act, under which benefit payments were to be made to farmers for diverting part of their grain, cotton, and tobacco acreage to uses calculated to build fertility and to check erosion.

AGRICULTURAL INDUSTRY IN

State*	Electricity	Electric water pump	Telephones	Distance to trading Center most frequently used		
				1 to 4 miles	5 to 9 miles	10 miles and over
Alabama	144,589	31,857	17,442	80,801	56,360	50,500
Arizona	8,062	4,630	4,408	3,421	2,308	3,171
Arkansas	121,916	30,808	19,201	77,044	50,517	34,356
California	124,613	85,194	78,720	64,636	32,625	20,458
Colorado	36,541	18,623	27,048	13,828	11,349	16,295
Connecticut	14,425	11,175	13,081	6,940	4,795	1,830
Delaware	6,112	4,665	4,990	3,263	2,662	491
Dist. of Columbia	18	1	17	1		
Florida	40,535	24,235	10,253	19,220	16,776	13,711
Georgia	149,271	52,916	18,624	73,390	66,754	40,656
Idaho	37,232	25,874	22,264	14,457	12,433	9,832
Illinois	169,645	105,237	127,618	81,116	65,093	31,351
Indiana	152,864	99,299	102,904	68,422	57,180	26,767
Iowa	184,787	116,983	166,380	78,935	73,690	32,858
Kansas	97,668	41,245	89,760	41,610	44,185	32,347
Kentucky	145,246	28,940	45,808	90,410	52,607	41,129
Louisiana	83,191	30,485	14,364	53,779	29,948	20,187
Maine	26,200	14,798	19,467	12,821	8,568	5,370
Maryland	30,302	20,765	19,457	15,749	10,121	6,348
Massachusetts	20,365	10,294	17,319	10,930	5,526	2,306
Michigan	146,902	114,255	83,136	66,687	55,320	22,426
Minnesota	150,755	101,391	107,359	65,896	69,101	33,833
Mississippi	140,695	36,188	16,425	97,035	75,862	55,320
Missouri	159,165	53,461	106,673	91,862	72,121	41,903
Montana	26,335	15,134	9,995	7,353	7,956	17,636
Nebraska	83,309	38,115	69,541	34,285	38,741	24,949
Nevada	2,184	1,457	1,550	949	700	1,056
New Hampshire	12,696	7,904	10,055	5,690	4,150	2,118
New Jersey	23,281	19,427	17,829	10,922	7,567	3,113
New Mexico	14,037	5,595	3,500	6,381	4,500	9,657
New York	117,262	79,735	87,767	55,746	38,471	16,417
North Carolina	219,417	71,021	23,347	111,337	85,498	62,154
North Dakota	44,200	19,812	27,214	15,894	22,791	22,711
Ohio	185,681	118,286	119,721	85,869	65,452	31,115
Oklahoma	93,315	30,512	47,161	45,054	47,291	38,594
Oregon	56,618	37,762	30,104	22,740	16,072	14,970
Pennsylvania	133,919	85,391	77,211	58,291	46,106	28,561
Rhode Island	2,411	1,862	1,998	1,011	746	489
South Carolina	95,025	32,961	11,901	51,902	47,985	29,191
South Dakota	45,898	16,631	37,221	16,690	22,242	23,650
Tennessee	165,541	41,694	43,541	94,713	57,025	45,843
Texas	260,373	89,647	79,080	106,288	100,888	93,197
Utah	21,602	5,448	12,515	8,397	4,574	4,460
Vermont	17,533	7,595	13,267	8,899	5,133	2,591
Virginia	114,273	40,701	35,853	56,202	37,830	38,524
Washington	64,599	42,293	40,166	29,037	19,397	14,287
West Virginia	59,141	13,915	21,724	32,736	19,683	19,003
Wisconsin	156,382	121,229	99,821	71,273	61,036	24,004
Wyoming	9,432	4,716	4,735	2,958	2,284	6,428
Total	4,213,563	2,011,162	2,059,625	2,072,940	1,640,239	1,117,473

*Based on reports for sample of farms.

THE UNITED STATES, 1950

Motor Trucks		Tractors		Automobiles		Farms Operated by Residents	State
Farms Reporting	Number	Farms Reporting	Number	Farms Reporting	Number		
47,088	52,801	37,791	45,962	64,436	71,276	199,511	Alabama
5,536	8,611	4,878	9,748	7,020	11,775	9,002	Arizona
56,568	63,589	41,415	60,892	57,999	65,197	171,665	Arkansas
71,165	110,724	73,356	124,963	110,759	172,148	119,710	California
31,190	42,663	32,174	53,187	35,713	48,842	41,100	Colorado
8,500	13,198	8,124	11,949	11,948	18,439	14,689	Connecticut
3,240	4,059	4,046	6,130	5,418	7,063	6,748	Delaware
11	15	1	4	6	29	23	Dist. of Columbia
20,811	29,267	15,287	22,033	28,216	36,123	49,046	Florida
55,409	63,022	48,384	60,991	89,290	100,586	185,058	Georgia
22,763	29,690	27,566	39,397	31,822	39,980	36,929	Idaho
79,072	86,789	142,018	234,893	159,682	196,183	181,944	Illinois
53,584	59,816	106,052	154,135	133,261	159,273	155,411	Indiana
58,742	62,612	161,357	241,090	180,966	228,541	191,759	Iowa
71,743	89,254	99,025	146,498	108,540	133,421	117,502	Kansas
49,799	55,032	49,351	59,193	102,938	119,881	203,497	Kentucky
30,296	36,445	23,497	36,059	48,496	56,515	117,258	Louisiana
14,854	19,197	12,804	16,675	19,874	23,937	28,248	Maine
16,917	21,428	20,547	29,885	26,805	36,446	33,549	Maryland
10,642	15,385	10,388	14,720	15,769	21,457	20,601	Massachusetts
49,508	56,976	111,375	149,372	130,202	164,763	145,241	Michigan
63,197	70,528	143,084	204,361	155,720	195,959	169,461	Minnesota
50,183	56,249	33,402	52,618	67,516	76,250	238,471	Mississippi
71,818	77,464	100,276	125,964	144,567	162,558	213,889	Missouri
26,584	38,772	27,260	44,991	26,783	35,077	31,073	Montana
45,811	54,398	87,710	127,352	94,536	121,220	98,407	Nebraska
1,967	3,123	1,733	3,113	2,005	3,066	2,742	Nevada
6,718	8,853	5,410	6,951	9,446	12,073	12,692	New Hampshire
15,619	24,279	15,364	26,181	18,874	27,976	23,282	New Jersey
11,728	15,098	10,535	15,871	11,629	15,110	20,862	New Mexico
56,625	72,463	81,977	119,706	97,264	129,972	116,557	New York
55,374	60,406	62,666	73,534	140,070	160,067	268,365	North Carolina
44,645	55,640	53,340	98,672	56,232	73,707	56,909	North Dakota
56,851	64,765	127,456	182,571	163,195	208,087	186,305	Ohio
59,869	68,895	71,705	93,804	83,389	95,224	128,668	Oklahoma
29,755	39,461	36,875	52,514	47,514	61,907	55,970	Oregon
54,346	66,113	91,127	125,907	112,508	151,763	137,441	Pennsylvania
1,516	2,445	1,285	1,939	1,950	2,773	2,390	Rhode Island
25,433	29,757	23,449	30,329	69,946	81,579	130,131	South Carolina
31,674	37,796	56,267	88,541	58,718	77,319	60,355	South Dakota
55,284	60,223	50,802	59,803	99,075	113,774	215,050	Tennessee
121,939	147,246	162,782	233,176	211,063	255,100	292,296	Texas
12,824	15,352	12,883	15,997	17,251	20,773	19,023	Utah
8,814	10,595	8,417	10,655	13,107	16,580	17,981	Vermont
41,708	49,087	36,516	48,256	77,098	94,036	141,102	Virginia
34,722	48,245	40,191	55,055	54,177	69,571	65,943	Washington
21,635	24,631	11,613	13,935	32,850	37,271	76,157	West Virginia
66,812	74,474	127,497	171,623	145,325	183,108	161,143	Wisconsin
9,113	12,600	9,260	15,606	9,320	12,912	11,534	Wyoming
1,840,682	2,209,531	2,526,268	3,617,001	3,390,288	4,206,687	4,982,330	Total

FARM INCOME AND GOVERNMENT PAYMENT BY STATES

Source: Bureau of Agricultural Economics, Department of Agriculture

State	Cash Receipts from farm marketing (000 omitted)			Government payments by program 1951 (000 omitted)		
	1949	1950	1951	Conservation	Sugar Act	Total
Alabama	345,822	349,787	415,088	6,348	.....	6,348
Arizona	233,108	275,895	352,712	1,480	5	1,485
Arkansas	542,701	512,098	564,519	6,533	.....	6,533
California	2,067,992	2,321,441	2,560,901	4,675	8,815	13,490
Colorado	511,607	505,910	537,037	4,615	4,044	8,659
Connecticut	153,609	143,372	166,185	502	.....	502
Delaware	97,026	99,095	117,573	471	.....	471
Florida	416,708	498,335	475,069	2,597	971	3,568
Georgia	447,671	519,411	642,235	8,634	.....	8,634
Idaho	336,032	341,915	379,457	1,907	3,895	5,802
Illinois	1,729,843	1,738,069	2,017,581	10,536	88	10,624
Indiana	961,264	976,155	1,168,707	6,854	21	6,875
Iowa	2,080,497	2,114,869	2,399,196	11,652	58	11,710
Kansas	994,819	1,028,521	1,035,914	7,802	190	7,992
Kentucky	534,398	517,771	632,632	7,366	.....	7,366
Louisiana	335,802	319,993	381,036	4,729	6,855	11,584
Maine	172,820	237,236	275,565	1,673	.....	1,673
Massachusetts	175,160	173,957	205,828	651	.....	651
Michigan	644,287	659,837	772,204	6,247	2,572	8,819
Minnesota	1,218,298	1,214,146	1,376,896	6,475	1,310	7,785
Mississippi	492,081	479,742	556,482	8,175	.....	8,175
Missouri	1,007,703	1,034,552	1,212,799	10,866	.....	10,866
Montana	367,774	376,251	448,384	4,205	1,834	6,039
Nebraska	933,809	979,822	1,097,010	7,202	1,938	9,140
Nevada	46,562	48,163	59,646	265	.....	265
New Hampshire	62,623	64,148	74,076	516	.....	516
New Jersey	282,049	290,230	350,167	926	.....	926
New Mexico	195,812	206,894	231,139	2,833	28	2,861
New York	814,353	810,864	957,378	7,135	.....	7,135
North Carolina	710,969	795,503	932,613	8,032	.....	8,032
North Dakota	537,644	523,450	650,244	5,933	629	6,562
Ohio	944,328	903,412	1,063,955	6,695	699	7,394
Oklahoma	606,333	564,597	618,762	9,238	.....	9,238
Oregon	349,873	389,345	406,927	2,466	886	3,352
Pennsylvania	749,462	732,434	866,673	6,426	.....	6,426
Rhode Island	22,794	21,655	24,804	86	.....	86
South Carolina	279,652	287,319	384,174	3,691	.....	3,691
South Dakota	554,777	508,204	668,837	6,354	119	6,473
Tennessee	432,700	430,344	487,598	7,006	.....	7,006
Texas	2,054,295	2,147,062	2,150,930	22,076	106	22,182
Utah	149,179	155,935	192,962	1,407	1,757	3,164
Vermont	107,033	109,469	126,459	1,165	.....	1,165
Virginia	411,203	436,339	517,992	5,373	.....	5,373
Washington	483,308	536,143	564,143	2,832	1,265	4,097
West Virginia	114,410	115,853	132,029	2,155	.....	2,155
Wisconsin	938,898	968,910	1,185,932	7,556	415	7,971
Wyoming	131,686	143,264	177,349	2,219	1,437	3,656
Total	28,011,650	28,772,839	32,791,129	245,628	39,937	285,565

POULTRY AND EGG PRODUCTION IN THE UNITED STATES, 1955

Source: Department of Agriculture, Agricultural Marketing Service; annual report, *Agricultural Statistics.*

	Eggs Produced on Farms (Millions)	Chickens Raised on Farms	Commercial Broilers Produced	Turkeys Raised	Chicks Hatched by Commercial Hatcheries
Alabama	781	7,216,000	57,764,000	276,000	42,869,000
Arizona	87	766,000	562,000	97,000	647,000
Arkansas	544	5,396,000	76,954,000	1,557,000	74,731,000
California	4,404	28,888,000	48,516,000	10,196,000	56,004,000
Colorado	336	2,998,000	1,945,000	860,000	914,000
Connecticut	663	6,636,000	25,852,000	271,000	38,941,000
Delaware	126	1,163,000	69,820,000	919,000	57,284,000
Florida	505	4,938,000	9,389,000	165,000	17,206,000
Georgia	1,213	11,167,000	177,642,000	316,000	187,566,000
Idaho	281	2,484,000	1,292,000	122,000	1,506,000
Illinois	3,064	22,274,000	8,691,000	896,000	14,104,000
Indiana	2,289	19,250,000	32,368,000	1,956,000	51,514,000
Iowa	4,855	34,601,000	4,740,000	4,453,000	4,550,000
Kansas	1,723	14,602,000	1,734,000	730,000	2,284,000
Kentucky	1,029	10,518,000	9,540,000	362,000	10,580,000
Louisiana	362	4,717,000	11,666,000	78,000	6,700,000
Maine	695	7,220,000	33,438,000	259,000	30,364,000
Maryland	406	3,651,000	58,367,000	535,000	69,930,000
Massachusetts	704	6,689,000	17,071,000	642,000	11,980,000
Michigan	1,690	13,207,000	4,252,000	964,000	7,250,000
Minnesota	4,287	24,500,000	2,463,000	8,034,000	2,125,000
Mississippi	584	6,186,000	37,486,000	147,000	42,587,000
Missouri	2,132	20,087,000	25,767,000	2,442,000	53,591,000
Montana	228	3,108,000	.....	67,000	230,000
Nebraska	1,790	15,500,000	3,577,000	816,000	1,745,000
Nevada	20	164,000	.....	10,000	.....
New Hampshire	436	5,406,000	7,627,000	142,000	20,609,000
New Jersey	2,433	12,404,000	9,384,000	334,000	16,742,000
New Mexico	114	772,000	.....	56,000	6,000
New York	2,121	13,209,000	13,052,000	974,000	7,658,000
North Carolina	1,469	14,967,000	59,516,000	1,053,000	82,056,000
North Dakota	560	5,903,000	.....	507,000	570,000
Ohio	2,366	15,929,000	17,181,000	2,958,000	20,250,000
Oklahoma	829	7,065,000	6,436,000	744,000	6,560,000
Oregon	615	4,691,000	6,133,000	1,535,000	9,658,000
Pennsylvania	3,654	23,199,000	30,318,000	2,297,000	39,137,000
Rhode Island	80	804,000	1,375,000	52,000	2,609,000
South Carolina	510	5,268,000	10,053,000	1,116,000	10,750,000
South Dakota	1,234	10,389,000	.....	329,000	.....
Tennessee	955	10,413,000	13,225,000	175,000	19,750,000
Texas	2,249	15,709,000	79,687,000	3,032,000	79,394,000
Utah	380	2,011,000	1,776,000	2,772,000	1,169,000
Vermont	207	2,245,000	966,000	115,000	282,000
Virginia	843	6,618,000	55,179,000	5,529,000	64,732,000
Washington	828	5,768,000	9,782,000	808,000	11,378,000
West Virginia	398	2,834,000	21,873,000	1,636,000	10,589,000
Wisconsin	2,328	17,658,000	13,805,000	2,211,000	13,683,000
Wyoming	78	680,000	.....	25,000	.....
Total	59,485	461,868,000	1,078,264,000	55,570,000	1,204,784,000

PRODUCTION OF FARM CROPS AND MEAT OF LEADING COUNTRIES, 1954

Source: Statistical Office of United Nations: *Statistical Yearbook*

In Short Tons

	Wheat	Cotton	Rice	Corn	Potatoes	Sugar[6]	Meat[5]
Argentina	8,477,000	122,000	190,000	2,806,000	1,835,000	857,000	1,294,000
Australia	4,998,000	.....	100,000	131,000	471,000	1,394,000	1,339,000
Austria	498,000	.....	.....	164,000	3,078,000	193,000	314,000
Belgium	649,000	.....	.....	.....	2,903,000	377,000	410,000
Brazil	908,000	493,000	[1]3,711,000	6,720,000	927,000	2,568,000	1,776,000
Bulgaria	.....	10,000	.....	.....	.....	77,000	.....
Canada	9,267,000	.....	.....	625,000	1,554,000	130,000	1,101,000
Chile	1,188,000	.....	103,000	112,000	680,000	.....	176,000
China	[1]23,920,000	717,000	[2]54,013,000	7,275,000	.....	496,000	.....
Colombia	112,000	32,000	306,000	1,039,000	580,000	252,000	.....
Cuba	.....	.....	212,000	193,000	.....	4,991,000	69,000
Denmark	322,000	.....	.....	.....	2,136,000	403,000	689,000
Ecuador	.....	.....	149,000	.....	140,000	.....	.....
Egypt	1,906,000	384,000	1,232,000	1,931,000	248,000	215,000	215,000
Finland	259,000	.....	.....	.....	1,202,000	.....	138,000
France	11,647,000	.....	55,000	1,053,000	18,724,000	1,674,000	2,612,000
Germany, Fed. Rep.	3,189,000	.....	.....	.....	29,508,000	2,437,000	2,228,000
Greece	1,343,000	43,000	97,000	281,000	502,000	.....	94,000
India	8,817,000	842,000	40,669,000	3,297,000	1,792,000	1,251,000	.....
Indonesia	.....	.....	13,000,000	2,297,000	.....	799,000	.....
Iran	2,315,000	47,000	579,000	.....	.....	77,000	.....
Iraq	1,279,000	9,000	198,000	.....	.....	.....	.....
Ireland	548,000	.....	.....	.....	2,518,000	129,000	234,000
Italy	7,993,000	11,000	947,000	3,256,000	3,509,000	860,000	682,000
Japan	1,671,000	.....	[3]12,055,000	62,000	3,024,000	687,000	177,000
Korea, South	144,000	11,000	4,299,000	.....	258,000	.....	.....
Mexico	915,000	419,000	179,000	4,409,000	164,000	993,000	241,000
Netherlands	438,000	.....	.....	32,000	4,408,000	457,000	365,000
New Zealand	120,000	.....	.....	.....	185,000	.....	632,000
Norway	45,000	.....	.....	.....	1,246,000	.....	116,000
Pakistan	4,125,000	313,000	14,121,000	493,000	.....	.....	316,000
Paraguay	.....	13,000	.....	118,000	.....	.....	.....
Peru	186,000	123,000	305,000	331,000	1,527,000	673,000	.....
Philippines	.....	.....	3,423,000	849,000	.....	1,405,000	66,000
Portugal	825,000	.....	159,000	425,000	1,140,000	.....	95,000
Spain	5,289,000	24,000	443,000	834,000	3,897,000	295,000	439,000
Sweden	1,124,000	.....	.....	.....	1,575,000	333,000	357,000
Switzerland	381,000	.....	.....	.....	1,538,000	.....	217,000
Syria	1,064,000	79,000	21,000	.....	30,000	.....	.....
Thailand	.....	10,000	6,293,000	.....	.....	.....	.....
Turkey	5,523,000	157,000	202,000	1,008,000	1,102,000	214,000	133,000
Union of So. Africa	590,000	7,000	.....	3,657,000	203,000	885,000	476,000
United Kingdom	3,117,000	.....	.....	.....	8,203,000	707,000	1,820,000
United States	29,094,000	3,274,000	2,943,000	83,010,000	10,681,000	2,488,000	12,667,000
Uruguay	917,000	.....	77,000	203,000	.....	.....	413,000
Venezuela	.....	4,000	80,000	359,000	.....	93,000	106,000
Yugoslavia	1,527,000	.....	.....	3,311,000	2,068,000	146,000	370,000
World Total[4]	166,228,000	7,826,000	180,669,000	148,702,000	183,976,000	37,644,000	32,377,000

[1] 1953 Figure. [2] Includes Manchuria. [3] Excludes Ryukyu Islands. [4] Excludes USSR. [5] Refers to beef and veal including buffalo meat), pork, mutton, lamb, goat meat. [6] Beet and Cane.

ANIMAL INDUSTRY

During the early period of man's development, wild animals were a valuable source of food and of clothing. Later, certain of the larger animals were tamed and used as beasts of burden. Fine furs are still taken chiefly from wild animals; but, as the population of the earth increased in numbers and advanced in the arts of civilization, man learned that better meat, more comfortable clothing, and superior types of motive power could be obtained from domestic animals. By careful selection and breeding, he gradually developed these animals to suit his needs.

Nevertheless, the number of species used by man is very small. Swine, cattle, sheep and goats, horses, mules, and asses comprise more than 99 per cent of all live stock exclusive of poultry. These animals are extensively distributed throughout the temperate zones, the type or species most suitable to any locality depending almost entirely on the climate and on the condition of the soil.

Swine. The total number of swine is less than that of either cattle or sheep. Nevertheless, because of its rapid growth and great rate of reproduction, the hog is the chief meat producing animal of the world. Hogs cannot live upon grass, but require a more concentrated food. They are found, therefore, wherever grain is raised, because the feeding of grain to hogs usually results in a more valuable food product. More than one-quarter of the American corn crop goes to market as pork. In fact, the corn belt is the center of the hog raising industry. According to the purpose for which they are raised, modern breeds of swine are divided chiefly into lard hogs and bacon hogs. The Poland-China, Duroc-Jersey, and Chester White hogs are of the first class, and, when fattened on corn, may yield as much as 50 per cent of their live weight in lard. The Tamworth and the Yorkshire are typical bacon producing breeds. In number of swine produced, China is first, followed by the United States, Germany, Russia, and Spain.

Sheep. Just as pork is the principal meat of grain producing countries, so mutton and wool are the chief animal products of all dry, rough, and thinly settled, grass-growing regions. Tunis, Algeria, and Morocco are known as the "sheep countries," and for centuries the shepherd has been representative of one of the most important industries of Syria, Palestine, and the great dry steppes of southern Russia and the Crimea. The semiarid regions of western United States and the high plateaus of Mexico are largely devoted to sheep raising. Australia leads all countries in number of sheep, Russia is second, United States third, and Argentina fourth. The number of sheep in the United States reached its maximum in 1903.

Draft Animals. The horse is the most important and the most valuable of all draft animals; nevertheless, for this purpose, it is exceeded in numbers, even at the present time, by the ox. In the production of horses, Russia is first, followed by the United States, Argentina, Brazil, China, Germany, and Canada. In Canada, horse raising is of unusual importance, as is shown by the fact that the number of horses sometimes exceeds that of sheep and is almost equal to that of swine.

The United States produces more than half of the world's supply of mules. The greatest horse and mule market in the world is at East Saint Louis, Illinois.

The Percheron, which is considered by many to be the finest type of draft horse, was developed by French breeders in the south of Normandy. The English Shires are the largest of all horses. The breeding of thoroughbreds—horses whose pedigree shows unbroken descent from pure Arabian and Barbary ancestors—is most extensive in Great Britain. A thoroughbred racer has sold for more than $200,000.

As a beast of burden, the camel is especially well adapted to traveling in the desert, the reindeer to the plains of the arctic regions, and the yak to cold places of high altitude, such as Tibet. The llama performs in the Andes the same services as does the yak in the Himalayas. The elephant is extensively used in India as a draft animal, and his great power is utilized by almost every traveling circus. The dog is the least important of general draft animals. However, it is very useful for drawing sleds in the snow regions of North America, and is commonly used for hauling wagons in the densely populated sections of northwestern Europe.

Cattle. India, the United States, Russia, Argentina, Brazil, Germany, and China are the chief cattle producing countries of the world; but the chief beef exporting nations are Argentina and Australia. The cattle of India consist largely of the humped Brahman variety, and of the water buffalo. They are not used to any great extent for food. Cattle raising is quite generally divided into the production of beef cattle of the Shorthorn and Hereford types, and of milk producing breeds, such as the Jersey and the Holstein. In a new, level, thinly settled country, well covered with rich grass, beef cattle are raised on a large scale for the export of meat, hides, and tallow. Fresh beef can be shipped to any part of the world, because of modern methods of artificial refrigeration. But, as the population increases, cattle ranges give place to farms, and the type of cattle gradually changes from beef producers to dairy animals. In order to produce more beef from fewer animals, the tendency of modern breeding is towards early maturing cattle. In Europe, where extensive pastures are no longer available, practically all cattle are stall-fed. Denmark is first as an exporter of butter, with Russia normally second, and Australia and New Zealand third.

Poultry. Poultry raising is the most universal form of animal industry. All countries raise poultry, chiefly chickens. China leads in the production of eggs, with Russia second. In the United States there is an average of only about 72 chickens to each reporting farm, yet the annual production of eggs amounts to some 2,391 million dozens. Turkeys, ducks, geese, and guinea fowls amount to about 4 per cent by value of all poultry in the United States. This total normally exceeds 350 million, and in Canada is about 50 million.

Of about 100 standard varieties of domestic chickens, the best-known fall into three classes: the Asiatic, meat producing type, such as the Brahmas, Cochins, and Langshans; the Mediterranean, egg laying type, which includes Leghorns, Minorcas, and Anconas; and the American, general utility type, represented by the Plymouth Rocks, Wyandottes, and Rhode Island Reds.

Silk Culture. The annual production of silk amounts to about 88 million pounds, of which Japan, China, and Italy together produce over 90 per cent. Silk raising requires, not only a plentiful supply of mulberry leaves, but also a large amount of inexpensive labor. The industry is, therefore, carried on chiefly by the women living on small farms. The annual importation of silk into the United States normally exceeds 400 million dollars in value.

Bees. The production of honey is an industry which depends upon the food-storing instinct of the honeybee, and upon a supply of growing flowers to provide the nectar. The total production of honey in the United States is over 65 million pounds annually. Of even greater value is the service performed by bees in fertilizing flowers of fruit trees and other useful plants.

Farm Animals in U. S. In 1940, each of the 6.1 million farms of the United States had on the average seven swine, ten cattle, seven sheep, two horses or mules, and 55 chickens, valued in all at $740.49. These animals produced, besides what was con-

DOMESTIC ANIMALS ON FARMS, 1956*

Source: 1950 data, Department of Commerce, Bureau of the Census; 1956 data, Department of Agriculture, Agricultural Marketing Service.

	Horses and Mules		All Cattle		Milk Cows	Sheep and Lambs	Hogs and Pigs
	1950	1956	1950	1956			
Alabama	288,000	160,000	1,269,000	1,798,000	654,000	110,000	1,042,000
Arizona	69,000	60,000	656,000	1,022,000	77,000	470,000	26,000
Arkansas	284,000	123,000	1,153,000	1,587,000	591,000	67,000	567,000
California	122,000	78,000	2,757,000	3,863,000	1,437,000	2,020,000	470,000
Colorado	121,000	72,000	1,776,000	2,075,000	263,000	1,731,000	195,000
Connecticut	8,000	5,000	164,000	177,000	167,000	9,000	26,000
Delaware	8,000	3,000	60,000	68,000	53,000	4,000	40,000
Florida	51,000	35,000	1,101,000	1,754,000	333,000	5,000	427,000
Georgia	254,000	138,000	1,003,000	1,562,000	516,000	46,000	1,663,000
Idaho	91,000	54,000	949,000	1,457,000	419,000	1,085,000	120,000
Illinois	212,000	71,000	2,928,000	4,028,000	1,394,000	708,000	6,291,000
Indiana	127,000	49,000	1,781,000	2,262,000	917,000	577,000	4,349,000
Iowa	257,000	88,000	4,540,000	6,223,000	1,651,000	1,247,000	11,602,000
Kansas	201,000	80,000	3,509,000	4,298,000	759,000	594,000	929,000
Kentucky	358,000	208,000	1,652,000	1,826,000	891,000	593,000	1,203,000
Louisiana	233,000	138,000	1,285,000	1,923,000	516,000	110,000	473,000
Maine	22,000	12,000	205,000	228,000	199,000	36,000	24,000
Maryland	48,000	20,000	431,000	529,000	358,000	49,000	225,000
Massachusetts	10,000	7,000	180,000	180,000	169,000	13,000	160,000
Michigan	106,000	40,000	1,696,000	1,924,000	1,405,000	399,000	776,000
Minnesota	260,000	90,000	3,110,000	4,018,000	2,450,000	953,000	3,637,000
Mississippi	393,000	242,000	1,569,000	2,440,000	878,000	97,000	808,000
Missouri	390,000	143,000	3,281,000	4,027,000	1,341,000	879,000	3,819,000
Montana	143,000	92,000	1,758,000	2,515,000	165,000	1,757,000	141,000
Nebraska	217,000	83,000	3,629,000	4,821,000	654,000	677,000	2,493,000
Nevada	28,000	22,000	424,000	597,000	35,000	458,000	19,000
New Hampshire	9,000	5,000	110,000	118,000	109,000	10,000	13,000
New Jersey	13,000	12,000	209,000	226,000	206,000	17,000	244,000
New Mexico	86,000	65,000	1,138,000	1,212,000	72,000	2,242,000	45,000
New York	138,000	62,000	2,022,000	2,288,000	2,152,000	175,000	157,000
North Carolina	352,000	236,000	698,000	955,000	543,000	53,000	1,276,000
North Dakota	152,000	79,000	1,588,000	2,131,000	620,000	668,000	439,000
Ohio	153,000	73,000	2,036,000	2,416,000	1,370,000	1,247,000	2,836,000
Oklahoma	233,000	96,000	2,658,000	3,244,000	662,000	257,000	463,000
Oregon	75,000	48,000	1,099,000	1,456,000	343,000	830,000	157,000
Pennsylvania	129,000	63,000	1,645,000	1,896,000	1,543,000	259,000	642,000
Rhode Island	1,000	1,000	24,000	25,000	24,000	2,000	12,000
South Carolina	170,000	113,000	370,000	633,000	252,000	8,000	581,000
South Dakota	174,000	79,000	2,513,000	3,367,000	529,000	1,315,000	1,494,000
Tennessee	371,000	210,000	1,561,000	1,753,000	940,000	295,000	1,183,000
Texas	516,000	298,000	7,825,000	8,586,000	1,248,000	5,208,000	1,100,000
Utah	54,000	37,000	562,000	779,000	175,000	1,472,000	63,000
Vermont	25,000	14,000	408,000	469,000	449,000	13,000	13,000
Virginia	195,000	120,000	1,199,000	1,396,000	627,000	347,000	678,000
Washington	64,000	38,000	878,000	1,218,000	456,000	294,000	134,000
West Virginia	92,000	58,000	588,000	593,000	284,000	314,000	170,000
Wisconsin	221,000	84,000	3,739,000	4,384,000	3,912,000	260,000	1,831,000
Wyoming	83,000	58,000	1,028,000	1,118,000	69,000	2,128,000	32,000
Total†	7,604,000	3,962,000	76,762,000	97,465,000	34,877,000	31,109,000	55,088,000

*January 1st. †Includes District of Columbia figures.

PUREBRED BEEF AND DUAL-PURPOSE CATTLE

Number of new registrations each year, as reported by breed associations, United States

Year	Aberdeen Angus	Devon	Hereford	Polled Hereford	Red Poll	Shorthorn	Brahman
1935	15,331	189	122,657	5,444	1,188	38,404	.....
1936	15,023	208	124,278	8,000	1,382	36,521	.....
1937	17,278	236	134,679	6,732	1,418	34,424	.....
1938	19,248	214	135,454	7,946	1,624	33,575	.....
1939	25,308	259	159,408	8,717	2,350	41,025	.....
1940	40,778	285	191,405	10,848	2,876	41,431	4,409
1941	38,737	336	207,517	15,244	2,724	50,120	4,132
1942	46,820	338	250,527	17,372	2,522	54,471	[1]
1943	52,432	398	288,675	17,034	3,155	52,845	8,536
1944	57,717	443	298,421	18,881	4,267	60,504	7,054
1945	66,020	401	316,081	31,863	3,958	63,988	10,954
1946	71,968	397	336,193	24,200	4,088	69,418	10,623
1947	81,992	403	356,530	33,000	4,366	80,853	14,928
1948	84,548	365	352,888	37,121	4,296	58,538	15,145
1949	87,722	...	370,015	37,179	4,689	73,986	17,220
1950	110,442	601	426,971	44,263	4,782	76,965	19,177
1951	138,896	511	506,061	61,513	5,093	108,565	20,610
1952	164,329	500	548,418	71,580	5,011	47,938	24,013
1953	160,754	710	560,794	78,152	4,225	47,674	17,873
1954	213,410	534	552,554	80,020	3,834	48,487	17,010
1955	186,316	560	522,639	101,084	3,443	48,963	16,564

[1] No report of registration received.

PUREBRED DAIRY CATTLE

Number of new registrations, by breeds, United States

Breed	1947	1948	1949	1950	1951	1952	1953	1954	1955
Ayrshire:									
Bulls	4,633	4,175	3,904	3,412	3,458	2,604	2,357	2,178	2,018
Cows	25,413	21,938	22,413	20,824	22,005	20,604	22,013	20,815	21,017
Total	30,046	26,113	26,317	24,236	25,463	23,208	24,370	22,993	23,035
Brown Swiss:									
Bulls	6,712	6,295	5,637	5,759	5,827	*			
Cows	15,757	16,330	15,678	16,962	19,936	*			
Total	22,469	22,625	21,315	22,721	25,763	23,385	21,854	22,854	21,667
Guernsey:									
Bulls	20,000	18,939	17,227	16,013	14,181	13,669	9,622	7,882	7,589
Cows	71,279	77,956	72,679	78,888	79,448	100,240	79,986	73,663	73,977
Total	91,279	96,895	89,906	94,901	93,629	113,909	89,608	81,545	81,566
Holstein-Friesian:									
Bulls	33,084	35,576	36,329	36,662	36,629	32,424	25,752	23,539	23,469
Cows	119,655	132,762	141,596	147,584	155,009	157,266	163,810	172,424	174,139
Total	152,739	168,338	177,925	184,246	191,638	189,690	189,572	195,963	197,608
Jersey:									
Bulls	15,797	12,152	11,273	10,654	9,145	7,934	7,841	6,041	5,777
Cows	70,579	56,974	54,701	58,325	59,506	62,924	79,741	54,555	54,483
Total	86,376	69,126	65,974	68,979	68,651	70,858	87,582	60,596	60,260

*Individual figures not available.

sumed on the farms, 399 dozen eggs, 49 pounds of wool, and 1916 gallons of milk, including that sold for making butter and cheese. The farm value of these products amounted to an average of $275.77 for each farm. The inhabitants of the United States are the greatest meat eaters in the world with an average total consumption estimated at about 130 for each person. In 1900 the average was 215.9 pounds.

The most important breeding grounds of beef cattle in the United States are the western portion of the Corn Belt, the Great Plains, the valleys and high plateaus of the Far West, and the Gulf coast from Georgia to Texas. Many animals are shipped from the ranges to the corn belt to be fattened.

Milk. The insuring of an adequate daily supply of fresh milk of standard quality in the large centers of population necessitates elaborate organization, specialized transportation, and rigid inspection. Most milk offered for sale is pasteurized, that is, heated to 60–63° C. for 20 to 30 minutes. Many municipalities have insisted on a unified system of grading milk as A, B, and C. Grade A, either raw or pasteurized, must have not more than 10,000 bacteria per cubic centimeter; grades B and C, not more than 50,000. Grade B must be pasteurized under official supervision; grade C is pasteurized, but not under official supervision. By the Babcock test, devised in 1890 by S. M. Babcock, the proportion of fat in milk is readily determined. This normally varies from 3 to 6%. Large amounts of milk are concentrated and shipped in air-tight tins for use in the home or food factories. Wisconsin and New York are the leading states in milk production.

Serums and Vaccines (*văk'sĭn*; *-sēn*). Employment of animals for the preparation of serums and of vaccine used in the treatment and prevention of diseases is a small but exceedingly important branch of animal industry. For example, diphtheria antitoxic serum is developed within the blood of healthy horses, while the vaccine used for preventing smallpox is generally obtained from calves. Production of these invaluable substances in the United States is carried on under rigid governmental inspection.

There is a marked difference between antitoxin and vaccine. Diphtheria antitoxin, as its name implies, contains substances which, when injected into the blood of a person suffering from diphtheria, neutralize the poisons already produced in the blood by the active germs of that disease. A vaccine is the exact opposite of an antitoxin. Smallpox vaccine, for example, contains, in a greatly diluted or weakened form, the virus which tends to produce smallpox, or, rather, cowpox. When, by the process of vaccination, a minute quantity of vaccine is allowed to enter the system, the blood soon proceeds to develop within itself quantities of antitoxin which neutralize the virus. As the result of this reaction, the system builds up a more or less permanent resistance to further attacks of the specific disease.

In the preparation of diphtheria antitoxin, a very small amount of the poison produced by growing diphtheria germs is injected into a healthy horse. The horse develops a very mild fever, which soon disappears. Successively larger doses are administered at intervals until the horse receives without injury an amount of the toxin many hundreds of times that which would kill an ordinary animal.

Smallpox vaccine is obtained by vaccinating healthy young calves with smallpox or cowpox virus. The virus is applied in long narrow scratches, which, in about a week, develop the characteristic swelling that contains vaccine lymph. The virus produced in these lesions is collected, purified, diluted with glycerin, and quickly distributed. The vaccine is prepared under most rigidly sanitary conditions. Wherever it is consistently used, smallpox becomes practically unknown.

Insulin. This extract, secured chiefly from the pancreas of cattle and hogs, is used extensively in the treatment of diabetic patients. It occurs in certain interior portions of the pancreas, known as the "islands (Latin—*insulæ*) of Langerhans"; hence its name. Diabetes is due to a failure of the liver to act normally in transforming sugar into glycogen, and as a result the blood becomes surcharged with unassimilated sugar. Insulin, when injected into the blood, temporarily enables the liver to take this sugar from the blood and, if persistently administered, serves to prolong the life of the patient. F. G. Banting and J. J. R. MacLeod of the University of Toronto received jointly a Nobel prize in 1923 for their discovery of insulin and its use.

ANIMAL INDUSTRY IN CANADA

Farm Live Stock, Dairy Products, and Poultry, by Provinces, 1950

Province	Horses		Cattle			Sheep	
	Number	Value	Number	Value	Dairy Products Value	Number	Value
Alberta	318,900	$ 13,126,000	1,442,900	$ 197,516,000	$ 51,519,000	414,500	$ 7,499,000
British Columbia	45,900	4,386,000	357,300	41,913,000	30,821,000	95,000	1,823,000
Manitoba	156,300	8,154,000	683,300	88,110,000	32,169,000	117,100	1,888,000
New Brunswick	39,300	4,251,000	203,000	21,712,000	14,486,000	70,700	1,025,000
Nova Scotia	29,900	4,232,000	200,200	22,998,000	17,076,000	131,600	1,814,000
Ontario	378,300	31,250,000	2,807,300	417,114,000	199,112,000	504,100	11,614,000
Prince Edward Is.	22,300	2,135,000	98,400	10,778,000	5,519,000	47,400	806,000
Quebec	288,200	33,614,000	1,985,500	225,354,000	165,954,000	397,600	5,572,000
Saskatchewan	103,900	15,419,000	1,214,400	164,792,000	43,125,000	237,000	3,713,000
Canada	1,683,000	116,567,000	8,992,300	1,190,287,000	559,781,000	2,015,000	35,754,000

Swine		Poultry		Fur-Bearing Animals*	Total Value	Rank of Province by Value	Province
Number	Value	Number	Value	Value	Animals		
809,700	$ 26,658,000	9,447,000	$ 9,066,000	$1,600,248	$ 255,465,248	3	Alberta
64,600	2,356,000	3,658,000	5,596,000	1,099,710	57,173,710	6	British Columbia
269,400	8,036,000	5,664,700	5,965,000	1,210,580	113,363,580	5	Manitoba
83,900	2,417,000	1,355,000	1,884,000	131,056	31,420,056	8	New Brunswick
55,600	1,637,000	1,969,000	2,841,000	175,973	33,697,973	7	Nova Scotia
2,213,100	77,907,000	23,460,000	29,379,000	2,696,060	569,960,060	1	Ontario
67,800	2,206,000	1,180,000	1,316,000	172,688	17,413,688	9	Prince Edward Is.
1,249,900	45,156,000	10,234,000	14,766,000	1,345,593	325,807,593	2	Quebec
133,700	13,183,000	8,149,100	8,033,000	477,627	205,617,627	4	Saskatchewan
5,247,100	179,556,000	65,416,800	78,846,000	8,909,535	1,609,919,535		Canada

*On fur farms, 1948.

The native home of the Hereford is Herefordshire, England. Henry Clay of Lexington, Ky.,made the first importation in 1817. Herefords are noted for distinctiveness in color. They are red with white faces. Breast, crest of neck, underline, and switch of tail are pure white. Herefords are low set, blocky, have well-sprung ribs, wide loin, long rump, and uniform and abundant depth. The carcass is unusually thick fleshed and evenly covered. Ability to convert grass, roughage, and grain into quality beef with efficiency and in minimum time is the basis of the breed's popularity. There are more Herefords, commercial and purebred, marketed every year in the United States than all other beef breeds combined.

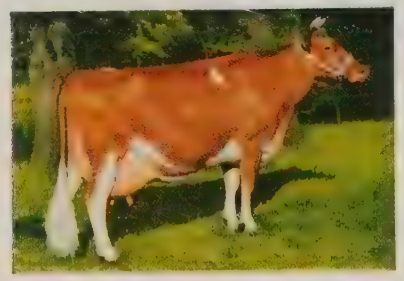
The Aberdeen-Angus breed originated in Scotland. The name came from two adjacent shires of Aberdeen and Angus. Hugh Watson was the first great improver of the Aberdeen-Angus breed. He began his operations in 1818. The first breeding herd in the United States was established by Anderson and Findlay, Lake Forest, Illinois. The color should be entirely black. White spots on the underline behind the navel or on the udder are permissible; but white on any other part of the body disqualifies an animal for show and registry. The typical animal of the breed is broad, deep, low set, symmetrical, and has a compact well-rounded body. The percentage of carcass to offal is very high. The meat is fine of grain, the marbling is excellent. and the quality of flesh is unsurpassed.

AMERICAN BEEF CATTLE

The Shorthorn breed is native to northeastern England. Breed progress began about 1780 under the direction of Colling Brothers, Thomas Booth and sons Richard and John, and Thomas Bates. Shorthorns were first imported into the United States in 1783, when a few were brought into Virginia. In color, Shorthorns may be pure red, red and white, pure white, or roan. They produce a beef carcass that is wide and thick in the loin, wide, long and thick in the hind quarters, the sections where the high-priced cuts are found. The Shorthorn was the pioneer beef breed in the United States.

Warren Gammon & Son, Des Moines, Iowa, bred the first Polled Herefords. They were developed by mating the offspring of horned Herefords that were born without horns. Mr. Gammon located 4 polled bulls and 10 cows by sending a letter of inquiry to 2500 Hereford breeders. He was able to purchase the 4 bulls and 7 of the cows. The first calves from this mating came in 1902. From 75 to 100 per cent of the calves were polled. When a Polled Hereford was mated to a Horned Hereford, from 50 to 75 per cent of the calves were polled. Polled Hereford type and conformation are essentially the same as Horned Herefords. Both are registered in the same herdbook of the American Hereford Association. Polled Herefords are increasing very rapidly in number and popularity.

The Holstein-Friesian breed originated in the province of Friesland in northern Germany. The first importations of Holsteins into the United States were made in 1795. The Holsteins are the largest of the dairy breeds. The color is black and white, with the colors sharply defined rather than blended. Cattle qualify for registration that are nearly all white or black, but no solid-color animal can be registered. A Holstein herd test of upwards of 100,000 cows shows an average annual production of 11,208 lbs. of milk with a fat test of 3.44% and a total average production of 385 lbs. of butterfat. Official records show that scores of Holstein cows have produced in excess of 30,000 lbs. of milk in a year.



The Guernsey breed originated in the Channel Islands, near the north coast of France. The first cattle brought to the United States were called Alderneys. Gradually the cattle on the islands of Alderney, Sark, and Guernsey became known as the Guernsey breed. The color of the Guernseys is fawn and white, with fawn predominating. A light cherry red with white is not unusual. The horns are of moderate size and amber in color. The skin is yellow. In a recent American Guernsey Cattle Club herd improvement registry covering several thousand cows on annual test the average production was 8688.5 pounds of milk and 425 pounds of butterfat.

The Jersey breed originated on the island of Jersey, one of the Channel Islands. In 1789 a law was passed prohibiting the importation of cattle into Jersey Island except for immediate slaughter. The first importation of Jerseys into the United States was made in 1850. Jerseys are more evenly distributed in the United States than any other breed. The color is usually some shade of fawn or cream, though different shades of mouse color, gray and brown are common. Some individuals are almost black. They may be a solid color of any of these shades, or spotted with white. The muzzles and tongues are usually black or lead colored, and around the muzzle is a white or mealy ring. Jerseys surpass all other breeds in the production of butterfat. Several cows have produced in excess of 1000 lbs. of butterfat in a year.

The Brown Swiss breed is one of the oldest in existence and was developed in Switzerland over a period of many centuries. The first importation of Brown Swiss into the United States was made by Henry M. Clark of Belmont, Massachusetts. It included 1 bull and 8 heifers. The bull named William Tell, became number one in the herdbook of the Brown Swiss Cattle Breeders' Association. The color varies from dark to light brown. There is usually a light stripe of gray along the back. The nose, switch, tongue, and horn tips are always black, and there is usually a light or mealy ring around the muzzle. The cows have made good at the milk bucket. Well-culled, well-fed farmer herds average 10,000 pounds of 4% milk year after year.

The Ayrshire breed originated in southwestern Scotland, in the county of Ayr. The first importations into the United States occurred in 1822. The color varies from almost pure white to nearly all cherry red or brown, with any combination of these colors. The horns turn gracefully, giving a distinctive appearance to the head. Ayrshire cows have more of the beef type conformation than most other dairy breeds. They produce milk that tests around 4% butterfat. In order for a bull to meet Approved Sire Plan adopted by the Ayrshire Breeders' Association, 70% of all tested daughters must each produce 8,500 pounds of milk or 340 pounds of fat in a 305-day lactation period.

AMERICAN DAIRY CATTLE

DAIRYING

This term embraces the production of milk and the manufacture of milk products. While goats, sheep, camels, reindeer, mares, and the Asiatic buffalo are sometimes used as a source of milk, the cow alone is bred for the purpose and supports a huge dairy industry. The dairy industry was revolutionized in the late 19th century by the introduction of the centrifugal cream separator and of the Babcock test for determining the fat content of milk. The latter, invented in 1890, made possible the purchase of milk, for manufacture and distribution, on the basis of quality and powerfully stimulated the improvement of herds.

The same period saw the rise of education in dairy management. A school of agriculture was opened in 1873 at Copenhagen, Denmark, which country has shown the most marked improvement in the quality of its milch cows. In 1890, at Madison, Wis., the first American school for dairying was opened, under the direction of W. A. Henry. Since that time numerous schools for dairying, experimental stations, and co-operative cow-testing associations have come into existence in the United States, Canada, and other countries. Australia, New Zealand, Argentina, Russia, and Switzerland are also large producers of milk and milk products.

Dairying in North America. In 1954 the number of dairy cows in the United States was about 24 million, and the average amount of milk produced per cow was 4500 pounds. A United States gallon of milk weighs about 8.6 pounds; the Canadian gallon, about 10.3 pounds. Each person in the United States annually consumes about 8.7 pounds of butter, 8.2 pounds of margarine, 7.7 pounds of cheese, and 16.3 pounds of ice cream. The popular consumption of margarine has risen markedly during recent years.

The chief dairying states are Wisconsin, New York, Iowa, Minnesota, Texas, and Illinois. Wisconsin produces the greatest amount of butter, cheese, and condensed milk; New York, the most milk for market. The dairy production of the United States is valued at about 1200 million dollars—$9.11 *per capita*; that of Canada, about 290 million dollars—$25.48 *per capita*. Among the Canadian provinces, Ontario leads in the production of cheese and butter, Quebec ranking second.

Cheese and Other Milk Products. Cheese was a common article of diet at least as early as 1400 B. C. It is made from milk by separating the curd, or casein, portions of the fat, and other constituents from the whey, shaping the mass into different forms, and usually curing it. The separation is ordinarily effected by rennet, prepared from the stomachs of young calves, puppies, or pigs. Upward of 150 kinds of cheese are made in Europe and America, the differences being dependent on the kind and condition of milk used, the manufacture, the seasoning, and especially the curing.

Milk is preserved either in the form of powder; as a sweet, slow-flowing liquid; or as an unsweetened, creamlike liquid. In these forms, which were first made about 1855, milk is now susceptible of much wider use than was formerly the case. It has become an important article of international commerce, and its use by bakers has resulted in a marked improvement in the quality of factory-made bread.

When used for ice cream, milk is generally *homogenized*, the fat globules being thereby rendered so small that they do not rise in the form of cream.

Casein obtained from milk is used in the manufacture of glue and also, in a plastic form, as a strong, elastic, noninflammable product resembling celluloid. Its uses include electric insulation and ornamental objects.

See *Butter*, page 1360; *Milk*, page 1318; *Cattle*, page 1315; also, for dairy production in the United States and Canada, tables on animal industry, pages 1316, 1317, and 1318.

FISHERIES

The three greatest commercial fishing grounds of the world are located near the coasts of northwestern Europe, northeastern North America, and northeastern Asia. In these places, where the ocean is comparatively shallow, enormous "schools" of valuable food fishes congregate in order to obtain the food that they find near the bottom. A second important type of fisheries takes advantage of the spawning habits of certain fish, which, at the spawning season, travel up rivers or to the shores, where they are easily caught. The cod and haddock are chief examples of bottom feeders, while salmon and shad are the most valuable of the second group.

The rank of various nations in order of the value of their fisheries is approximately: Japan, United States, China, Russia, Great Britain, Canada, France, Siam, and Norway. Although the United States is near the top of the list, the fishing industry is of less relative importance there than in any other of the countries named. The total annual products of the fisheries in the United States are about 3.3 billion pounds, valued at $110,000,000. In Newfoundland and Norway, fishing is the chief industry, while in Japan the fisheries supply almost the only animal food of the entire population. The world's fish production averages over 2 million dollars a day in value. London is the greatest fish market of the world and the herring is the most important fish. Whaling is carried on mainly in the Antarctic Ocean. It is largely in the hands of Norwegians, who operate in ships equipped like factories for processing the animals when captured. The oil is sold chiefly for making soap.

The development of a process of rapid freezing, which has the effect of preserving the original flavor, has greatly expanded the consumption of fresh fish.

Fisheries of the United States. Because of its great extent, the United States affords almost all kinds of fishing, from seals in Alaska to sponges in Florida. The oyster is the most valuable product of the country's fisheries, with salmon second, menhaden third, cod fourth, and halibut fifth. The menhaden is used chiefly for its oil. Of the fish taken from the Great Lakes, the most valuable are the ciscoes, lake trout, whitefish, and pike-perch.

Salmon is canned chiefly in the northwestern coastal states and in Alaska. The salmon pack of Alaska exceeds in value any other product of the territory. Tuna packing is a comparatively recent industry of southern California. Sardines are canned in Maine, where young herring are used, and in California, where the pilchard or true sardine is extensively taken. Canned crab meat is largely imported from Japan. Lobsters, which are taken on the Atlantic Coast from Delaware to Labrador, are most abundant off Maine and Nova Scotia.

Canadian Fisheries. The salmon of British Columbia is the most valuable product of Canadian fisheries, with lobster second, cod third, halibut fourth, and herring fifth. In order of production, British Columbia leads the provinces, and is followed by Nova Scotia, New Brunswick, Ontario, and Quebec. Government bounties are paid to encourage the industries and interior bodies of water are stocked with fish fry.

Secondary Products. In addition to food, there are many other uses for fishery products. From the whale are obtained the ordinary whale oil and whalebone, and also sperm oil, spermaceti wax, and ambergris, which is highly valued for use in fine perfumes. True caviar is prepared from the roe of the sturgeon, and the swimming bladder of the same fish is the source of the finest isinglass. Liquid glue is prepared from fishskins and offal, while crushed oyster, clam, and other shells are used for poultry grit, for surfacing roads, and for making lime. Sealskin, pearls, and corals are among the luxury products of the fisheries. Fish scales enter into *essence d'orient*, used in making artificial pearls.

MINING AND MINERAL PRODUCTION

Mining includes all the methods and processes involved in obtaining useful materials from the earth. The further processes by which metals are obtained from their ores are included in the science of metallurgy.

Mining is purely an extractive process. For this reason it is the most destructive of the primary industries by which man satisfies his wants. A ruined forest may be replaced, if necessary, within a few generations; even the number of fish in the sea may be greatly increased by artificial propagation. But, when a ton of coal or of iron ore has once been mined, the store available to future generations has been decreased by just so much. There can be no replacement.

Importance. In the United States, the combined crops of corn and wheat greatly exceed in value all mineral products, so that on this basis of comparison mining might at first seem of secondary importance. Nevertheless, the distinctive character of modern commerce, industry, and civilization is due largely to the extensive employment of the products of the mine. Consider, for example, modern methods of transportation as represented by the railroads. Engines and cars are built largely of metal, and travel on metal rails; the fuel used to generate the power necessary to run the trains comes from the mines; and the terminal buildings are composed chiefly of products of the quarry. Finally, 65 per cent of the freight hauled by American railroads consists of mining products. Similarly, nearly all essential parts of the automobile have the same source; the fuel and the lubricating oil, the glass of the wind shield, and even the acid in the battery are prepared from mineral products. The rubber tires, while they may seem to be an exception, could not be used were it not for the sulphur with which they are vulcanized.

Historical. In the development of the human race, the acquirement of a knowledge of mining and of the metallurgical arts marks the change from savagery to barbarism. This change has not been made by all races at the same time. Copper was obtained from the mines of Sinai by the Egyptians 5000 or more years ago, although this stage was not reached in Europe until about 2000 B. C. Gold and meteoric iron, which are found as free metals, were utilized at even earlier periods. Similarly, the savages of North America employed native copper which they found in the region of Lake Superior.

Copper was the first metal to be reduced from its ore. The Phœnicians, about 1000 B. C., were accustomed to obtain the red metal from Cyprus and from Spain. They obtained also great quantities of silver from Spain, and, for the tin necessary to alloy with copper in making bronze, they sailed north to the "tin islands," which we now call Great Britain. The Romans had extensive iron mines on the island of Elba. During the 16th century it was the quest for gold that sent the Spanish adventurers to South America and to Mexico. They found gold in enormous quantities, although the Aztecs, whom they despoiled of their treasure, still employed weapons and tools of bronze. The value attached to iron and other metal products by ancient peoples is suggested by the fact that the Greek god Hephæstus, the Roman god Vulcan, and Thor, the Norse deity, were all workers at the forge.

Mining Products. These important substances may be roughly classified as metals, fuels, and the products of the quarry. The first group supplies the materials from which practically all tools and machines are constructed; the second group yields energy, without which most of our machinery would be useless; while from the third group are produced cement, limestone, granite, marble, and other products, so necessary for permanent building.

Types of Mines. Heavy minerals, of which gold is the most important, are frequently found disseminated throughout an alluvial or a glacial deposit. A mineral-bearing bed of this type is known as a placer, from the Spanish word *placel*, meaning sand bank. The simplest form of placer mining consists in shaking the gold-bearing earth in a pan of water with such a motion that the heavier particles sink to the bottom while much of the lighter material can be thrown over the side.

In *sluicing*, an operation which depends on the same principle, a stream of water flows through a wooden trough or other form of channel provided with corrugations, or riffles, on the bottom. Mercury is placed in the riffles. When placer dirt is shoveled into the sluice, the current carries away the lighter substance while the gold settles into the riffles, where it amalgamates with the mercury and is retained. The amalgam is collected and heated in a retort, from which the mercury distills, leaving the gold.

Hydraulicking is placer mining on a large scale. In this process the gravel bank is washed down into sluices by means of a stream of water under a pressure of 250 to 400 pounds per square inch. Huge dredges are also used on placer deposits, the buckets dropping the sand on screens, from which the fine particles pass to sluices, where the gold is recovered.

Where bodies of ore are to be found comparatively near the surface, *open-pit* mining is frequently most satisfactory. By this process the overburden of useless earth is removed so that the ore may be taken up by steam shovels and dropped directly into railroad cars. This is the principal method used in Minnesota for obtaining iron ore. It is also employed elsewhere on copper ores and, to some extent, on coal. In 1914, Hibbing, Minnesota, a town of 10,000 people, was moved to a new location in order that a valuable body of ore might be available for open-pit operation.

Drilled wells are used chiefly to obtain petroleum, natural gas, salt, and sulphur.

Underground mines are reached by tunnels entering the side of a hill or mountain, by shafts sloping gradually, or by vertical shafts. When the veins of mineral are reached, various systems of cutting away the ore are used so as to obtain as much of the valuable material as possible, consistent with economy, safety, and ease of working. Some of these methods are known as *stoping*, *room-and-pillar* mining, the *longwall* method, *milling*, and *caving*. Removal of the coal or ore may be accomplished by pick-and-shovel methods or by machines.

Explosives are nearly always used in mining; in fact, three-quarters of all explosives ordinarily manufactured in the United States are discharged in the mines. High explosives are employed where a hard ore is being mined, but for coal "permissible explosives" are preferred. These cause less shattering than does dynamite, and have a short, low-temperature flame, in order to eliminate, as far as possible, the danger of igniting any explosive gases that may have collected in the mine. The use of permissible explosives has reduced the accident mortality in coal mines from 3.39 per 10,000 in 1903 to much less than 1 per 10,000 at present.

Prospecting. The search for valuable bodies of minerals in the earth is known as prospecting. An oily spot on the surface of the ground, an outcropping vein, rusty places, or a strip of unusually rich or poor vegetation may call attention to a useful deposit. Modern methods of prospecting are generally carried out by large companies in the light of geological knowledge supplied by scientific experts. Any region that gives indication of mineral wealth may be tested by means of core drills which bring up a section of the material through which they pass. Careful geological and chemical examination of the core forms a basis for a fairly accurate estimate of the amount and the quality of ore that may be expected.

Development. Having established a promising location, shafts must be sunk, the ore blocked out by further drilling, and provision made for drainage and ventilation of the tunnels. If early indications are confirmed, the necessary machinery is installed, a mill or a cleaning house is constructed, and the mine is placed in operation. The proper operation of a mine is a great problem of economics, because commercial success often depends on the utilization of products which in earlier times were considered of no value.

Ore Dressing. Ore as taken from the mine is usually contaminated with various impurities of no value. Mechanical methods of concentrating the valuable minerals and of separating one ore from another, as zinc sulphide from lead sulphide, are known as *ore dressing*. Ore from the mine is usually discharged upon bar screens called *grizzlies*, where large lumps of impurities can be rejected by hand. The remainder passes through crushing, grinding, and pulverizing machinery, washers, screens, settling tanks, and other devices—all acting to produce a concentrated ore for the smelter.

Technical Processes. Magnetic ores are frequently separated from nonmagnetic substances by passing the powdered material through a magnetic field. A similar separation of conducting and nonconducting minerals may be produced by means of an electrostatic field. The use of the amalgamation process in placer mining has already been explained. Gold-bearing ore taken from the lodes of underground mines usually consists chiefly of quartz. This hard material is reduced to powder by stamp mills or by other types of machinery and is then passed over copper plates coated with mercury. Much of the gold is retained by these plates. The remainder of the metal may be obtained by treating the powder with chlorine gas, which forms a soluble chloride of gold, or with weak cyanide solution, which dissolves gold and silver. The precious metal is precipitated from the cyanide solution by means of zinc dust or shavings; heat is sufficient to decompose the salt formed by chlorination.

In separating diamonds from other minerals, the final concentrates are passed in a stream of water over greased plates, which retain only the diamonds. A similar physical, selective action is utilized in the important concentrating process known as *flotation*. This consists in causing one of the constituents of a finely ground ore to float at or above the surface of a mixture of the ore with water and, usually, oil. As generally practiced, the ore is mixed with pine oil,—wood and tar oils and petroleum are also used,—and passed through a flotation machine in a rising current of water. Minerals having an adamantine, a resinous, or a metallic luster are carried to the surface with the oil so that a separation is readily effected. Other flotation processes make use of bubbles of gas rather than of particles of oil to accomplish the same result.

Mining in Canada. Minerals were first discovered in Canada in 1604 by Master Simon, a French mining engineer. Coal is the most valuable product of the Canadian mines, but to the world at large the nickel mines are most important. The mines at Sudbury, Ontario, produce 85 per cent or more of the world's supply of this valuable metal, for which no satisfactory substitute is known. Canada produces notable quantities of gold, silver, and copper. The Hollinger mine, in the Porcupine district, is the largest gold mine in the world. The geological formation which, in Ontario, yields the gold of Porcupine, the silver of Cobalt, and the nickel of Sudbury passes into northern Quebec, where, because of the undeveloped condition of the country, the mineral wealth is still unknown.

Production in the United States. The United States, because of the great variety and abundance of its natural resources, is the center of the mineral industry of the world. It produces each year more than one-third of the total value of all mineral products, and ranks first in output of approximately half of the 30 most important mineral commodities. It is also first, not only in absolute value of mineral products, but in the ratio of production to population. Most of the copper used in Europe comes from America.

The value of the annual production of minerals in the United States averages about 5 billion dollars. Of the total for 1930, petroleum and natural gas contributed 30.3 per cent, bituminous coal 16.9 per cent, and anthracite 7.3 per cent—a total of 54.5 per cent for fuel. Pig iron was valued at 10.6 per cent of the total, copper 3.8 per cent, lead and zinc 2.2 per cent, gold and silver 1.4 per cent, and limestone 2.1 per cent. Thus limestone alone was worth more than all the gold and silver. The value of cement production constituted 4.8 per cent of the total.

More than one million persons, or 2.9 per cent of all male workers, were engaged in the mineral industry. Of these, more than 70 per cent were engaged in the production of coal. A train of a length sufficient to carry the annual products of the coal mines of the United States would stretch six times around the earth.

Bureau of Mines. This branch of the department of the interior was established by an act of Congress which became effective July 1, 1910.

It is the duty of the bureau to conduct scientific investigations having for their object the improvement of technical processes and conditions of labor involved in the production and the use of mineral wealth. One of the most valuable results of this work has been a great reduction in the number of explosions and other accidents in mines.

The headquarters of the bureau are at Washington, D. C., where an analytical laboratory is maintained for testing the quality of the fuel used by the navy, the army, the Panama Canal zone, and the Federal buildings. The central laboratory is established at Pittsburgh, with other stations devoted to special investigations located in various parts of the United States and in Alaska.

Economic Significance. Among the scores of minerals which the world produces, certain ones stand out as pre-eminently important by reason of their utility in our civilization. Among them are coal, petroleum, iron, and gold.

Coal and petroleum are the basic fuels for the production of power, on which industrial civilization rests. Coal is of primary importance for industrial power, and petroleum for motive power in transportation by sea, highway, and air. Hence the possession of large reserves of these minerals confers on any nation an advantage of the first order. The exploitation of coal in Great Britain was a primary factor in its early industrial development. The United States is favored by even larger supplies of coal, and its petroleum resources, added to these, have placed it in a decisive position of economic leadership. Since gasoline, however, may be made by the Bergius process from low-grade coal, lack of petroleum may be offset by the possession of coal and lignite.

Iron is by far the most essential metal in the machine age. When iron deposits are found in close proximity to coal deposits, the material elements are present for building up an economic empire. These conditions account to a large extent for the industrial growth of the United States, Great Britain, western Europe, Russia, and the Japanese power in Manchukuo.

Gold is placed among the premier minerals because of its unique value as a promoter of trade and commerce. By its acceptance as an international standard of value and a basis of credit, it has, as it were, fertilized the wealth-creating activities of every nation.

MINERAL PRODUCTS OF THE UNITED STATES

Mineral	Quantity	Value
Metallic		
Aluminum . 1,000 pounds	1,246,912	$ 180,755,000
Antimonial lead . . . tons	100,764	. . . . .
Bauxite . . . . long tons	1,457,148	8,697,000
Cadmium . . . . pounds	7,639,113	12,680,000
Chromite . . . . long tons	3,231	. . . . .
Copper . . . . . pounds	842,477	365,635,000
Ferro-alloys . . long tons	1,952,246	273,450,000
Gold . . . . 1,000 troy oz.	2 025	70,892,000
Iron: Ore . 1,000 long tons	100,822	394,461,000
Pig	60,051	2,232,122,000
Lead, refined . . . . tons	339,413	121,510,000
Manganese ore . . . tons	131,100	4,390,000
Manganiferous ore . . tons	1,340,565	. . . . .
Mercury (quicksilver) flasks 76 pounds net	14,388	1,101,000
Nickel . . . . . tons	833	. . . . .
Platinum . . . . troy oz.	17,067	1,239,000
Silver . . . 1,000 troy oz.	39,228	35,504,000
Tungsten ore . . . . tons	4,005	6,312,000
Zinc . . . . . tons	537,966	143,099,000
Nonmetallic		
Arsenious Oxide . . . tons	15,516	1 268,000
Asbestos . . . . . tons	37,092	1,806,000
Asphalt: native . . . tons	1,136,126	5,026,000
Oil . . . . tons	8,006,196	149,169,000
Barite, crude . . . . tons	799,848	6,693,000
Boron minerals . . . tons	450,932	11,148,000
Bromine . . 1,000 pounds	76,048	14,844,000
Calcium-magnesium chloride . . . . . tons	301,936	3,903,000
Cement 1,000 barrels 376 lbs. net	207,680	453,412,000
Clay: Products[1]	. . . . .	268,081,000
Raw . . 1,000 tons	37,386	80,074,000
Coal: Bituminous 1,000 tons	594,000	2,941,417
Pa. Anthracite[2] 1,000 tons	57,140	467,052,000
Coke . . . . 1,000 tons	74,862	928,282,000
Emery . . . . . tons	5,405	69,000
Feldspar, Crude . long tons	460,713	2,564,000
Flourspar . . . . . tons	331.749	11,277,000
Fuller's earth . . . . tons	342,081	5,274,000
Garnet, abrasive . . tons	8,039	588,000
Grindstones and pulpstones . . . . . tons	7,954	405,000
Gypsum . . . 1,000 tons	7,255	19,113,000
Lime . . . . . tons	7,264	75,163,000
Magnesite . . . . . tons		
Mica: Scrap . . . . tons	52,157	1,092,000
Sheet 1,000 pounds	270	46,000
Millstones	. . . . .	18,000
Mineral pigments: Natural pig iron oxide pigments . . . . . tons	111,317	10,937,000
Zinc and lead . . . tons	218,399	49,411,000
Natural Gas million cu. ft.	4,963,853	1,197,550,000
Natural Gasoline 1,000 gals.	3,929,429	351,576,000
Petroleum 1,000 barrels 42 gals.	2,016,232	5,196,034,000
Phosphate Rock long tons	8,699	50,592,000
Potassium salts . . . tons	1,143,339	35,999,000
Pumice . . . . . tons	607,746	2,502,000
Pyrite . . . . . long tons	928,531	3,950,000
Quartz . . . . . tons	161,861	751,000
Salt . . . . . 1,000 tons	16,403	54,332,000
Sand: Glass . 1,000 tons	4,542	10,771,000
Molding and building 1,000 tons	314,724	241,727,000
Slate . . . . . tons	799,400	12,881,000
Stone . . . . 1,000 tons	225,537	328,985,000
Sulfur . . 1,000 long tons	4,979	89,600,000
Sulfuric acid . 1,000 tons	641	8,584,000
Talc and soapstone . tons	518,746	8,265,000
Summary		
Total value of all metallic products[3] . .		3,510,000,000
Total value of nonmetallic products . .		12,160,000,000
Grand total, approximate, of all mineral products		15,670,000,000

[1]Value of clay products excludes values of potteries and refractories.

[2]Includes brown coal and lignite, and anthracite mined elsewhere than in Pennsylvania.

[3]Figures for many mineral products not available, but value of products derived therefrom are in some instances included in the total.

VALUE OF MINERAL PRODUCTION IN THE U. S., BY STATES, 1953

State	Value	Rank	Per cent of total
Alabama . . .	187,900,000	18	1.31
Arizona	256,616,000	15	1.78
Arkansas . . .	125,885,000	24	.88
California . . .	1,392,883,000	2	9.69
Colorado . . .	211,586,000	17	1.47
Connecticut . .	7,917,000	45	.06
Delaware . . .	659,000	48	.01
Dist. of Col. . .	15,000	49	(1)
Florida	92,336,000	27	.64
Georgia	52,397,000	32	.36
Idaho	66,987,000	29	.47
Illinois	461,795,000	8	3.21
Indiana	169,179,000	20	1.18
Iowa	52,001,000	33	.36
Kansas	413,243,000	9	2.87
Kentucky . . .	381,742,000	10	2.66
Louisiana . . .	965,237,000	4	6.71
Maine	10,503,000	44	.07
Maryland . . .	27,085,000	38	.19
Massachusetts .	17,891,000	42	.12
Michigan . . .	286,487,000	14	1.99
Minnesota . .	542,547,000	7	3.77
Mississippi . .	107,868,000	25	.75
Missouri . . .	128,297,000	23	.89
Montana . . .	132,185,000	22	.92
Nebraska . . .	33,281,000	37	.23
Nevada	73,665,000	28	.51
New Hampshire	1,805,000	46	.01
New Jersey . .	51,948,000	34	.36
New Mexico . .	330,829,000	11	2.30
New York . . .	186,868,000	19	1.30
North Carolina	38,446,000	35	.27
North Dakota . .	19,237,000	41	.13
Ohio	302,843,000	12	2.11
Oklahoma . . .	678,160,000	6	4.72
Oregon	24,449,000	39	.17
Pennsylvania .	1,121,579,000	3	7.80
Rhode Island .	1,462,000	47	.01
South Carolina	17,771,000	43	.12
South Dakota .	33,896,000	36	.24
Tennessee . . .	98,050,000	26	.68
Texas	3,647,806,000	1	25.37
Utah	298,629,000	13	2.08
Vermont . . .	20,302,000	40	.14
Virginia	152,777,000	21	1.06
Washington . .	54,577,000	31	.38
West Virginia .	790,110,000	5	5.49
Wisconsin . . .	55,271,000	30	.38
Wyoming . . .	255,906,000	16	1.78
Total	14,381,000,000	—	100.00

[1]Less than 0.005 per cent.

TOTAL VALUE OF MINERAL PRODUCTS OF THE U. S.

Year	Metallic Value Dollars	Nonmetallic* Value Dollars	Total Value Dollars
1880-1919	23,529,255,000	34,937,874,000	58,467,129,000
1920	1,763,675,000	5,217,665,000	6,981,340,000
1921	654,700,000	3,483,800,000	4,138,500,000
1922	988,100,000	3,659,190,000	4,647,290,000
1923	1,511,930,000	4,474,570,000	5,986,500,000
1924	1,233,370,000	4,072,430,000	5,305,800,000
1925	1,382,155,000	4,295,475,000	5,677,630,000
1926	1,405,345,000	4,808,255,000	6,213 600,000
1927	1,220,633,000	4,309,367,000	5,530,000,000
1928	1,288,290,000	4,096,910,000	5,385,200,000
1929	1,480,390,000	4,407,210,000	5,887,600,000
1930	985,790,000	3,779,010,000	4,764,800 000
1931	569,790,000	2,596,810,000	3,166,600,000
1932	285,875,000	2,175,825,000	2,461,700,000
1933	417,065,000	2,138,035,000	2,555,100,000
1934	548,934.000	2,776,466,000	3,325,400,000
1935	733,130,000	2,916,870,000	3,650,000,000
1936	1,081,600,000	3,475,200,000	4,556,800,000
1937	1,468,200,000	3,945,200,000	5,413,400,000
1938	892,600,000	3,470,600,000	4,363,200,000
1940	1,677,700,000	3,904,800,000	5,582,500,000
1948	15,670,000,000	12,160,000,000	27,830,000,000
1950†	1,351,000,000	10,504,000,000	11,855,000,000
1953†	1,796,000,000	12,585,000,000	14,381,000,000

*Includes fuels—coal, natural gas, natural gasoline, petroleum. †Continental U. S. only.

INVENTIONS

PRIMITIVE man became safely established in his supremacy over the lower animals when he invented the bow and arrow. Since that prehistoric time, millions of inventions have been made, each adding a part to the total sum of knowledge by which mankind is gradually achieving mastery of space and control of the forces of nature. Some inventions are of trifling importance; others are so fundamental that their development affects the lives of all civilized people. The history of human progress has been marked by a series of epoch-making inventions.

At Ghent, in Flanders, on December 14, 1814, a treaty was signed which formally declared at an end the War of 1812 between England and the United States. Nevertheless, fighting was still going on in Louisiana 59 *days* later, because news of the treaty had not yet arrived. Few examples could more strikingly illustrate the progress of invention during the last century. Today, an event of similar importance could be known throughout the country in less than 59 *minutes*.

An invention is considered to be any new and useful machine, art, manufacture, or composition of matter, or any new and useful improvement thereon. All civilized nations recognize the right of an inventor to his product, and, when all requirements have been fulfilled, will issue a written contract or *patent*, guaranteeing to him the exclusive right to the use of his invention for a definite period of time. The life of a United States patent is 17 years. Approximately two million patents have been issued by the United States patent office. Comparatively few have shown themselves to be valuable.

SOME NOTED INVENTIONS OF MODERN TIMES

Certain inventions have proved to be of special importance because of their marked influence upon the welfare and the progress of mankind. Talking machines, telephones, and motion pictures, for example, are so much a part of our daily life that the wonderful principles governing their operation usually receive but little attention. Some of the more noteworthy of these inventions are given special treatment in the articles that follow.

Air Brake. A device, invented by George Westinghouse, Jr. in 1869, for applying the brakes to the cars of a railroad train by means of compressed air. Although the original system has been greatly improved in many ways by Westinghouse and others, the following description applies to the mechanism common both to passenger and to freight trains.

Each car is equipped with a *brake cylinder*, in which there is a piston connected to the brake shoes by a rod; an *auxiliary reservoir* to hold compressed air; a *triple valve*; and a train pipe with flexible couplings at each end. On the locomotive, in addition to its own brakes, are a steam driven *air compressor* which supplies air to the whole system, a *main air reservoir*, and the *control valve* operated by the engineer.

Under normal conditions, equal pressures of about 70 pounds are maintained in the train pipe and in the auxiliary reservoirs, and this condition of equal pressure holds the triple valve in a position closing the brake cylinder. To *set* the brakes, the engineer allows air to *escape* from the train pipe, thus reducing the pressure below that of the auxiliary reservoir. The triple valve then changes so that air enters the brake cylinder and forces the brake shoes against the wheels.

To *release* the brakes, the engineer allows air from the main reservoir, which has about 110 pounds pressure, to enter the train pipe until it again has a pressure equal to that in the auxiliary reservoir. The triple valve then resumes its normal position and the pressure is removed from the brakes. It is obvious that, if the coupling of a car becomes detached or broken, the train pipe pressure is lowered and the brakes are immediately applied.

This system has been of great importance in the development of the railroads because it allows the engineer to have complete control of his train, and permits of quick stops at high speed, either in an emergency or under ordinary running conditions.

Airplane, or **Aeroplane.** A heavier-than-air flying machine that flies because of the lifting effect of *moving* air upon a surface inclined to the wind at a small angle. The necessary movement of the air is relative to that of the airplane. For example; a speed of about 35 miles per hour *with respect to the air* is generally required before a flying machine can leave the ground. If the air is still, the machine will have to travel along the ground at 35 miles per hour, but, if a 20-mile wind is blowing, the machine can rise when moving into the wind at only 15 miles per hour.

Airplanes are usually classified, according to the number of their supporting surfaces, as *monoplanes* or *biplanes;* the latter type is becoming less common. The planes are not flat, but are curved upward, with the greatest curve near the front edge. A two or three bladed propeller at the front is driven by a gasoline motor. The larger military and cargo planes have two or four engines.

Among notable attempts to solve the problem of artificial flight was the work of Lilienthal and Chanute, with gliders; and of Ader, Maxim, and Langley, who, with the aid of their respective governments, built power driven machines which were usually destroyed by accidents at the first trial.

Orville and Wilbur Wright, bicycle manufacturers of Dayton, Ohio, were interested in aviation, and they found after many tests that the current theories were partly correct and partly guesswork. The Wrights devoted their attention chiefly toward a means of securing stability of a machine when in the air. They succeeded in developing a system of maintaining balance and control by bending or warping the ends of the planes, and using an elevating rudder in front. On December 17, 1903, they achieved flights of from 12 to 59 seconds, Wilbur being the first to fly successfully in a heavier-than-air machine. Reports of this work traveled to Europe and encouraged the French school of enthusiasts to continue their efforts. Alberto Santos-Dumont was the first of these to succeed, when in 1906 he made flights of several hundred feet. The French airplanes differed from the Wright type in having a tail, which was not adopted by the Wrights until about seven years later. Glenn H. Curtiss, in America, developed a type of biplane, and in 1911 and 1912 he developed the hydro-airplane and flying boat, capable of rising from and landing on the water.

From 1908 the development of the airplane was very rapid, especially in France and Germany. Improved engines also supplied greater power although they weighed much less. Of these, the rotary engines are most peculiar because the cylinders are placed like the spokes of a wheel, and revolve around a fixed crank shaft. The motors commonly used average two pounds in weight per horse power; some racing motors are as light as .8 pounds per horse power.

In World War I airplanes carried machine guns and even small cannon. These guns were often geared to fire between the revolving blades of the propeller. In World War II the armament was greatly increased. Bombing planes can carry bombs weighing up to 4000 pounds. Photographic equipment is used for reconnaissance and for checking the damage done by bombing. Radio keeps the aviator in communication with other planes. By the use of gliders, engineless planes towed by another plane, an entire army may be transported by air and set down behind the enemy's lines. Since World War II the

development of jet-propelled planes, particularly the propellerless jet and the turbo-propeller jet, has given military planes supersonic speed. In September 1948 the U. S. Air Force F-86 made 670 m.p.h., while in July 1949 a naval jet reached 710 m.p.h.

Noteworthy aerial achievements include the first non-stop flight across the Atlantic Ocean, 1930 miles from Newfoundland to Ireland, in 16 hours, 12 minutes, made in 1919 by English aviators, Alcock and Brown; a discontinuous flight of 26,103 miles around the world in 365 hours, 11 minutes, of flying time, made in 1924 by U. S. Army Air Service planes; and an altitude record of 56,046 feet by Col. Mario Pezzi, an Italian, in 1938.

The first American passenger air line service was begun on November 1, 1920, between Key West and Habana.

Various types of airplanes have been built for vertical ascent. The most successful is the autogiro, invented in 1923 by De la Cierva, a Spaniard. It differs from all other heavier-than-air craft in the source of its lifting power. This lift is given, not by wings, but by four rotating blades hinged to a nearly vertical spindle and moving in a horizontal plane. They rotate by wind pressure, and are not driven by the engine, the sole function of which is to propel the machine. The autogiro can climb steeply and descend almost vertically at a speed less than a man with a parachute, thereby eliminating the hazards of landing which attend the usual type of airplane. Moreover, it is proof against falling into a spin, and can maintain itself in the air at a forward speed as slow as 25 miles an hour. See *Aeronautics, Transportation by Air.*

Airship. A dirigible balloon as distinguished from an airplane. Ordinary balloons were invented by the Montgolfier brothers in 1783, and in the same year Pilâtre de Rozier made the first ascension. Attempts were made, almost from the beginning, to control the direction of flight. However, the first successful dirigible was not built until 1852 when Henri Giffard propelled a balloon at six miles per hour by means of a three horse power steam engine. Alberto Santos-Dumont constructed 14 dirigibles. As all of the earlier airships were handicapped by lack of light, powerful motors, it remained for the Lebaudy brothers, Major Parseval, and Count Ferdinand von Zeppelin to develop dirigibles capable of fulfilling the requirements for military use.

Dirigible balloons may be classified as rigid, semirigid, and nonrigid. The rigid type has a strong skeleton or framework inside the envelope; the semirigid is held by a network of wires and rods; the nonrigid is merely a large bag of gas. Successful development of the rigid type is due largely to Zeppelin, whose airships were all rigid.

The zeppelin was developed commercially for mail and passengers before World War I and in that war was used for bombing expeditions. The United States tried dirigibles, but gave them less attention after several accidents. They proved of great value, however, in World War II in combating submarines. Captive balloons were used for observation during World War I, and, in World War II, to support cables and nets for air raid protection. Blimps are non-rigid airships. A U. S. Navy blimp set a world record in 1954 by staying aloft more than 8 days.

The lifting power of airships has customarily been provided by the use of hydrogen, although in recent years helium has been increasingly employed. The buoyancy of helium is somewhat less and the cost is higher, but it has the merit of not being inflammable. This advantage of helium received a tragic confirmation in 1937, when the German zeppelin *Hindenburg* was destroyed by flames, with most of its passengers, its hydrogen having ignited from an unknown cause as the craft was mooring at Lakehurst, N. J. See *Airship Transportation.*

Amplifier. This is a general term applied to devices for magnifying variations in electric currents. The commonest form is the three-electrode vacuum tube. It has made possible such recent achievements as transatlantic radiotelephony, phototelegraphy, television, speaking motion pictures, a radically improved type of phonograph, and the "loud speaker."

The idea is already familiar that the sound variations constituting speech or music can be rendered as equivalent grooves on the record of a phonograph and then reconverted into sound. It is equally true that a modulated electric current can be produced which will represent such sound variations. The current may also represent light variations, through the agency of the photoelectric cell, the action of which is explained under *Phototelegraphy.* The amplifier is used to magnify the modulated electrical current to such a degree that, when this is converted to equivalent sound or light variations, the results will be easily heard or seen.

In speaking motion pictures, sound is converted to an equivalent band of light and shade, which is placed so accurately beside the pictures on the film that, on reconversion to sound, it produces an effect remarkably close to real life. The amplifier is essential to the process. Phonographs also owe much to the amplifier, both in improving the quality, and in enlarging the volume, of the sound reproduced.

Automobile. A self-propelled, four-wheeled vehicle designed to travel on highways. As steam and electric automobiles comprise less than 2 per cent of the total number, the term refers, when used without qualification, to a motor vehicle propelled by a gasoline engine. In Great Britain, gasoline is commonly called *petrol*; in Germany, *benzin*; and, in France, *essence de pétrole*, or simply *essence.*

Most standard automobiles of today consist essentially of a steel frame, attached through springs and axles to four pneumatic tired wheels. A four-cycle gasoline engine is mounted at the front, just behind a radiator through which water for cooling the engine is pumped. By means of a *clutch* operated by a left-foot pedal, the flywheel may be connected with the *transmission gears* which transmit the power through a driving shaft to bevel and differential gears attached to the middle of the rear axle.

Speed of the car is varied by shifting from one to another of the transmission gears, and by changing the amount of fuel supplied to the engine. The *differential gear* permits the rear wheels to revolve at different rates when the car rounds a curve and the outside wheel must move faster than that on the inside. The engine is started by means of an electric motor which receives power from a storage battery and is geared to the flywheel. When the engine is running, the battery is charged by a generator driven by the fan belt.

The front axle does not turn, but the wheels are attached to it by movable joints which are connected by a bar called a tie rod. The bottom of the post on which the steering wheel is mounted is fitted with a screw thread which causes a vertical *steering arm* to move forward or backward. This movement is transmitted to the *steering knuckle* by a rod.

The engine usually has from 4 to 12 cylinders, runs at from 800 to 4000 revolutions per minute, and weighs from 5 to 15 pounds per horse power. Some of the speed records which have been made are: 1 mile in 17.7 sec.; 10 miles in 4 min. 9.31 sec.; 50 miles in 26 min. 23.4 sec.; 100 miles in 54 min. 17.8 sec.; and 500 miles in 5 hr. 7 min. 26 sec.

It is probable that Siegfried Markus, a German, should be called the inventor of the gasoline automobile, for in 1875 he built a crude machine which carried him about the streets. Gottlieb Daimler is often called the "father of the automobile" because of the great improvement which he made in the gasoline engine, about 1884. In 1885 both Daimler and Karl Benz used gasoline engines to propel bicycles and tricycles. The first commercially manufactured car, made by Panhard and Levassor in 1891, used the Daimler engine. But the first automobile imported into the United States was a Benz, taken to the Chicago World's Fair in 1893.

The first successful American automobile was built by Charles E. and J. Frank Duryea in 1892. Henry Ford built a car in 1893, and Elwood Haynes in 1894. In 1896 these three cars and the imported Benz were the only ones in the United States; in 1948 there were 33¼ million passenger cars alone. The first public auto race was run in 1894 from Paris to Rouen; the first in the United States took place in 1895 from Chicago to Waukegan. The commercial history of gasoline automobiles in the United States may be said to date from 1898, when a Winton was the first car sold. The first commercially successful Ford was sold in 1903.

In 1879, George B. Selden, of Rochester, N. Y., applied for a fundamental patent on a road vehicle driven by a gasoline motor. The application was kept active, by perfectly legitimate methods, for 16 years, when a patent was taken out in 1895. Because of this patent, many of the leading manufacturers were forced to pay royalties of from .8 to 1.25 per cent of the retail price. Others refused to pay and, led by Henry Ford, carried the question to the United States circuit court of appeals which in 1911 decided in their favor and freed the industry of this burden. See *Internal Combustion Engine.*

Colorscope. This is an electrical device for matching colors. Each of two colors to be matched is placed before a photoelectric cell, which generates an electric current proportional in intensity to the light waves received by the cell. When the colors are exactly matched, the two currents are equal and register zero on a galvanometer. The instrument was invented by Dr. H. H. Sheldon and exhibited first in 1930.

Compass. A device designed to hold a certain definite direction, from which a ship or airplane may establish and maintain a true course. Prior to the 20th century, the only compass known was the magnetic, or *mariner's*, compass. This acted imperfectly in the presence of magnetized iron on ships, and the gyrocompass was devised to overcome this difficulty. The development of aeronautics demanded a different type. Several have been invented, of which the earth inductor compass is best known.

Magnetic Compass.—The action of this kind of compass depends on the magnetic force of the earth. The earth is a huge magnet, one pole being approximately at 70° N. lat. and 97° W long. and the other at 72° S. lat. and 153° E. long.

One or more magnets, or needles, are mounted to move in a horizontal plane within a circular framework, the flat upper side of which is called the compass card. The magnet sets itself in line with the earth's "lines of force," thereby pointing in the general direction of the earth's magnetic poles. In order that motion may be as free as possible, the needle with its framework may be floated on a nonfreezing liquid within the compass bowl. This is the so-called liquid compass. In the dry compass, the entire weight of the needle and framework rests on a pivot within the bowl.

Since the compass needle points to the magnetic poles of the earth, not the geographic poles, it shows, for most places, a variation, or declination, from the true north and south. This angle of variation is known as the compass error. To enable navigators to make necessary corrections for declination, magnetic charts are prepared. They are revised periodically, since the location of the magnetic poles varies slightly from time to time.

Gyrocompass.—In the construction of this nonmagnetic compass, use is made of the fact that the axis of a freely suspended gyroscope wheel will tend to turn parallel to the earth's axis of rotation.

The most successful type of gyrocompass is that known as the *Sperry compass*, perfected about 1910 by Elmer A. Sperry.

The instrument consists essentially of a gyro wheel mounted so as to be free to spin, free to tilt about a horizontal axis, and free to turn about a vertical axis. The gyro wheel is about 9 inches in diameter and weighs 50 pounds. It revolves in a vacuum inside a metallic casing at a speed of about 8500 revolutions per minute.

Upon starting the gyro wheel in motion, it gradually assumes a position parallel to the earth's axis. In the course of a few hours it establishes a north and south direction, which is maintained with marked accuracy so long as the wheel is kept rotating at the right speed. As usually mounted, the instrument carries a compass card similar to that of the magnetic compass. See *Gyroscope*; also *Magnetism*, page 945.

Earth Inductor Compass.—This instrument was invented by scientists in the United States bureau of standards. It consists of a generator, a direction controller, and a steering indicator. The generator is pivoted on a vertical axis. It contains two pairs of brushes, which are revolved in the magnetic field of the earth at the rate of 1400 revolutions per minute. Each pair of brushes collects a direct current.

When the generator is oriented properly, the currents are equal and register zero on a galvanometer, known as the steering indicator. If the generator is oriented at an angle to this position, one current is stronger than the other and deflects the steering indicator to the right or left. The direction controller is a crank for orienting the generator by reference to a compass card.

If the aviator wishes to change his direction, he moves the direction controller to the compass point indicating the desired direction. This changes the current strengths and deflects the steering indicator to the left or right until the plane is headed in the direction for which the control crank is set. To continue in this direction the aviator must steer so that the steering indicator remains at zero.

Boxing the Compass.—Around the outer edge of the circular compass card the degrees are marked from 0 to 360, beginning at north and numbering in the same direction as the hands of a clock move. Besides being marked in degrees, the compass card is marked also in points (11¼°), half points, and quarter points. The four primary directions—north, south, east, and west—are called the *cardinal* points. The points intermediate between these—northeast, southeast, southwest, and northwest—are called *intercardinal*. The point halfway between north and northeast is north-northeast, that between northeast and east is east-northeast, and so on for like subdivisions. Other points are named north by east, northeast by north, and similarly, according to the following table.

COMPASS CARD

N.	E.	S.	W.
N. by E.	E. by S.	S. by W.	W. by N.
N. N. E.	E. S. E.	S. S. W.	W. N. W.
N. E. by N.	S. E. by E.	S. W. by S.	N. W. by W.
N. E.	S. E.	S. W.	N. W.
N. E. by E.	S. E. by S.	S. W. by W.	N. W. by N.
E. N. E.	S. S. E.	W. S. W.	N. N. W.
E. by N.	S. by E.	W. by S.	N. by W.

Composing Machine. A machine which sets either type or type molds and arranges them in lines of the proper order and length for printing. The true typesetting machine has been almost entirely supplanted by those which set type molds from which castings are automatically produced. Of this second class, the linotype and monotype are best known, and, because of their extensive use in printing, are of greatest economic importance.

The linotype was invented in 1885 by Ottmar Mergenthaler, a German living in Baltimore. It is operated similarly to a typewriter, from a keyboard having 90 or more keys. When a key is pressed, the corresponding brass matrix is released from its compartment in a magazine and falls on a moving belt which carries it to a collector. At the end of each word a wedge-shaped spacer is inserted. When

the molds for one line of type are assembled they are carried to a casting wheel and placed in front of a slot.

At this time the wedge-shaped spacers are pushed up between the matrices so that the words are spread until they exactly fill one line. A pump then forces molten type metal into the slot and against the matrices. The metal cools rapidly, so that the molds may be almost instantly removed and redistributed into the proper section of the magazine. The slug of metal is trimmed to exact size between knives and placed with others to form a column of type. Should any error be discovered, a whole line must be reset. Linotype machines may be operated electrically by the so-called teletypesetter, first used in 1928. This device makes use of ticker tape perforations transmitted by telegraph. These, corresponding to words, are fed into the teletypesetter, which depresses the proper keys of the linotype keyboard so as to reproduce the words of the message.

The monotype, as indicated by its name, casts each letter separately. It also differs from the linotype in that the composing and the type casting are done on different machines. The composing mechanism has a keyboard of 225 keys which cause holes corresponding to the proper letter to be punched in a moving strip of paper. When words have been set almost to fill a line, an automatic indicator shows the operator what size space is required to *justify*, or exactly fill the line. When this ribbon is passed through the casting machine, each type is cast separately and delivered in proper order of lines.

Dynamo and Electric Motor. The dynamo, sometimes called a generator, is a machine for producing electric current. It is driven by mechanical power, usually steam or water power. The same machine, when reversed in action, is an electric motor. Driven by an electric current, it is capable of performing work, such as driving machinery or providing traction for cars. The dynamo and motor are sometimes referred to under the single term dynamo-electric machine.

Michael Faraday in England discovered, in 1831, the principle on which the dynamo is based, namely, that, if the lines of force between the poles of a magnet are cut by an electric conductor moving across them, an electric current is induced in the conductor. The dynamo consists essentially of one or more coils of insulated copper wire about a ring of soft iron, which revolves rapidly on its diameter between the poles of a magnet. The revolving part is called the *armature*. The ends of the wire lead to metal *collecting rings*, from which two metal brushes, connected through an external circuit, pick up the current. In this simple form, at each complete revolution of the armature, the current flows first in one direction and then in the opposite direction. The change from one point of maximum intensity in one direction to the next in the same direction is called a cycle. By adding two or more rings to the armature, a so-called two or many-phase current is produced, in which, for every revolution of the armature, there are two or more points of maximum current intensity in each direction.

If the collecting rings are replaced by a *commutator*, that is, by insulated ring segments placed opposite each other, a one-direction, or direct, current may be produced. It will fall to zero once during each revolution of the armature, but this pulsation may be virtually eliminated by increasing the number of armature rings and coils.

The magnets used for the early dynamos were permanent magnets, but later the electromagnet was substituted. For alternating currents, this is actuated by a separate circuit, but, with direct current machines, the current produced by the dynamo may be used in whole or part to actuate, and regulate the strength of, the magnet.

Designs of modern dynamos differ widely. One or many magnets may be used and either the magnets or the armature may revolve, the other remaining stationary. Motors have been adapted to innumerable uses, including electric railways, elevators, machine shops, and household appliances.

For long distance transmission, the alternating current is almost exclusively used in America, since this current may be readily transformed to a high potential and so transmitted over a much smaller copper or aluminum conductor than would otherwise be necessary. At the point of use, the current is "stepped down" by transformers and distributed to the users. It is common practice to transmit in this way currents of 220,000 volts over hundreds of miles.

When the peak requirements for electricity at different using centers occur at different times, economies can be effected by connecting many generating stations and consuming centers, thereby making available the surplus from any station for the center needing it. To such systems the term *superpower* has been applied.

Electric power is generated most economically where coal, natural gas, oil, or water power are readily available. The chief generating centers or regions in the United States include Niagara Falls; New York City; Chicago; Los Angeles; San Francisco; Pittsburgh; Muscle Shoals, Ala.; Butte, Mont.; and the North Pacific states. The electric power produced and used in the United States is over 60 billion kilowatt hours and the number of customers exceeds 15 million. Each customer uses, on the average, over 42 incandescent lamps.

Electron Tube. A vacuum tube very similar in appearance to an incandescent electric lamp, but generally containing, in addition to the filament, a flat metallic plate and an irregularly shaped grid. When the filament is heated to glowing by means of an electric current, it emits *electrons* or negative charges of electricity, which ordinarily would return to the wire. If, however, a battery is connected to the filament and to the plate so that the plate is *positively* charged, the electrons will be attracted to the plate and a current of electricity will flow through the vacuum and around the circuit. If the plate is negatively charged, no current will flow; consequently, when connected with an alternating current, the tube acts as a valve which allows the electricity to pass through in one direction only, thus producing a direct current.

The grid is placed between the filament and the plate, so that, if a charge of varying strength is applied to the grid, corresponding changes will also be imposed on the current flowing through the tube. A weak current is thus enabled to control one that is much stronger. Because of these properties, electron tubes are used as relays, which make long-distance telephony possible; as converters, by which direct current may be obtained from an alternating source; as detectors, which amplify weak radio telegraph or telephone signals and make them audible; and as transmitters, which can be used to send out a continuous train of ether waves of almost any desired frequency.

The first patent for a simple electron tube was issued to J. A. Fleming in 1904. Notable improvements were made later by DeForest and Langmuir. See *Amplifier*, *Radio*.

Fathometer. An instrument for measuring the depth of water in the process of echo sounding. An electric oscillator on a ship makes a characteristic sound which is transmitted to the water. The instrument clocks the time of its production and the time when the echo, reflected from the floor of the ocean, returns to the instrument. Since sound travels about 4700 feet a second in water, the depth is calculated from the lapse of time, an indicator showing the result. By thus making possible the almost instantaneous recording of the contour of the sea floor, the instrument multiplies the speed and the economy with which the ocean bed can be mapped.

Gyroscope. A mechanical device invented early in the 19th century, and at first used chiefly to illustrate certain laws of rotating bodies. It consists

essentially of a wheel with a heavy rim, mounted on an axis which is pivoted at both ends within a light circular framework. Instruments of this type are frequently sold as toys under the name *gyro-top*. The more scientific form of gyroscope is so mounted that it is free to revolve about three mutually perpendicular axes, whose common center is the center of gravity of the spinning wheel.

When the wheel of a gyro-top is made to rotate rapidly,—usually by pulling away a string coiled about the axis,—two characteristics are noticeable. First, any attempt to change the direction of the axis meets with a surprising amount of resistance. Second, this resistance is so great that, if the gyroscope is turned on its side and supported at only one end, it will not fall, but will move in a horizontal circle about its point of support, apparently in contradiction of the laws of gravity. This circling movement, known as *precession*, takes place in the direction opposite to that in which the wheel is rotating.

A gyroscope resists any force which tends to change the direction of its axis for the same reason that the passengers on a moving train are jerked forward when the brakes are suddenly applied; that is, because of inertia. The amount of inertia depends upon the speed of the wheel, its mass, and the average distance of the mass from the axis.

The act of precession is explained by the fact that a body moving under the influence of two forces must respond to both. The wheel which is rotating on one axis is also pulled downward because of gravitational attraction. The gyroscope then tends to place its axis parallel to a third, intermediate axis, and, as a result, moves backward. As the third axis also changes its position at the same time, precession continues as long as the inertia of the wheel is sufficient to prevent falling.

The earth acts as a huge gyroscope, spinning on an axis which points toward the polestar, and also rotating around the sun. As these two axes of rotation do not coincide, the earth, like the top, is forced to precess, thus causing the pole to move west in a small circle which is completed once in 25,900 years. For this reason, the star which indicated true north when the Egyptians built the pyramids is not the polestar of today.

The tendency of a gyroscope to rotate in one plane has been utilized for many purposes. By means of a gyroscope, Léon Foucault, about 1852, was able to demonstrate the rotation of the earth.

Gyroscopes are no longer scientific toys. The *Brennan monorail car* is capable of retaining perfect equilibrium upon a single rail, because of two heavy, motor-driven gyroscopes, which spin in opposite directions. Somewhat similar devices are used upon ships to prevent rolling, while, for ice-breaking vessels, the gyroscope is fastened so as to cause the vessel to roll. Torpedoes are held to their course by means of a controlling gyroscope which begins to spin when the torpedo is released. Gyroscopic apparatus for stabilizing airplanes is also in use. This stabilizing influence becomes more comprehensible in the light of Newton's third law of motion—to every action there is an equal and opposite reaction. Probably the most important application of the gyroscope is the gyrocompass which indicates true north regardless of any change in the magnetic field. See *Gyrocompass*.

Internal Combustion Engine. A heat engine which performs work because of the expansive energy of hot gases formed within a closed chamber. The fuel used may be a natural or an artificial gas, a volatile liquid such as gasoline or alcohol, a poorly volatile liquid such as kerosene, or heavy oils and tars. An engine is usually named for the fuel to which it is best adapted.

In order that such engines may operate continuously it is necessary that the fuel, together with the proper amount of air, be placed in the cylinder, compressed, burned, and allowed to expand, after which the spent gases must be removed and the series of operations repeated. When these processes are performed during four strokes of the piston the machine is called a *four-cycle* engine.

The action of a four-cycle gas or gasoline engine is as follows: At the first, or *intake stroke*, with the exhaust valve closed and the intake valve open, the piston moves away from the closed end of the cylinder, and fuel is sucked into the chamber. With both valves closed, the piston then returns on the *compression stroke* which forces the confined gas into a small space. The compressed gas is then ignited by means of an electric spark, and the chemical action of burning raises the temperature so that the gases expand and force the piston outward. After this *power stroke*, the exhaust valve opens and the piston returns on the *exhaust stroke*, forcing out the burned gas.

In a *four-cycle* engine there is one power stroke during two revolutions of the flywheel. In a *two-cycle* engine the same operations are performed during two strokes of the piston, so that there is an explosion at each revolution of the crank shaft. This is usually effected by making the crank case gas-tight and filling this space with the proper mixture of gas and air. At the end of the power stroke, two valves or ports are uncovered. One opens to the exhaust and the other to the crank case, which is under slight pressure, so that the burned gas flows out and fresh fuel is forced into the cylinder. As the piston returns, it covers the valve openings and compresses the gas, which is then ignited and the series repeated.

It is obvious that power thus imparted by a blow on the piston at every second or fourth stroke will be jerky. In order to prevent excessive vibration, a single-cylinder engine usually has a heavy flywheel, while larger engines have several cylinders connected to one crank shaft and firing in rotation so that the pressure is more continuous. For automobile and aircraft engines, four and six vertical cylinders in a straight line, or eight and twelve cylinders in two equal rows inclined so as to form a V, have been most generally satisfactory. In some aircraft engines vibration is almost eliminated by having the cylinders rotate like a flywheel about a fixed crank shaft.

In gas engines the proper amounts of gas and air are easily adjusted in a mixing chamber; in the gasoline engine a jet of the volatile liquid is sprayed into a current of air as it is drawn through a *carburetor* into the cylinder. With kerosene or other less volatile fuels, a hot bulb or other form of heating device is often necessary. Ignition is almost universally caused by means of an electric spark produced by an induction coil or a high tension magneto.

The *Diesel* type of engine, which operates with heavy hydrocarbons such as tar oil, usually requires no ignition system when once in operation. Instead, air is drawn into the cylinder and highly compressed. The great pressure raises the temperature of the air to such a degree that, when the fuel is forced into the cylinder by means of a pump, spontaneous combustion occurs. The great advantage of the Diesel engine due to the low cost of fuel is partly offset by the heavier construction necessary to provide for the great pressure.

A theoretical plan for the four-cycle engine was originated by Beau de Rochas in 1862. The same plan was independently invented by Nicholas A. Otto, of Cologne, and was developed into a practical machine in 1877.

The power which a four-cycle engine will deliver is generally calculated by means of the formula,

$$\text{DHP} = \frac{\text{D}^2 \times \text{S} \times \text{RPM}}{18{,}000}$$

For example: the *delivered horse power* (DHP) of an engine having a 3-inch bore (D), a 4-inch stroke (S), and running at 1000 *revolutions per minute* (RPM) equals $3 \times 3 \times 4 \times 1000 = 36{,}000 \div 18{,}000$ or 2 horse power. The power of a two-cycle engine is obtained by dividing by 13,500 instead of 18,000.

For multicylinder engines the result is multiplied by the number of cylinders.

Microscope. An optical instrument consisting of a lens or combination of lenses, used to obtain a magnified image of minute objects. A *simple microscope* consists of a single convex lens composed of one or more parts, and is often called a magnifying glass. Instruments of this class have been known and used for centuries.

A *compound microscope* is composed of two lenses,—the objective and the eyepiece, or ocular,—mounted in opposite ends of a metal tube. The objective, being of short focus, is placed close to the object, of which it produces a magnified image within the tube. The eyepiece, which is generally of low power, magnifies this image a second time.

The first instrument of this type seems to have been made, about 1590, by Zacharias Janssen, a native of Holland. The magnifying power of a compound microscope depends on the power of the objective, the power of the eyepiece, and the distance between the two. It would thus seem possible to produce images of any magnification, but greatly enlarged images lack detail and sharpness, so that a power of 2000 diameters is seldom exceeded for visual work. It should be remembered that, as area increases with the square of the diameter, 2000 diameters means 4,000,000 times the area of the object.

The usual form of compound microscope consists of the lenses in an adjustable tube fastened above a platform having an opening in the center, across which the object is to be placed. Beneath the platform is a mirror which reflects rays of light from some source of illumination upward through a condenser. This, as its name indicates, concentrates the light from the mirror into a small bundle of rays which pass up through the stage, object, and lenses. For opaque objects the lighting must be from above.

Eyepieces which magnify from 4 to 20 diameters are generally used with objectives having a focal length of ⅔, ⅙, or 1/12 inch and a corresponding power of about 10, 44, and 90 diameters. A 1/12 inch objective with a 10-power ocular would therefore produce a magnification of 900 diameters. To prevent loss of light when using objectives of very short focus, a drop of cedar oil or similar fluid is placed so that it touches both the object and the lens. Objectives constructed to operate under such conditions are called *oil-immersion* lenses.

No microscope can show directly the true form of any object smaller than one-half the wave length of light by which it is seen. Much smaller objects, however, may be observed indirectly by means of two devices—the *ultramicroscope* and the *electron microscope.*

The ultramicroscope consists of an arrangement by which minute objects may be made visible as spots of light against a dark field. Light is sent across the field instead of up through it, so that any ultramicroscopic particles reflect light and are seen like dust in the air of a dark room through which a ray of sunshine is passing. In this way particles about six-millionths of an inch have been detected.

The electron microscope, invented in 1938, is a revolutionary contribution to microscopy. It employs the principle that electrons are, like light, reflected from what they strike. The electrons are focused, by a magnetic field within a cylindrical coil of electric wires, upon a glass plate treated chemically so as to become fluorescent where the electrons converge. The fluorescence reproduces the pattern of the minute object scanned.

The instrument is steel, about five feet high, with glass windows. Its interior is a vacuum. Within the vacuum a cathode-ray tube sends out a stream of electrons which strike the object to be scanned. Those reflected by the object are picked up by the magnetic field created by the coil of electric wire and are converged upon the chemically treated glass. The image may be projected in enlarged form on a phosphorescent screen.

Motion Pictures. A series of separate pictures projected upon a screen, and changed so rapidly that the eye receives the effect of continuous motion. This effect is due to a physiological property of the eye called *persistence of vision*, which causes an image to remain apparent for about 1/5 second after it has really disappeared. Standard pictures are projected at the rate of 16 per second. Each picture is shown perfectly still for 5/96 second, and the screen is dark for 1/96 second three times in the period during which one picture passes before the source of illumination.

After the invention and the development of photography, many investigators worked over the problem of picturing motion. Edward Muybridge, using methods devised by John D. Isaacs about 1872-73, studied the movements of a trotting horse by means of a row of 24 cameras, exposed in order as the horse passed before them. The photographs were projected in such a way as to simulate movement, but his apparatus was necessarily clumsy as he had only glass plates. A light, flexible, continuous film was needed as a substitute for the glass, and this was invented by Goodwin and produced by Eastman.

In 1894, Edison placed on the market his kinetoscope, which successfully depicts motion by means of photographs printed on an endless strip of celluloid film. But the pictures in this machine can be viewed by only one person at a time. In 1895, Thomas Armat of Washington was the first to produce motion pictures by modern methods. The essential point in the improvement made by Armat, with whom C. F. Jenkins was for a while associated as experimenter, was a device by which the film moved intermittently, having periods of rest and illumination largely in excess of the period of movement from image to image. Other projectors were made and exhibited in 1896. From 1897 to 1907 a violent war of litigation over patents disturbed the industry.

Motion picture film is so standardized that pictures made by one company may be exhibited on any machine in the world. It is usually prepared in strips 200 feet long by 1⅜ inches wide. On each side there is a margin of 1/16 inch in which perforations are cut. There are 16 photographs and 64 perforations to the foot. Each picture is thus 1 x ¾ inches. One thousand feet is the standard length to fill one reel.

The motion picture camera is equipped with a very fast, high grade lens of 2 to 3 inch focus. The shutter is a revolving, perforated disk driven by a crank which the operator usually turns at the rate of two revolutions per second. Eight exposures are made at each turn of the handle. Within the box the film passes from the original coil over several rolls. It is carried behind the lens, over other rolls which preserve an even tension and prevent tearing, and finally is rewound on a second reel. A delicate mechanism, catching in the perforated edges, holds the film firmly while the shutter is open and jerks it forward just ¾ inch when the shutter closes.

The exposed film is wound spirally on racks and is developed in huge tanks in a dark room. From the negative, any number of positives may be printed at the rate of from 5 to 8 pictures per second. These are made on similar strips of film coated with an emulsion which is not so sensitive but which gives greater contrast.

In the projecting machine, an electric arc is the usual source of illumination. The light passes first through heat filters and condensing lenses, and then through the film and the projecting lenses to the screen, where the picture is enlarged about 10,000 times. Most films are made of celluloid and are consequently highly inflammable. Non-inflammable films may be produced from cellulose acetate, but even these are melted by the heat from the arc if they are held too long between the lenses. The used and the unused reels of film are therefore held in asbestos lined boxes, and a safety shutter is

provided, which automatically protects the picture from the light if the machine accidentally stops. The mechanism for moving the film is similar to that used in the camera, but the shutter disk which revolves once for each picture has two large openings instead of a single small one.

Animated cartoons are made by photographing a great number of single drawings each showing a different stage of the action. Colored "movies" are made by exposing through a series of color screens and projecting through similar screens in reverse order—the technicolor process. These pictures must usually be shown at about twice the normal speed. "Talking movies" depend for their success on the exact timing of picture and voice. This problem was solved by the use of the photoelectric cell and the amplifier. See *Amplifier*, *Photoelectric Cell*.

The motion picture industry as organized today has three principal divisions: production, distribution, and exhibition. Forty-five years after its birth, in about 1895, the industry in the United States had grown to such proportions that it employed nearly 300,000 people. Nearly one-fifth of the total of the world's motion picture theaters, approximating 100,000, are in the United States. Russia is credited with the largest number, about 30,000. It is estimated that one-eighth of the world's population attend motion picture theaters each week.

The first studio for making motion pictures was a little, black, paper covered shanty built by Edison near his factory in New Jersey. Today a whole community in California is given over to the staging and filming of picture stories. This community, Hollywood, in Los Angeles, produces over two-thirds of the world's output.

Phonograph. An instrument which records and reproduces sound by means of a moving diaphragm that is caused to vibrate by sound waves in the air. A stylus or chisel-like needle connected with the diaphragm is allowed to trace or engrave a spiral line upon a revolving cylinder or disk. The slightest movement of the diaphragm is thus recorded on the path of the needle. To reproduce the sound, the record is again revolved at the same speed and a smooth needle attached to a second diaphragm is allowed to travel over the engraved line. The irregular motion of the needle then forces the diaphragm to vibrate and produce sound waves similar to those first recorded.

The first phonograph, or "talking machine," was invented by Thomas A. Edison in 1877. It consisted of a cylinder having a spiral groove cut on its surface, and mounted on a screw passing through its center. A smooth layer of tin foil was placed on the cylinder, which was then revolved so that the groove was always under the point attached to the diaphragm. The movements of the diaphragm thus produced irregular indentations in the tin foil, which would impart similar vibrations when the stylus was again allowed to travel over the cylinder.

The *graphophone*, invented in 1885 by Chichester Bell and Charles Tainter, improved on the phonograph by substituting a wax tube for the tin foil. The *gramophone*, invented by Emile Berliner in 1887, differed fundamentally from the first two, in producing a tracing of the sound waves as a zigzag line of even depth, rather than an up-and-down engraving. This system was found more satisfactory on disks than on cylinders. Modern practice tends toward the use of wax cylinders for temporary records, such as those used for commercial dictation, and of hard disks for all permanent records. Some machines employ reproducing needles which are used but once, while others have a permanent diamond or sapphire point.

In preparing commercial records the original is recorded directly upon a wax tablet. This is carefully covered with graphite in order that it may conduct electricity, and is then electroplated with copper. The copper shell is stripped from the wax and then nickel-plated in order to harden it. From this *master record*, a second, mother record is prepared in the same way, and from the mother record several matrices are made which are used for molding the familiar commercial disks. These are generally composed of shellac, together with charcoal, barium sulphate, and other substances.

In the *auxetophone*, an ordinary record is used to control the action of a delicate valve which impresses the proper vibrations on a stream of air generated by an air compressor. The recorded sound is thus *reproduced* without the aid of a vibrating diaphragm.

Great progress has been made within the past few years in the recording and transmission of sound. A new accuracy and realism has been achieved by the introduction of high-fidelity (hi-fi) equipment, which reproduces sound with an amazing degree of faithfulness to the original. This has been accomplished largely by eliminating sound distortion caused by electronic deficiencies in the making of a record and in the transmitting equipment. Its popularity, especially among lovers of music, has proved a stimulus to the industry.

Photoelectric Cell. This device, often called the electric eye, is used for translating variations in the intensity of light into variations in intensity of an electric current. Since the electric current, properly amplified by electron tubes, can be made to perform innumerable operations, the photoelectric cell makes it possible to produce these results by changes in the light which falls on the cell. Possible applications are almost innumerable.

The effect of light on an electric current was first noted by Heinrich Hertz in 1887. Julius Elster and Hans Geitel constructed in 1890 the first photoelectric cell. In modern practice, this cell consists essentially of a glass bulb or tube, either evacuated of air or filled with an inert gas, such as argon or neon, having an anode of platinum or some other suitable metal. The cathode is usually a very thin coating of an alkali metal, such as potassium or cæsium, which has been found to emit particles of negative electricity, or electrons, when exposed to light. When an electric current is passed from the anode to the cathode, this current is decreased by the action of light on the cathode. This effect varies with the amount and the wave length (color) of the light, which is admitted through a small window. The current used is necessarily of extremely low voltage and must be magnified enormously by an amplifier before being put to effective use in the production of sound or the operation of mechanical devices. Another type of cell utilizes a property of selenium, which is a very poor conductor of electricity when in the dark but, when exposed to light, conducts an electric current much more readily.

Photoelectric cells differ in their sensitivity to light of different colors or wave lengths. Some are adapted to respond to infra-red light rays, which are invisible to the human eye. Such cells can "see" in the dark, and the resulting current fluctuations can be made to produce visible photographs of invisible objects.

The first important application of the photoelectric cell was in the production of audible motion pictures. It is the basic element in phototelegraphy and television. It may be used also for mechanically counting objects passing before its "eye," for sorting objects by their color, for analyzing and matching colors, for measuring illumination and ultra-violet radiation, for transforming the printed page into intelligible sound, and for picking up obscure or invisible light signals and performing operations in accordance with the signals. All these operations it can perform better than the human eye. With the development of television, it promises to enable man to see in the dark or through fogs.

Photography. The process of forming and fixing images of objects upon a sensitized surface by means of the physical and chemical properties of light. The question "Who invented photog-

raphy?" is often asked, but cannot be definitely answered because modern photographic methods have been developed by contributions from many minds.

J. H. Schultz, in 1727, made the first photographic copy of writing. In 1802, Thomas Wedgwood copied pictures by the action of light. Joseph Nicéphore Niepce produced the first permanent pictures in 1814. Louis Jacques Daguerre, in 1839, made public the details of his *daguerreotype* process of sensitizing a silver plate with iodine, and developing, with vapors of mercury, the image produced on exposure. The next year Professor John W. Draper of New York university made by this method the first photograph of a human face. William H. F. Talbot, in 1841, presented his calotype process, which permitted many copies to be made from one paper negative.

In 1851, Scott Archer introduced the process in which sensitive silver salts are produced in a film of *collodion* supported on a glass plate. The gelatin-silver bromide emulsion, which is the basis of modern dry plates, was discovered in 1871 by Dr. R. L. Maddox. In 1884, George Eastman patented a successful roll film of paper, and, in 1887, Rev. Hannibal Goodwin applied for a patent on a transparent, sensitive, celluloid-like pellicle which was the basis of the modern roll and cut film. Both films and glass plates are coated with a creamy yellow emulsion of gelatin containing the bromide and iodide of silver.

Modern photographic apparatus usually consists of a light-tight box or camera, equipped with a lens which focuses an image upon the sensitive surface of a plate or film when the shutter is opened. No change can be seen on the exposed plate until it is *developed* by immersion in an alkaline, oxygen-absorbing solution of pyrogallol, metol, or similar reducing agent. In this solution the plate gradually darkens and the image appears. But, as the parts of any object which reflect the most light cause the greatest change in the silver salts, a reversed image, called a *negative*, is produced, in which the high lights of the object appear dark, and the shadows, light. Developing is done in the dark or in a red light, which does not affect ordinary plates. The negative is next *fixed* with a solution of sodium thiosulphate, commonly called *hypo*, which dissolves all *unchanged* silver salts. After further washing in fresh water, the negative is dried. Satisfactory negatives are produced almost mechanically by the system of *tank development*, in which the exposed plates are treated with a developer of known strength, for a definite time at a fixed temperature.

The final step consists in making a positive *print* by placing sensitized paper behind the negative and exposing these to the light. The dark parts of the negative hold back more light than the lighter shadows, so that the resulting image has the same light values as the original object. The principal kinds of photographic paper are: those which are printed by artificial light, developed, and fixed in the same way as the negative; and ordinary *printing out paper*, which is exposed to the sun until the image appears, and is then fixed, washed, and often given further treatment to improve the color. Other types of photographic paper are the gum bichromate, platinum, and blue print.

Photographs in natural colors are generally produced by means of screens or filters which separate light into its red, green, and violet components. The finished photograph must usually be viewed through similar screens. The processes of Ives, Joly, Wood, and the Lumière brothers are best known. On the Lumière autochrome plate a permanent screen is formed by a layer of starch particles colored red, green, and violet and mixed in the proper proportions.

By use of highly sensitized film, photography will produce results which far outdistance the capacity of the human eye. Rays, for instance, invisible to the eye may nevertheless produce pictures from objects which appear to be completely in the dark. In astronomical work, by long exposure, stars are photographed which are completely invisible to the human eye. In warfare, photographs made from airplanes will reveal changes in enemy forces which camouflage conceals from the eye. X-ray photography is one of the most valuable aids to surgery. Another important use is the photographing of documents or pages of books. The pictures are produced on a very small scale in a non-inflammable film, from which they may be projected by a lantern on a screen. The so-called candid camera depends on the use of very sensitive films and high speed exposure.

Phototelegraphy. A process for sending photographs by telegraph or telephone, perfected in the Bell Telephone laboratories, New York City, about 1925. The apparatus consists of a transmitter and a receiver, which may be used at the ends of any telephone line. A positive film of the photograph to be transmitted is rolled into cylindrical form and inserted in the transmitter. This film is revolved, at the same time moving forward very gradually with a screwlike motion. A small intense ray of light is focused on the film and shines through it with intensities varying according to the lightness or shade of the portion traversed. The varying currents thus set up control a similar cell and a beam of light directed upon an unexposed photographic film at the receiving end which is geared to rotate synchronously with the film at the transmitting end.

Radar. This term means "radio direction and ranging," operating on the principle of high tension radio impulses sent out in a straight line and reflected directly back to the sending instrument. The time of travel gives the distance. This was the device used by the Allies to detect the approach of enemy aircraft and ships in World War II and to determine the distance (range) to enemy forces. A joint Army-Navy release proclaimed the existence of Radar April 25, 1943. The system operates with ultra-high-frequency radio waves and was discovered in September, 1922, by Dr. A. H. Taylor and Leo C. Young of the U. S. Naval Aircraft Radio laboratory. The battleship *New York*, in 1938, was the first ship to be equipped for its use, and British "locators" during the Blitz of 1943–45 operated on the same principle as Radar.

Radio. This term is used to describe the transmission and reception of signals by means of radiated electromagnetic rays (radio waves).

The utilization of radio waves for sending messages by code is known as radiotelegraphy or wireless telegraphy. It may be accomplished by a series of interrupted waves to indicate dots and dashes, as in wire telegraphy. To transmit the tones of the voice or music, a continuous wave is required. To produce such radiations, an alternating current of very high frequency is necessary. This is supplied by electron tubes. Communication of this type is known as radiotelephony, or more often simply as radio. See *Radio Broadcasting*.

The basis of modern systems of wireless or radiotelegraphy was laid down in 1864 when Clerk-Maxwell, by mathematical reasoning, predicted the existence of electromagnetic waves in the ether. In 1887 Professor H. Hertz proved by experiments that such waves existed, and later Edouard Branly and Sir Oliver Lodge each developed an instrument called a coherer, by which these waves could be detected. Hertz found that they could be produced in the ether by the discharge of an electric spark. The shortest of these waves is many times longer than the longest light wave, but they travel at the same speed, 186,284 miles per second.

Guglielmo Marconi, in 1895, was the first to combine the discoveries of earlier scientists into a practical method of signaling. In 1901 he signalled the letter S across the Atlantic. This achievement was surprising, since it meant that the waves must have changed their direction with the curvature of the earth. Professor Kennelly in the United States

and Dr. Heaviside in England later proved that the Hertzian waves were reflected by a layer of ionized atoms produced about 50 to 100 miles above the earth's surface by ultra-violet rays from the sun. The existence of this celestial mirror, the so-called ionosphere, makes possible long distance communication by radio.

Marconi produced his signals by means of sparks formed by an induction coil and condenser. One side of the electric discharge was connected with the earth; the other, with a series of aerial wires or antennæ supported from tall poles. The current producing the spark was controlled by a telegraph key, so that long and short trains of waves, corresponding to the dashes and dots of the telegraph code, were radiated from the antennæ. At the receiving station, similar aerial wires conducted the incoming waves to a coherer which under their influence operated a local telegraphic circuit.

The coherer was soon replaced by electrolytic detectors and by crystals of carborundum, silicon, galena, and other minerals which, when used with telephone receivers, were much more sensitive. These in turn have been largely superseded by electron tubes which are used both for receiving and for transmitting.

A message sent out is radiated in every direction. To insure that the receiving station obtain only that message intended for it, the so-called wave antenna is employed, having a length approximately that of the wave used and pointed in the direction of expected messages. The antenna is not sensitive to waves coming crosswise. The large transatlantic stations are able to transmit two and receive six messages simultaneously. This result is possible partly through the use of different wave lengths and partly through the so-called barrage receiver, by which interfering waves from near-by stations are neutralized and the desired waves are amplified. In the short-wave "beam" system, reflectors are used at the sending and receiving ends, thereby greatly increasing the energy of the waves received.

The development of wireless telegraphy has been rapid. Three large systems are those of the Marconi and Telefunken companies, and of the Radio Corporation of America. In 1902 the first transatlantic message was sent, and later the value of the wireless telegraph on shipboard was proved by incidents such as the rescue of the survivors of the *Titanic* in 1912. Commercial service is regularly carried on throughout all parts of the world. All ships except the smallest are required to carry the necessary sending and receiving equipment.

Radio Broadcasting. Although all transmission by radio is broadcast in all directions, as distinguished from wire telegraphy and telephony, the term radio broadcasting is not applied to radiotelegraphy but only to wireless transmission by high frequency electromagnetic waves, or radiotelephony. These waves with their modulations corresponding to different sounds in music or speech, are produced through the medium of electron tubes in the sending instruments. Receiving instruments, also by means of electron tubes, reconvert the modulations into air vibrations recognized by the ear as sounds.

The waves used in transmission differ in length according to the instruments producing them. If messages are sent out over waves having the same or not greatly different lengths the messages will "interfere." Consequently, to avoid "interference" no two or more stations within range of each other may be allowed to transmit over approximately the same length at the same time. For this reason, sending stations are licensed to broadcast with waves of a definite length and to broadcast at certain hours. Licensing is done by governments according to rules agreed on at international conventions. A high-power receiving station near Grand Island, Nebr., checks on American broadcasting stations to see that they observe the terms of their license.

Ordinary radio waves have lengths varying from 30,000 to 10 meters. "Short" radio waves have lengths from 10 meters down to lengths of microscopic proportions. The term *frequency*, measured in *kilocycles*, as applied to radio waves is the inverse of wave length. If a wave length is doubled, the frequency is halved. See *Spectrum of Rays*.

Short-wave broadcasts have the advantage of being more readily reflected along the ionosphere. A system known as the national "hook up" is accomplished by the transmission of programs by wire to distant points where they are broadcast on long waves. Static refers to static electricity causing imperfect reception.

On September 29, 1915, the same year in which the first transcontinental telephone line was completed, a conversation over the wireless telephone occurred between New York and San Francisco and was heard in Panama and Honolulu. A regular transatlantic radiotelephone service was inaugurated in 1927. See *Electron Tube*, *Radio*.

Frequency Modulation. (F.M.) A circuit designed by Major E. H. Armstrong. The practical effect is to do away with static and man-made noises and interferences, also to permit a large number of stations to use a wave length.

Television. The method of broadcasting both sound and pictorial effects simultaneously. Transmission by wire or wireless of scenes or moving pictures by conversion of light rays to electrical waves, which are reconverted to reproduce the original image.

Refrigeration. While ice has been used at least as early as the Christian era to chill foods, and the addition of salt has been known for centuries to add to its effectiveness, the invention of a device to lower temperatures by mechanical means opened an entirely new chapter in refrigeration.

The first patent for a refrigerating machine was granted to Dr. John Gorie, Apalachicola, Fla., in 1851, and the first refrigeration plant to be operated commercially was opened in New Orleans in 1866.

Refrigerating machines are based on the principles (1) that a liquid absorbs heat ("produces cold") when it turns into a gas and (2) that a gas tends to turn into a liquid when the pressure upon it is increased and to return to a gaseous state when the pressure is lowered. These principles are applied as follows:

A gas is chosen as a "refrigerant" which will liquefy at a pressure not far above that of the atmosphere. Pressure is increased upon the gas, thus liquefying it. The liquid is led into pipes not subject to the higher pressure. The liquid becomes a gas, absorbing heat from the walls of the pipes and their surroundings, thereby cooling the surroundings. The gas is returned to the compression chamber, where it is again liquefied and the cycle repeats itself.

Gases commonly used as refrigerants include sulphur dioxide, ammonia, and carbon dioxide. They are usually compressed by a pump driven by an electric motor, although an alternative method is to heat a solution of ammonia gas in a closed boiler, the gas driven off increasing the pressure. Refrigerating machines are ordinarily automatic. This requirement involves (1) use of a thermostat to start the application of power when the temperature of the commodities to be chilled rises above a certain point and to stop the power when the temperature falls below another point and (2) valves which permit the flow of the refrigerant from the compression chamber to the cooling tubes and on to the compression chamber again when certain temperature conditions prevail.

Refrigeration machinery was first used in breweries and later was applied to the manufacture of ice. Its employment for the direct cooling of food storage chambers has had an influence on the diet of the world's population which is difficult to exaggerate. It has made possible, for instance, the storage and long-distance shipping of meat, fruits, and vegetables. The process of very rapid freezing of fresh

fruits and fish has been found to preserve the original flavor without change.

One of the most important applications of refrigeration is so-called air conditioning, which usually involves the cooling of air and regulation of its humidity. The process involves sending air through a water spray chamber, the water ordinarily being cooled by refrigeration equipment.

For certain purposes, refrigeration is applied through the medium of solidified carbon dioxide, or "dry ice." The dry ice is produced under high pressure by refrigeration machinery, its temperature being about 110° F. below zero. In view of its low temperature, a much smaller bulk is required for a given amount of cooling than would be required if ordinary ice were used. As heat is absorbed, the dry ice turns into gas, leaving no liquid residue. The resulting carbon dioxide gas, being heavier than air, forms a protecting blanket around the solid, thus decreasing loss of heat to the surrounding air.

Sewing Machines. Modern sewing machines may be divided into two classes, chain stitch and lock stitch. The great majority of domestic machines make the lock stitch because the chain stitch is liable to ravel. Both types use a needle having the eye near the point, and usually a groove along the side so that the thread will not bind.

In making the chain stitch the needle plunges through the cloth and returns to its first position, leaving a loop of thread on the underside of the cloth. The material is advanced automatically, and the needle descends through the first loop, which is tightened while another loop is left. Through this the needle passes on the next stitch. The upper side of chain stitching appears as a straight line; the lower side forms a series of chainlike links. A second type of chain stitch machine employs a rotating hook to make a twisted loop.

Two threads are necessary to form the lock stitch. One passes from the spool, over various guides, and through the eye of the needle. The other is wound upon a bobbin that is attached beneath the sewing table to a vibrating shuttle or at the center of a rotating hook. When the needle descends, it throws out a loop, through which the shuttle or the hook passes with the second thread, thus locking the stitch. With a properly adjusted tension on the thread, the end of the loop is drawn to the middle of the cloth, so that both sides of the stitching present the same appearance.

An important device used on all domestic machines is the four-motion feed plate which lies under the material and moves it forward between stitches. The surface of this plate is covered with forward-pointing teeth which engage the cloth and with the first motion pull it toward the needle. The plate next drops down from the cloth, moves backward, then upward, and again travels forward for the length of the stitch.

Several hundred different types of sewing machines are used for commercial purposes. There are machines which sew on buttons, others which make the buttonholes, and delicate machines, having from four to a dozen needles, for sewing gloves. Carpet-sewing machines travel along the seam, because the material is too large and heavy to be moved to the needle. Sewing machines have had a predominating influence upon the garment making industry. The McKay stitching machine, invented by Lyman Blake, and the Goodyear welt-sewing machine have revolutionized shoemaking. By the Goodyear method, the insole of a shoe is fastened to the upper, and a narrow strip, called the welt, is sewed around the edge of the insole. The sole is then sewed to the welt.

The first sewing machine was invented in 1790 by Thomas Saint, an Englishman. Saint probably never built a machine, but a model constructed from his plans has been shown to be entirely practicable. In 1830, Barthelemy Thimonnier, a French tailor, produced a machine which was used for sewing uniforms for the French army. It was Thimonnier's factory that was destroyed by a mob. Later improvements of the sewing machine were made almost entirely by Americans.

About 1832–34, Walter Hunt, a machinist, first combined an eye-pointed needle with a lock stitch machine. He sold his interest in his invention to a blacksmith, who refused to apply for a patent. In 1853, Hunt himself applied, but the courts held that in waiting so long he had abandoned his rights to protection.

Elias Howe, in September 1846, received a patent for a sewing machine on which he had been working for three years. Howe's machines were the first to become a real competitor of hand labor. As the courts sustained the fundamental principles of Howe's patent, he is generally considered to be the inventor of the modern sewing machine. Howe was also the first to patent a lock stitch machine. He used in it an eye-pointed, grooved needle that moved horizontally.

In 1849, John Bachelder produced the first machine having a horizontal sewing table and a continuous feed. This feed consisted of an endless leather belt studded with pins.

Isaac Merritt Singer, in 1851, received patents for the first machine with a rigid, overhanging arm and a vertical needle. His machine made the lock stitch and was operated by a foot treadle.

The four-motion feed was invented in 1850 by Allen B. Wilson, a cabinetmaker. In 1857, A. E. Gibbs, a Virginia farmer, invented a rotary hook for making a chain stitch. As the fundamental patents have gradually expired, the most satisfactory features of the older machines have been adopted by all modern sewing machine manufacturers.

Steam Engine. A machine by which the expansive power of steam is transferred into mechanical energy and useful work.

The use of steam as a driving force is not new, for, in the first century A. D., Hero of Alexandria described a toy which revolved because of escaping steam. During the 17th century, steam appliances were used for pumping water, and, in 1705, Newcomen built for the same purpose the first practicable engine in which pressure was applied to a piston. In 1765, James Watt invented the separate condenser, and later made many other improvements of the greatest importance.

Modern steam engines may be divided into two types: the *reciprocating engine* and the *steam turbine*. In the first and more common type, steam acts alternately on either side of a *piston* which is forced back and forth within a hollow cylinder.

The piston is attached by a *piston rod* to a *crosshead*, which is in turn connected with the *flywheel* by a *connecting rod*. Through the action of valves, the steam is admitted behind the piston, while that part of the cylinder in front is connected with the exhaust. The piston moves toward the opposite end, and at the proper moment the steam is cut off, the piston finishes its stroke, and the valves automatically change so that the action is reversed. In a noncondensing engine the exhaust steam is forced out into the air against the atmospheric pressure of 14.7 pounds per square inch. In a *condensing engine* the exhaust steam is drawn off into a vacuum and condensed. By thus avoiding back pressure, more power is developed. In *expansion* engines the exhaust steam is forced into a second, larger cylinder, where it expands further and does more work. Marine engines are frequently of the *triple expansion* and even *quadruple expansion* type in which the steam, before it is exhausted, is allowed to expand into a third and a fourth cylinder, each larger than that preceding.

In spite of the great commercial importance of the reciprocating engine, it is very far from being efficient. In the best engines only about 12½% of the energy in the fuel is delivered as mechanical

energy. The largest single units of this type are of about 10,000 horse power.

In the steam turbine, steam flows from an opening against vanes attached to a *rotor*, which revolves under the pressure of the moving steam. As the steam leaves the moving vanes, it strikes stationary blades, which again deflect it against another row of the vanes.

The turbine is the most nearly perfect of all steam engines. It operates at very high speed and is especially effective in driving dynamos and in propelling ships. Turbine generators may attain a capacity of 160,000 kilowatts, or 251,000 horse power. The first vessel driven by turbines developed a speed of 34½ knots, so that large vessels were soon equipped with the new engines which give greater power and require much less space. The turbine was used by De Laval in 1880 for driving a cream separator, and in 1884 Parsons built the first practical power turbine.

The steam necessary for such engines is produced by heating water in a boiler. *Saturated steam* is in such a condition that any lowering of its temperature or increase of pressure will cause part of it to condense to water. One pound of such steam normally occupies 26.36 cubic feet. Saturated steam holding in suspension less than 3 per cent of water is called *dry steam*. It should be remembered that steam is a colorless, transparent, invisible vapor. The white clouds formed when steam escapes into air are due to condensation and the formation of fine particles of water.

Steam at a temperature higher than its normal condensing point is known as *superheated steam*. By its use and through improvements in design and fueling, boilers have been constructed to operate at a pressure of 3375 pounds to the square inch. Variant types of boilers include those which employ electricity for heating or which use mercury vapor instead of steam.

Telegraph. In its simplest form the telegraph is composed of a *line* of wire, usually galvanized iron; a key for sending; a sounder to make the signals audible; and some source of current such as a battery or dynamo. All are connected so that the current must pass through each one. Only one wire is generally used because the earth serves as a return wire to complete the circuit.

The *key* is merely a lever held in place by a spring. It has an insulated knob on one end, and carries a contact point underneath. The *sounder* consists of two electromagnets with a piece of iron mounted close to their ends. The iron armature is attached to a pivoted arm which strikes a brass anvil when it moves either up or down. When the key is *open*, no current can flow, but, when the knob is depressed, a contact is made which closes the circuit. The current then flows through the magnets, which pull the iron toward them, causing a click when the arm strikes the anvil. When the key is raised, the arm springs away from the magnets with another click.

The signals depend upon the time between the sounds of an up and a down click. A short period corresponds to a dot, a longer period to a dash, with a definite arrangement of dots and dashes for each letter. The Morse code, which is used in the United States and Canada, also makes use of a space in order to simplify the combinations. To avoid errors, the Continental Morse code using only dots and dashes is generally employed in Europe, and also in radiotelegraphy.

A commercial Morse telegraph key is equipped with a switch which is closed when the instrument is not in use. A current thus flows continually through all the instruments on a line until some operator wishes to send a message. He then opens his switch and sends the signals which are repeated in every office connected with the line. As the current flowing over a long line is usually too weak to operate a sounder, the main line is connected with a *relay*, which operates in the same way but is much more sensitive. The moving arm of the relay acts as a key to close a local circuit and operate a sounder. Very long lines, such as those from New York to Chicago, are generally divided into sections by *repeaters* which act as a reversible relay to repeat the signals with a stronger current.

By using currents differing in strength or direction, or both, it is possible by the *duplex* system to send a message in both directions at the same time. In 1873, Edison invented the *quadruplex* system whereby two messages may be sent in both directions at the same time. The *synchronous multiplex* system permits six operators to send over the same wire. Machines, such as the Wheatstone automatic telegraph, which use a perforated tape, are capable of transmitting 300 to 400 words per minute as compared with 25 to 40 by a good operator. With the multiplex *printing telegraph* system, messages are sent by pressing keys on a machine resembling a typewriter, and are automatically printed on telegraph blanks at the receiving end. Most telegrams are now sent in this way. Facsimile telegrams may be sent by phototelegraphic instruments. (See *Phototelegraphy*.)

The supreme court of the United States has decided that Samuel F. B. Morse was the inventor of the electromagnetic telegraph. Other famous scientists who worked on the same problem were the Englishmen, Wheatstone and Cook, whose five-wire system was the first to be tried commercially, and Professor Joseph Henry, an American, who in 1831 operated the first sounding electric telegraph. Steinheil of Munich also developed a similar system about 1837. Morse began his work in 1832. His first commercial line was constructed with government aid. It extended between Washington and Baltimore and was opened to the public April 1, 1844.

Morse Code. A·— B—··· C—·—· D—·· E· F··—· G——· H···· I·· J·——— K—·— L·—·· M—— N—· O——— P·——· Q——·— R·—· S··· T— U··— V···— W·—— X—··— Y—·—— Z——··

Continental Code. A·— B—··· C—·—· D—·· E· F··—· G——· H···· I·· J·——— K—·— L·—·· M—— N—· O——— P·——· Q——·— R·—· S··· T— U··— V···— W·—— X—··— Y—·—— Z——··

Telephone. An instrument used for the purpose indicated by its name, which means a "voice from afar." Many inventors worked on the problem of an electric telephone. On February 14, 1876, Alexander Graham Bell applied for a patent, granted on the following March 7, which is fundamental for this method of transmitting speech by means of electricity.

Although it follows the basic principles of Bell's telephone, today's set possesses far better sending and receiving qualities. The telephone consists of two basic parts: 1) the handset which contains a receiver and transmitter, and 2) the base housing a ringer, an electrical network, a switch, and often a dial.

When the handset is lifted off the base, an electrical circuit is established through the telephone instrument. In the transmitter, this circuit passes through carbon granules in a chamber located immediately behind the diaphragm. Sound waves cause the diaphragm to vibrate, which in turn exerts pressure upon the granules, compressing them in varying densities. The varying resistance of the granules regulates the current flow. An electrical pattern of the voice is sent through a switching center to the other telephone.

In the receiver of the other telephone, a permanent magnet, surrounded by an electromagnet, exerts force on an iron-rimmed fabric diaphragm. As current passes through the electromagnet (coil),

the magnet's attraction on the iron rim and attached diaphragm varies and the diaphragm moves accordingly. The surges of current dispatched from the transmitter set the pattern of vibration. This vibration sets sound waves in motion which the listener hears.

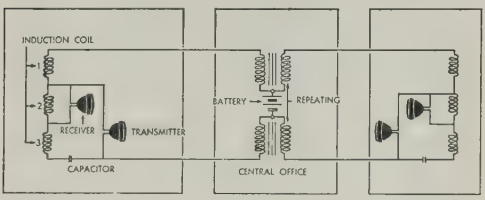


Diagram of a Telephone Circuit

One telephone is connected to another automatically (dial) or by hand in the switching center, called a central office. Today almost 90 per cent of all Bell telephones are dial operated. Three main types of dial apparatus are in use. Step-by-step, a switching system which connects a call in stages as each figure is dialed, is used mostly in smaller communities. In larger cities, or where switching requirements are complicated, "panel" and "crossbar" systems are most often found. Panel equipment has largely been replaced by "crossbar" for new installations. Unlike step equipment, crossbar switching of a call does not begin until the number is completely dialed. Then the entire operation is completed almost instantaneously. In conjunction with automatic accounting equipment, crossbar systems have opened the way for such modern, time-saving arrangements as operator long distance dialing and customer dialing to distant points. In 144 cities, in mid-1956, approximately 1,500,000 customers could dial long distance calls on a nationwide basis, some to points as far away as 3500 miles.

Telephone conversations are carried over various types of voice highways. *Wire* transmission, the best known, basically depends on a pair of wires, providing metallic circuit. Two pairs form a quad and, when suitably arranged, can carry three conversations simultaneously. Telephone cables are made up of quads and pairs of various sizes. "*Carrier*" systems are today the principal method of long distance transmission. "Carrier" is the term given to a method by which a pair of wires, or other transmission medium, can be adapted to carry many simultaneous conversations. Conversations are put on different frequency bands. Filters at the receiving end sort out and "demodulate" (restore) the frequencies to those of the original voice band.

"Coaxial" cable is one of the transmission media used for long distance carrier systems. Such cables usually have eight tubes. Tubes and a copper wire within have a common axis, or are coaxial. Voice signals are sent through the tubes on different frequency bands at speeds approaching light. With today's equipment, 1860 separate conversations or 660 conversations plus TV signals in each direction can be carried on a pair of tubes. Since two tubes are kept for emergencies, a coaxial cable thus can carry a maximum of 5580 separate simultaneous conversations. *Radio Relay*, a narrow beam radio system of super high frequencies (microwave), is another carrier communications system. The principal Bell Company radio relay systems can handle as many as six broad band communications paths in each direction. Two such highways in opposite directions can carry up to 600 conversations or two television programs. *V.H.F.(Very High Frequency) Radio* is used for communicating to and from moving vehicles, while *high frequency radio* is used for many overseas calls. In 1956, the first two major transoceanic telephone cable systems were expected to be laid—one between North America and Great Britain and the other between Alaska and the United States. Each underseas cable system can carry 36 conversations.

About 57,200,000 telephones are in use in the United States—more than 50 per cent of the world's total. They are operated by Bell Companies and approximately 4,650 independent concerns.

Television. This term is applied to the reproduction, transmission, and reception, through the medium of electromagnetic rays, of a series of rapidly succeeding photographic pictures which give the impression of a scene from life. The word means "seeing from a distance."

The central element in the process is a specialized form of electron tube known in different forms as an iconoscope or an image dissector. It contains a screen consisting of numerous minute light-sensitive cells. A photographic image is focused on the light-sensitive cells. The screen is scanned by an electronic beam, which has the effect of setting up in the cells currents proportional to the amount of light received. The currents on transmission to a receiving instrument are used to reconstruct the light pattern in the original image. A standard picture calls for the electronic beam passing across the image 440 times and making 30 complete pictures in a second.

Transmission requires the simultaneous use of numerous telephonic channels, a requirement which is met by the coaxial cable for wire transmission and short wave bands for wireless transmission.

Thermostat. An instrument for automatically regulating the temperature produced by heating apparatus. When the temperature to be regulated rises to a certain point it causes an element of the thermostat, either a fluid or a metal bar, to expand and touch off a control which closes a draft or the fuel feed supplying the heat. Then when the temperature falls to a certain point, the sensitive element of the thermostat contracts and the control is actuated in such a way as to cause more heat to be supplied.

Thermostats in household use are ordinarily placed in a living room. The control actuated by the expanding or contracting element is connected electrically with a device for regulating the furnace. In a hot air furnace, if coal is burned, the device closes or opens the drafts; if oil or gas is used, the device partially cuts off the feed. In hot water furnaces, the action of the thermostat is to cut off or turn on an electric current operating a pump which, when in action, causes the hot water to circulate. A second thermostate regulates the temperature of the water.

Typewriter. An instrument for writing in characters similar to those used for printing. Christopher Latham Sholes is generally considered to be the inventor of the modern typewriter. On his first machine, completed in September 1867, many letters were written and sent to friends. One of these letters induced James Densmore, of Meadville, Pa., to take a large financial interest in the new invention, which was patented in 1868. Six months later, when Densmore first saw the typewriter, he decided that it was absolutely impracticable.

Under the constructive criticism of Densmore, Sholes proceeded to build model after model, until, after five years of work, a satisfactory machine was produced.

A famous firm of gunmakers, E. Remington and Sons, was then persuaded to manufacture the machine, which, in 1874, appeared on the market as the Remington typewriter.

Most of the standard modern typewriters are operated by 42 keys arranged in what has been found to be the most convenient order. This arrangement is known as the *universal keyboard*. Scores of other arrangements are used for writing in foreign languages, or for the use of special characters. Each key controls a steel type bar which carries two characters near the free end.

Selection of the desired character is obtained by means of a shift key.

The type bars are hinged in a basket-like group, so that each one may strike on a common center when the proper key is depressed. The paper is placed upon a rubber cylinder, which is mounted on a carriage moving from right to left. Under the control of a pawl and ratchet, the carriage moves one space to the left after each letter is printed or when the space bar is used. At the end of a line the carriage is pushed to the right by the operator. This pressure also serves to advance the paper for a new line.

Just before the type bar reaches the cylinder, an inked ribbon is raised into place so that the key strikes the ribbon and leaves a sharp impression upon the paper. Key and ribbon then drop back so that the writing is always visible. The ribbon, which is usually about 25 feet long, is stretched between two spools and moves at the same speed as the carriage. When most of the ribbon has been wound upon one spool, the direction of winding is automatically reversed.

The average operator writes about sixty words per minute, which is about three times as fast as the ordinary penman. Special typewriters are in use for bookkeeping and similar operations.

Outstanding among typewriter improvements was the early introduction of the warning bell which tells the typist the end of the line is approaching, the coming of the noiseless machine in 1909, and the advent of the electric typewriter about 1935. The portable typewriter, which is small and light and easily carried in a hand case, has proved a boon to newspapermen, students, and others who work outside offices.

The teletype or teletypewriter records messages by electrical transmission, as does also the machine known as the stock market ticker. See *page 1209*.

MODERN INVENTIONS

Invention, Inventor, and Country	Date
Adding machine; Blaise Pascal; France	1642
Recording; Burroughs; United States	1888
Air brake; George Westinghouse, Jr.; United States.	1869
Airplane; Orville and Wilbur Wright; United States.	1903
Airplane compass; Mendenhall and Williamson; United States	1917
Air pump; Otto von Guericke; Germany	1654
Airship; Henri Giffard; France	1852
Aluminum, Hall process of making; Charles M. Hall; United States	1886
Aniline dyes; W. H. Perkin; England	1856
Autogiro; J. de la Cierva	1920
Automobile, gas engine; Siegfried Markus; Germany	1875
First commercial; Levassor; France	1891
Babbitt metal; Isaac Babbitt; United States	1839
Bakelite; L. H. Baekeland; Belgium-United States	1907
Balloon; J. E. and J. M. Montgolfier; France	1783
Barbed wire machine; Glidden and Vaughan; United States	1874
Barometer; Torricelli; Italy	1643
Bicycle; Macmillan; Scotland	1840
Modern type; James Starley; England	1884
Bifocal lens; Benjamin Franklin; United States	1780
Calcium carbide, commercial production of; Thomas L. Willson; United States	1892
Carborundum; E. G. Acheson; United States	1891
Car coupler, automatic; E. H. Janney; United States	1873
Carding machine; Whittemore; United States	1797
Cartridge, metallic; Houiller; France	1847
Cash register; J. Ritty; United States	1879
Caterpillar tractor; Benjamin Holt; United States	1900
Caustic soda, Castner process; Hamilton Y. Castner; United States	1890
Cellophane; J. E. Brandenberger; France	1912
Celluloid; J. W. and Isaac Hyatt; United States	1869
Chrome tanning; Schultz; United States	1884
Clock, pendulum; Huygens; Netherlands	1657
Coach, steam; Richard Trevithick; England	1801
Coal, liquefaction of, for producing gasoline; Friedrich Bergius; Germany	1914
Coherer, for detecting "wireless" waves; E. Branly; France	1892
Color photography; F. E. Ives; United States	1892
Ruled screen process; John Joly; Ireland	1894
Autochrome process; A. and L. Lumiére; France	1906
Cotton gin; Eli Whitney; United States	1793
Cream separator, centrifugal; De Laval; Sweden	1880
Cultivator, rotary disc; Mallon; United States	1878
Cyanide process for gold and silver ore; Forrest and MacArthur; Scotland	1890
Dental plate, rubber; Charles Goodyear, Jr.; United States	1855
Depth bomb; Unge; Sweden	1903
Improved; Godfrey Tait; United States	1916
Diesel engine; Rudolf Diesel; Germany	1893
Dynamite; A. Nobel; Sweden	1866
Dynamo-electric machine, first; Michael Faraday; England	1831
Drum wound armature; Werner Siemens; Germany	1854
Separately excited field; H. Wilde; England	1863
Electric arc lighting, practicable system; C. F. Brush; United States	1878
Electric battery, primary; Alessandro Volta; Italy	1799
Electric battery, storage; Gaston Plante; France	1859
Nickel-iron type; Thomas A. Edison; United States	1903
Electric furnace, arc type; Pichou and Johnson; France and England	1853
Resistance type; W. Borchers; Germany	1880
Electric lamp, carbon filament; Joseph W. Swan; England	1860
Improved carbon filament; Thomas A. Edison; United States	1879
Ductile tungsten filament; W. D. Coolidge; United States	1910
Electric motor, split phase; Tesla; United States	1887
Alternate current; Tesla; United States	1892
Electric welding, resistance process; Elihu Thompson; United States	1886
Electrocast blocks; G. S. Fulcher; United States	1927
Electromagnet; Wm. Sturgeon; England	1824
Electron tube, practical; J. A. Fleming; England	1904
Three-electrode; Lee De Forest; United States	1906
Electroplating; Luigi Brugnatelli; Italy	1805
Electrotyping; Moritz H. von Jacobi (Germany) and Thomas Spencer (England)	1838
Elevator, power; Elisha G. Otis; United States	1852
Flotation process, ore refining; Elmore; United States	1899
Food preservation, canning process; Appert; France	1810
Fourdrinier paper-making machine; Louis Robert; France	1798
Galvanometer; Sweigger; Germany	1820
Gas engine, electric ignition; Barsonti and Matteucci; Italy	1857
Four-cycle; Nicholas August Otto; Germany	1877
Successful; Gottlieb Daimler; Germany	1884
Gaslighting system; Wm. Murdock; England	1792
Gas mantle, incandescent; von Welsbach; Austria	1885
Gas meter, wet; S. Clegg; England	1815
Dry, modern; Wm. Richards; United States	1843
Gatling gun; R. J. Gatling; United States	1861
Gauge, steam pressure; Bourdon; France	1849
Gramophone; Emile Berliner; United States	1887
Graphophone; Bell and Tainter; United States	1885
Guncotton; Schönbein; Germany	1846
Gyrocompass; H. Anschutz-Kampfe; Germany	1906
Improved; Elmer A. Sperry; United States	1910
Gyroscope; Foucants; France	1852
Harvester and thresher, combined; S. C. Matteson; United States	1888
Hydraulic press; Joseph Bramah; England	1795
Hydrogenation, catalytic; Sabatier and Senderens; France	1902
Hydroplane; Glenn H. Curtiss; United States	1911
Ice machine, compressor system; Jacob Perkins; United States	1834
Absorption system; F. P. E. Carré; France	1860
Induction coil, modern; Ruhmkorff; Germany	1851
Injector, steam, for boilers; Henri Giffard; France	1858
Iron, galvanizing process; Henry Craufurd; England	1837
Knitting machine; William Lee; England	1589
Circular; M. I. Brunel; England	1816
Latch needle; Townsend and Moulding; England	1858
Kodak, roll-film hand camera; Eastman and Walker; United States	1888
Lacquer, synthetic—nitrocellulose; W. P. Field; United States	1890
Cellulose acetate; C. F. Cross, E. J. Bevan; England	1892
Lathe, turret; Stephen Fitch; United States	1845
Lawn mower; A. M. Hills; United States	1868
Lewis gun; I. N. Lewis; United States	1912
Leyden jar, modern; John Bevis; England	1746
Lightning conductor; Benjamin Franklin; United States	1752
Linotype; Ottmar Mergenthaler; United States	1885
Lithography; Alois Senefelder; Bohemia	1798

MODERN INVENTIONS—Con.

Invention, Inventor, and Country	Date
Locomotive, steam, on rails; Richard Trevithick; England	1804
First successful; George Stephenson; England	1829
Loom, pattern; M. J. Jacquard; France	1801
Power; Edmund Cartwright; England	1785
Locomotive, electric; Vail; United States	1851
Machine rifle; John M. Browning; United States	1916
Matches, friction; John Walker; England	1827
Safety; Lundstrom; Sweden	1855
Mercerized cotton; John Mercer; England	1844
Mercury vapor lamp; Peter Cooper Hewitt; United States	1900
Microphone; Emile Berliner; United States	1877
Microscope, compound; Zacharias Janssen; Netherlands	1590
Electron; E. Ruska, B. von Boris; Germany	1938
Monotype; Talbert Lanston; United States	1887
Motion picture machine; Thomas Armat; United States	1895
Mowing machine; Manning; United States	1831
With differential gear; Eickemeyer; United States	1876
Multiplying machine; G. W. Leibnitz; Germany	1671
Nails, machine cut; Ezekiel Reed; United States	1786
Naval telescope gun sight; Bradley A. Fiske; United States	1891
Nernst lamp; Walter Nernst; Germany	1897
Nitrogen fixation electric arc; C. Birkeland; Norway	1903
Catalytic process; Haber and Bosch; Germany	1911
Cyanamid process; Caro and Franke; Germany	1908
Nylon; E. I. du Pont de Nemours & Co., U. S.	1937
Oleomargarine; H. Mege-Mouries; France	1869
Opthalmoscope; Helmholtz; Germany	1851
Optophone, by which blind can read type; E. E. Fournier d'Albe; England	1914
Pen, steel; Samuel Harrison; England	1780
First successful fountain; L. E. Waterman; U. S.	1884
Percussion cap; Shaw; United States	1816
Phonograph; Thomas A. Edison; United States	1877
Photoelectric cell; J. Elster and H. Geitel; Germany	1895
Photography, daguerreotype process; L. Daguerre; France	1839
Bichromate process; Mungo Ponton; Scotland	1839
Use of hypo; John Herschel; England	1839
Collodion process; Scott Archer; England	1851
Gelatin-silver bromide emulsion; R. L. Maddox; England	1871
Roll-film, modern; Hannibal Goodwin; United States	1887
Phototelegraphy; Bell Telephone Laboratories; United States	1925
Piano; Bartollomeo Cristofori; Italy	1709
Piano player, first pneumatic; M. Fourneaux; France	1863
Pin-making machine; L. W. Wright; United States	1824
Plow, cast-iron, modern shape; Jethro Wood; United States	1819
Disk; Hardy; United States	1896
Pneumatic tire; R. W. Thompson; England	1845
Independently by John B. Dunlop, Ireland	1888
Pneumatic tool; George Law; England	1865
Portland cement; Joseph Aspdin; England	1824
Printing from movable type; J. Gutenberg; Germany	1450
Printing press, cylinder; F. Konig; Germany	1811
Double cylinder; R. Hoe & Co., United States	1845
Rotary; Thomas Nelson; England	1850
Gordon; George P. Gordon; United States	1850
Pulmotor; Alexander B. Dräger; Germany	1911
Radar; Dr. A. Hoyt Taylor and Leo C. Young of the Naval Aircraft Radio laboratory; United States	1922
Radiotelegraph; G. Marconi; Italy	1895
Radiotelephone; Lee DeForest; United States	1906
Long-distance; American Tel. & Tel. Co.; United States	1915
Rail, flanged; T. R. L. Stevens; United States	1831
Rayon; H. de Chardonnet; France	1889
Reaper, McCormick; Cyrus H. McCormick; United States	1831
Refrigerating machine; John Gorie; United States	1851
Revolver; Samuel Colt; United States	1835
Rifle, spiral grooves; Koster; England	1620
Breech-loading, successful; John M. Hall; United States	1810
Bolt action, military; Dreyse; Germany	1839
Repeating; Henry; United States	1860
Rock drill, percussion; J. J. Couch; United States	1849
Diamond bit; Herman; United States	1854
Safety lamp, miner's; Sir Humphry Davy; England	1815
Saw, band, wood; William Newbery; England	1808
Circular, wood; Samuel Miller; England	1777
Screw propeller, successful application; John Ericsson; Sweden	1841
Self-binding reaper, twine; J. F. Appleby; United States	1875
Sewing machine; Elias Howe; United States	1846
Four-motion feed; Allen B. Wilson; United States	1854
Shoe-sewing machine, McKay; Lyman Blake; United States	1858
Welt-sewing; Charles Goodyear, Jr.; United States	1871
Shotgun, practical breech-loading; Casimir Lefaucheux; France	1836
Hammerless, ejecting; J. Needham; England	1874
Silencer for firearms; Hiram P. Maxim; United States	1909
Smokeless powder; J. F. E. Schultze; Germany	1867
Spectroscope; Kirchhoff and Bunsen; Germany	1859
Spinning machine, jenny; James Hargreaves; England	1767
Roll-drawing; Richard Arkwright; England	1769
Mule-jenny; Samuel Crompton; England	1779
Ring spinner; John Thorp; United States	1828
Stainless steel; Brearley; England	1914
Steamboat, successful; Robert Fulton; United States	1807
Steam engine, atmospheric; Thomas Newcomen; England	1705
With separate condenser; James Watt; Scotland	1765
Double action, use of expanding steam; James Watt; Scotland	1782
Compound; Jonathan C. Hornblower; England	1781
High-pressure; Oliver Evans; United States	1799
Steam hammer; James Nasmyth; Scotland	1839
Steam turbine; Charles A. Parsons; England	1884
Steel, Bessemer process; William Kelly; United States	1847
Independently by Henry Bessemer; England	1855
Crucible process; Robert Huntsman; England	1740
Open-hearth process; Siemens and Martin; England	1866
High speed; F. W. Taylor and M. White; United States	1900
Manganese; Hadfield; England	1884
Stereoscope, lenticular; Sir David Brewster; England	1849
Stereotyping; William Ged; Scotland	1725
Stethoscope; Laënnec; France	1819
Submarine boat, first successful; John P. Holland; United States	1900
Submarine detector; Max Mason; United States	1917
Tack machine; Blanchard; United States	1806
Tank, military; Gen. E. D. Swinton; England	1914
Telegraph; S. F. B. Morse; United States	1837
Duplex system; J. B. Stearns; United States	1872
Quadruplex system; Thomas A. Edison; United States	1873
Submarine, siphon recorder; Wm. Thompson; England	1874
Telephone; A. G. Bell; United States	1876
Automatic; A. B. Strowger; United States	1889
Long-distance, by loading coils; Michael I. Pupin; United States	1900
Telephone transmitter, microphone; Emile Berliner and Thomas A. Edison, United States	1877
Telescope; Jan Lippershey; Netherlands	1608
Teletypesetter; Morkrum-Kleinschmidt Corporation; United States	1928
Television; J. L. Baird; England	1925
Independently by C. F. Jenkins; United States	1925
Thermit mixtures; H. Goldschmidt; Germany	1897
Thermometer; Galileo; Italy	1593
Threshing machine; Andrew Meikle; Scotland	1786
Torpedo, self-propelled; Whitehead; England	1868
Radio controlled; Bradley A. Fiske; United States	1897
Trolley car, practical system; F. J. Sprague; United States	1888
Tunnel shield; M. I. Brunel; England	1818
Turbine, hydraulic; J. B. Francis; United States	1849
Turret, revolving, for floating battery; Theodore Timby; United States	1862
Typewriter, first practicable; C. L. Sholes; United States	1868
Vacuum bottle; James Dewar; England	1892
Valve gear, Stephenson link; William Howe; England	1843
Walshaert gear; Egide Walshaert; Sweden	1844
Vulcanized rubber; Charles Goodyear; United States	1844
Watches, machine-made; Dennison and Howard; United States	1850
Water gas, modern process; T. S. C. Lowe; United States	1873
Wood pulp, for paper, mechanical process; Keller and Voelter; Germany	1844
Sulphite process; B. C. Tilghmann; United States	1867
Sulphate process; Dahl; Sweden	1883

ENGINEERING AND BUILDING

An engineer directs the natural forces of nature to the uses of mankind. He must therefore be a scientist; for mathematics, physics, and chemistry are the foundation of most engineering training. Nevertheless, the pioneer of science who devotes his energies to solving the problems of physics or chemistry is not an engineer. To qualify as such, he must apply the knowledge obtained by research and testing, to the design, construction, and operation of works, machines, or processes.

The mathematician studies the mutual relations between the sides and the angles of a triangle; the engineer uses the knowledge thus obtained to measure the distance across a river or to the top of a distant peak. The physicist studies the laws of centrifugal force; the engineer applies these laws when he raises the outer rail at a curve, to prevent a train from leaving the track. The chemist discovers that starch can easily be changed into glucose; the engineer then designs and operates a factory where table sirups are made from corn or potatoes. Because of this practical side of his work, an engineer has been described as one who can accomplish with one dollar what an untrained worker can do, indifferently, with two.

The practice of engineering is not new, for the pyramids of Egypt with their perfectly placed masses of stone compare well with the greatest of modern structures; and some of the bridges and aqueducts constructed by the Romans are still in use. The earliest engineers were chiefly surveyors. Later, engineering became largely a military profession, because the chief demand of the time was for men who could plan strong fortifications and construct tunnels and the engines of war necessary to reduce opposing forts.

With the advance of civilization and the development of commerce, engineering projects, such as bridges and harbors, dams, roads, and canals, were required even more for civil than for military purposes. As a result, men capable of filling this need gradually developed the profession of *civil engineering*, which is now generally recognized as the first and largest division of engineering practice. Next, the rapid increase in the application of power to mechanical operations caused men to specialize in the design and the use of machines. Thus developed the second great branch of the engineering field—that of *mechanical engineering*.

Branches of Engineering. Civil and mechanical engineering represent the fundamental divisions of engineering practice. Mining, electrical, chemical, and sanitary engineering are specialized branches, each applying general engineering principles in connection with a particular division of science. The electrical engineer is probably the most highly specialized, but that each branch is closely related to every other is shown by the training given to students of engineering in the great technical schools. For the first two or three years of their work, students of electrical, mechanical, or chemical engineering study almost the same subjects; later they are permitted to specialize.

More than a hundred well recognized subdivisions might also be named, such as heat, hydraulic or water power, railway, locomotive, automotive, ventilation, highway, telephone, and aeronautical engineering.

Civil Engineering. The civil engineer may be compared to a general at war with the elements, for he strives to bring the land and the sea under his control. He is a builder, in order that commerce and industry may be more easily carried on. He designs, locates, and builds highways and railroads, and, if these are interrupted by a deep gorge or by wide rivers, bridges and tunnels are constructed under his direction. He deepens harbors, protects them from the open waters by means of breakwaters, places lighthouses to guide ships to safety, and builds docks at which cargoes can easily be handled.

Construction of canals and the development of inland waterways, the building of dams for purposes of irrigation and water power, the erection of a single skyscraper or the building of an entire city and of aqueducts to supply the city with water—all come directly within the province of the civil engineer.

Mechanical Engineering. The division of engineering which is concerned with the design, construction, and operation of machines. A civil engineer may plan and lay out a railroad, and a naval architect may design a fast and beautiful steamship, but it is the mechanical engineer who designs the locomotive that hauls the trains and the boilers and engines that drive the vessel. While an architect designs, and a civil engineer constructs, a mighty office building, the mechanical engineer provides for a suitable power plant, pumps, elevators, hot water, ventilation, heat, and often a system of refrigeration. A steel mill, with its enormous power plant and giant engines for handling and shaping iron and steel products, is one of the most impressive examples of mechanical engineering.

When a new type of machine is required for some special purpose, it must be designed by a mechanical engineer. However, standardized machines for many purposes are already on the market, so that in factory operation the mechanical engineer must frequently select and arrange the proper machines to produce a certain result in the most economical manner. The design and the improvement of automobiles have become so important that specialists in this branch of mechanical work are called *automotive engineers*.

Another important duty of the mechanical engineer is the testing of structural materials. The builder of a bridge knows that it will carry its load because a mechanical engineer has designed machines capable of testing steel beams by the application of enormous forces. In this age of machinery, no engineering problem of any considerable importance can be carried through without the aid of the mechanical expert.

Mining Engineering. A branch of engineering devoted to the surveying, testing, and evaluation of mineral deposits, and the planning and execution of the methods by which the mineral is obtained and treated. The mining engineer must decide on the methods to be used in removing the ore, in strengthening tunnel walls to prevent accidents, in providing drainage and ventilation for the mine, and in quickly and efficiently hoisting the mineral to the surface. He must, therefore, be especially trained in civil and mechanical engineering, and in chemistry, geology, and mineralogy.

Electrical Engineering. Engineering principles applied to the designing, building, and operating of dynamos and batteries, electric light and power systems, electric railways, motors, heating apparatus varying in type from a toaster to a giant furnace, telegraph and telephone systems including radio transmission, and various other types of electrical apparatus.

In co-operation with the mechanical engineer, the electrical engineer has done important work in providing mechanical equipment with electrical control. And, in co-operation with the chemical engineer, he has developed the important division of *electrochemical* engineering, which deals with the use of electricity in chemical processes. The products of the electrochemical industries include some of the most indispensable materials employed in manufacture, such as ferro-alloys, aluminum, electrolytic copper, caustic soda, chlorine, hydrogen, oxygen, carborundum, cyanamid, and calcium carbide.

SOME NOTED BRIDGES AND VIADUCTS OF THE WORLD*

Kind and Name	Location	Completed	Length Feet	Main Span Feet	Height Feet	Approximate Cost
Bascule [(1) one leaf; (2) two leaf]:						
Canadian Pacific Ry. (2)	Sault Ste. Marie canal (U. S.)	1914	426	336		$ 250,000
Michigan Ave. (2)	Chicago R., Chicago, Ill.	1920	300	256	16.5	
Wells St. (1)	Chicago R., Chicago, Ill.	1921		268		
Outer-Drive (2)	Chicago R., Chicago, Ill.	1937		264	24	1,800,000
St. Charles Air Lane (1)	Chicago R., Chicago, Ill.	1931	277	219.3	20	705,000
Arlington Memorial (2)	Potomac R., Washington, D. C.	1932	2,163	216	35	7,360,000
Tower (2)	Thames R., London, Eng.	1894	2,980	200	30	5,000,000
Cantilever:						
Quebec	St. Lawrence R., Quebec	1917	3,240	1,800	150	9,000,000
Forth	Firth of Forth, Scotland	1890	8,095	1,700	150	16,000,000
Rip Van Winkle	Hudson R., Catskill, N. Y.	1935	5,040	1,600	142	2,165,000
Victoria	St. Lawrence R., Montreal	1898	8,440	1,250	150	6,000,000
Longview	Columbia R., Wash.	1930	3,740	1,200	196	5,800,000
Queensboro	East R., New York City.	1909	7,449	1,182	135	13,000,000
Carquinez	Carquinez Str., Cal.	1927	4,482	1,100	158	7,800,000
South Shore	St. Lawrence R., Montreal	1929	9,137	1,097	162	18,639,000
Cooper River	Charleston, S. C.	1929	14,313	1,050	160	6,000,000
Bluewater	St. Clair R., Port Huron.	1938	6,539	871	210	3,250,000
Baton Rouge	Mississippi R., La.	1939	15,840	850	90	8,500,000
Concrete Arch:						
Plougastel-Brest	Elorn R., France	1930	2,625	612	118	440,000
Westinghouse Memorial	Turtle Creek Valley, East Pittsburgh	1931	1,560	460	200	1,480,000
Pont de la Caille	Cruseilles, France			458.5		
Cappelen Memorial	Mississippi R., Minneapolis	1923	1,032	435	88	900,000
Pierre du Vauvray	Seine R., Ande, France	1924		432		
Royal Tweed	Tweed R., Edinburgh, Scot.	1928	1,400	361.5	45	800,000
Resorgimento	Tiber R., Rome, Italy	1911	492	328	47	238,000
Grafton	Auckland, N. Z.	1909	973	320	147	170,000
Masonry Arch:						
Plauen	White Elster R., Germany	1903	492	295.2	58	125,000
Sidi Rached	Constantine, Algeria	1915	1,468	227	300	366,000
Cabin John	Cabin John Creek, Washington, D. C.	1864	420	220	101	237,000
London	Thames R., England	1831	928	152	56	7,241,500
Steel Arch:						
Kill van Kull	Staten Is.—Bayonne, N. J.	1931	5,780	1,652	150	18,000,000
Sydney Harbor	Sydney, Australia	1932	3,770	1,650	170	35,000,000
Birchenough	Sabi R., Southern Rhodesia	1935	1,080	1,080		500,000
Hell Gate	East R., New York City.	1917	17,868	977.5	135	15,000,000
Rainbow	Niagara R., Niagara Falls	1941	1,240	950	189	3,760,000
Henry Hudson	Harlem R., New York City	1936	2,000	800	142.5	1,137,876
McKees Rocks	Ohio R., near Pittsburgh	1930	3,600	750	100	6,000,000
West End	Ohio R., Pittsburgh	1931	1,889	780	73	
Croton Lake	Westchester Co., N. Y.	1931	1,210	750	40	830,000
Suspension:						
San Francisco-Oakland Bay	San Francisco Bay, Cal.	1936	22,720	4,620†	200	77,600,000
Golden Gate	San Francisco Bay, Cal.	1937	8,500	4,200	220	32,815,000
Washington Memorial	Hudson R., New York City	1931	8,243	3,500	213	60,000,000
Delaware Memorial	Delaware R. near Wilmington	1951	10,750	2,150	442	44,000,000
Ambassador	Detroit R., Detroit, Mich.	1929	8,000	1,850	152	22,500,000
Delaware River	Camden-Philadelphia	1926	9,570	1,750	135	24,600,000
Bear Mountain	Hudson R.	1924	2,257	1,632	155	5,000,000
Williamsburg	East R., New York City.	1903	7,308	1,600	135	15,000,000
Brooklyn	East R., New York City.	1883	7,580	1,595.5	135	18,000,000
Lions Gate	Vancouver Harbor, Vancouver, B. C.	1938	5,820	1,550	200	6,000,000
Mid-Hudson	Hudson R., Poughkeepsie, N. Y.	1930	4,200	1,500	135	5,622,700
Manhattan	East R., New York City.	1909	6,855	1,470	135	17,000,000
Triborough‡	East and Harlem Rs., N.Y.C.	1936	4,318	1,380	135	42,000,000
Truss [(s) simple; (c) continuous]:						
Metropolis (s)	Ohio R., Ill.	1917	5,700	720	53	3,000,000
Paducah (s)	Ohio R., Ohio	1929	9,000	716	100	
St. Louis (c)	Mississippi R., Mo.	1930	5,350	700	55	
Tanana River (s)	Alaska	1923	700	700		1,370,000
Cincinnati (c)	Ohio R., Ohio	1929	1,575	675	104	1,750,000
Cape Girardeau (c)	Mississippi R., Mo.	1930	2,339	671	99	
St. Louis Municipal (s)	St. Louis, Mo.	1913	668	668		
Vertical Lift:						
Buzzards Bay	Cape Cod Canal, Mass.	1936	806	544	139	2,000,000
Marine Park	Jamaica Bay Channel, N. Y.	1937	4,802	540	55	3,800,000
Burlington-Bristol	Delaware R., N. J.—Pa.	1931	3,027	534	61	1,300,000
Kansas City	Missouri R., Kans.—Mo.	1912	5,340	428	65	2,200,000
Boonville, Mo., M.K.T.R.R.	Missouri R.	1932	1,638	408	27	1,000,000
Hackensack River	P.R.R. near Jersey City	1930	2,950	331.5	40	
Suisun Bay	California	1930	5,603.5	328	70	12,000,000
San Mateo	San Francisco Bay	1929	7.1 mi.	303	125	7,500,000

*The bridges in this table are divided according to the type of their main span. In each division, the bridges are arranged in the order of the length of the main span.

†Two joined spans of 2310 feet each. Includes also a main cantilever span of 1400 feet.

‡Suspension span over East river; vertical lift span, 310 feet long, over Harlem river.

Many bridges which are not remarkable for their main spans are nevertheless noteworthy on account of their lengths or their heights. Among the longest bridges in the world are the following:

San Francisco-Oakland Bay, 8 miles long.

Great Salt Lake cutoff, a railroad trestle 20 miles long.

San Mateo bridge across San Francisco bay, 7.1 miles.

Florida Keys viaduct, the longest over-water section being 7 miles.

Lake Pontchartrain railroad bridge, Louisiana, 7 miles.

James River Highway bridge, near Newport News, Va., with approaches, 6 miles; without approaches, 4½ miles.

Gandy bridge, near Tampa, Fla., about 6 miles.

Lake Pontchartrain highway bridge, Louisiana, 5 miles.

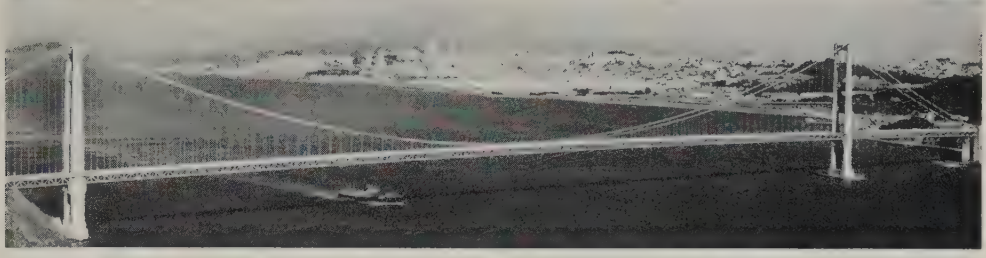
Huey Long cantilever bridge over Mississippi at New Orleans, completed 1935, totaling 4½ miles.

Rainbow Bridge, Niagara river, is the longest hingeless arch span in the world.

Among the highest bridges are the following:

Royal Gorge, a suspension bridge over the Arkansas river at Canon City, Colo., 1050 feet high; Snake River cantilever bridge near Twin Falls, Idaho, 502 feet high; Marble Canyon, a steel arch bridge over the Colorado river at Lee's Ferry, Arizona, 467 feet high. The Fades viaduct, at Vauriat, France, 434.5 feet high.

NOTABLE BRIDGES



The famous Golden Gate Bridge reaching from San Francisco, California, to Marin County and the Redwood Highway. It is the longest suspension bridge in the world and was completed in 1937 at a cost of more than 32 million.

The multiple arched Atchafalaya Bridge stretches across the Atchafalaya River at Morgan City, Louisiana. This bridge is said to have the largest set of piles of any bridge in the world.

Recently constructed Chesapeake Bridge featuring several types of bridge construction, including suspension and truss design. This bridge links the city of Annapolis with the eastern shore of Maryland.

The steel arched Bayonne Bridge crosses the Kill van Kull from Bayonne, New Jersey, to Port Richmond on Staten Island. Length of the main structure is 5780 feet, the arch span is 1675 feet.

New Jersey's Pulaski Skyway speeds traffic from the Holland Tunnel to Newark and Jersey City. Of cantilever construction, it was completed in 1932 and it spans the Passaic River 550 feet wide at this point.

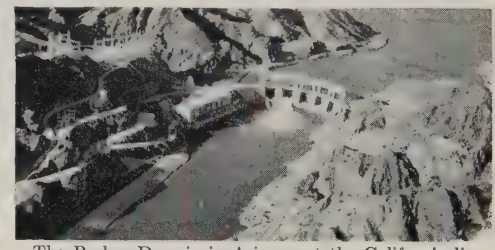
The Harlem River lift bridge, integral part of New York City's famous Triborough Bridge.

GREAT AMERICAN DAMS

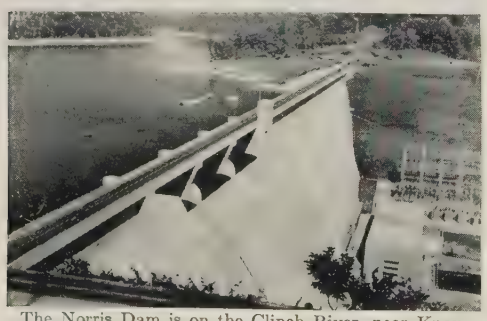
Fontana Dam, on the Little Tennessee River in North Carolina's Great Smoky Mountains, is 480 feet high. The average rainfall in this area is 84 inches. The dam assures flood control and electric power for the T. V. A. system.

The Grand Coulee Dam on the Columbia River, Washington, is 553 feet high and creates a lake of 127 square miles. This water will be used to irrigate land to provide a living for about 350,000 people.

The Roosevelt Dam is on the Salt River in Arizona. It is 1125 feet long, 280 feet high and provides water for the irrigation of the arid country below it. It also assures flood control and provides electric power.

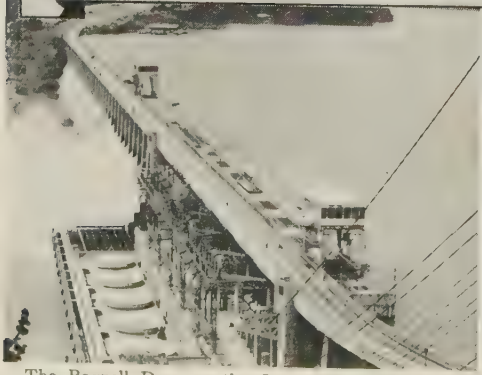


The Parker Dam is in Arizona at the California line. It creates a reservoir in the Colorado River. From this an aqueduct 242 miles long carries water to Southern California. Powerhouses shown provide electricity.



The Norris Dam is on the Clinch River, near Knoxville, Tennessee. It is 265 feet high, and creates a reservoir of 837 million gallons of water. It is valuable in flood control and provides electric power for the area.

Wheeler Dam, on the Tennessee River in Alabama, was completed in 1936. It provides flood control and electric power, and improves navigation. Power generators may be seen at right of picture.



The Bagnell Dam on the Osage River in Missouri creates the Lake of the Ozarks. Its maximum height is 148 feet and its volume is 551,000 cubic yards. The dam powerhouses generate the electricity used by the area.

The Coolidge Dam across the Gila River in Arizona, completed in 1928, is of the concrete multiple-dome type. It conserves water for the irrigation of very arid country and assures an ample supply of electricity.

Chemical Engineering. A chemical engineer designs and operates the process and special equipment necessary for commercial preparation of chemical substances. His field includes the production of acids and alkalies, dyes, fertilizers, gases, explosives, synthetic drugs and perfumes, and also of many products, such as leather, paper, soap, starch, glucose, and sugar, which frequently do not suggest the chemical methods by which they are prepared.

Sanitary Engineering. A branch of civil engineering which deals with problems such as providing a community with pure water, and disposing of sewage, garbage, and other refuse, in such a manner as to avoid danger to the public health. In addition to the fundamental civil engineering, a sanitary engineer must, therefore, have special training in biology, bacteriology, and chemistry.

Military Engineering. This consists in the application of engineering principles to military problems. The military engineer is essentially a civil engineer who has specialized in the design and construction of permanent forts, military bridges, roads, railroads, barracks, and camps. The plans for dugouts, trenches, tunnels, barbed wire entanglements, and the placing of mines and big guns are all under the direction of the military branch called, in the United States army, the Corps of Engineers. On graduation at West Point, the cadets ranking at the head of their class are usually assigned to this corps, which, in addition to purely military duties, has charge of navigable rivers and harbors, and also of the bridges and roads in Crater Lake and Yellowstone national parks.

The mechanical engineering involved in the production of guns and ammunition for the United States army is done under the direction of the department of ordnance. The magnitude of the work may be best appreciated after considering the size of one of the 16-inch guns guarding the Panama canal. It weighs 130 tons and is 49¼ feet long, tapering from a diameter of 28 inches at the muzzle to 5 feet at the breech. The projectile weighs 2400 pounds, and, when driven by a full charge of 667 pounds of powder, leaves the bore at the rate of about half a mile per second. When the gun is fired, the gas pressure on the base of the shell equals 19 tons to the square inch, or about 180 times the pressure on the foundations of a great skyscraper. If the tallest known building were placed on top of the earth's highest mountain, ten miles away from this gun, the engineers in charge could fire a shell over the obstacle with a fair chance of striking a target 21 miles distant.

Graduates of the United States Naval Academy are all trained as mechanical engineers. Those wishing to specialize in the designing of warships are given advanced courses in *naval architecture*; those who are to have control of a ship's engines, are given special courses in *naval engineering*. It is these specialists who decide upon the number and size of the guns, the type and size of the power plant, and the thickness of armor plate on a battleship; the size and equipment of submarines; the design of torpedoes, mines, depth bombs; and similar engineering problems relating to the navy.

Aqueduct (Latin, *aqua*, "water"; *ducere*, "to lead"). An artificial channel or system of conduits through which a large volume of water may flow for a long distance under the action of gravity. Aqueducts are generally used when a city is unable to obtain a near-by supply of water. And, because water is absolutely necessary, aqueducts were used by some of the most ancient cities of which there is any record.

The earliest aqueducts were tunnels, but the Romans developed the use of masonry conduits carried across the country on tall, arched piers. It is this type of structure which is generally associated with the name aqueduct. Modern engineers are returning more and more to the use of tunnels, preferring siphons—which are U-shaped tunnels—instead of bridges, for carrying the water across a river or a low level.

Rome was supplied with water by eleven aqueducts, constructed between 312 B. C. and 226 A. D. The longest of these, the *Anio Novus*, had a length of 62 miles. The *Aqua Virgo*, or *Aqua Vergine* as it is called in the modern Italian language, was restored by the popes Nicholas V and Pius IV and now supplies water for several fountains in Rome. Among the many aqueducts built throughout the Roman Empire, that at Segovia, Spain, and the Pont du Gard at Nimes, France, are probably most famous.

There are many modern aqueducts of great length. In England, Liverpool has a 68-mile aqueduct and Manchester one of 96 miles. Vienna, Austria, obtains water through a conduit 114 miles in length. Longest of all is the Pugliese aqueduct, which supplies 536 Italian towns with water, and has a total length of 1175 miles. The city of Winnipeg, Canada, has a 100-mile aqueduct, and Denver, Colorado, brings a part of its water a distance of 20 miles through large wooden pipes.

The Catskill aqueduct, built to supply New York City with an additional 600 million gallons of water per day, was completed in 1917 at a total cost of 177 million dollars. The water, obtained from the Esopus and Schoharie watersheds, is first stored in the Ashokan reservoir, which has sufficient capacity to cover all of Manhattan island to a depth of 30 feet. The aqueduct proper, 92 miles long, is composed of 55 miles of cut-and-cover conduit, 31 miles of tunnel, and 6 miles of steel pressure tubing. The cut-and-cover sections are made by excavating a channel, in which a 17-foot concrete conduit is built and then covered with earth. The water is carried under the Hudson river at Storm King, about 4 miles above West Point, by means of a siphon consisting of a tunnel 3022 feet long, bored through solid rock at a depth of 1100 feet below sea level. The aqueduct ends at Hill View reservoir, and the water is distributed to the city from a pressure tunnel 18 miles long, which passes the length of Manhattan island and into Brooklyn at a depth of 200 to 700 feet below the streets.

The Los Angeles aqueduct, built between 1908 and 1913, begins at the Owens river, which, with about 35 contributing streams, drains an area of 2800 square miles in the Sierra Nevada. The total length of the aqueduct is about 233 miles. For 60 miles the water is carried in open canal to the Haiwee reservoir. From the end of the reservoir, which is 3760 feet above sea level, the water flows to its destination through 98 miles of covered conduit, 43 miles of tunnel, and 12 miles of steel siphon. As Los Angeles has an elevation of only 275 feet, the water, in coming from the reservoir, has a total drop of almost 3500 feet and thus serves as a source of electrical energy capable of producing 120,000 horse power. The aqueduct is designed to carry 260 million gallons of water per day, and, as there is not yet need for so great an amount, the excess is used for irrigation purposes. The total cost of the aqueduct was about 24 million dollars.

The great Hetch Hetchy project for supplying water for the city of San Francisco involves the construction of an aqueduct 170 miles long.

Bridge. The first artificial bridges were probably tree trunks or strong vines used by primitive man to cross some narrow gorge or stream. Simple bridges, consisting of logs of wood or slabs of stone supported at each end, were used by the earliest known groups of mankind.

The arch bridge was probably first used by the Chinese. Simple brick arches have been discovered among Egyptian ruins, but whether or not the Egyptians used arch bridges is unknown. Bridges are not mentioned in the Bible, but according to other records a brick arch was erected across the Euphrates river within the city of Babylon. *Pontoon*

bridges, which are carried on boats or other floating supports, were used for military purposes by Cyrus and other Persian kings as early as the 6th century B. C.

The stone arch was developed by the Romans, who used it especially for strong monumental bridges, some of which are still standing. Smaller Roman bridges usually consisted of wooden beams resting either on stone or on timber foundations. In the 16th century Leonardo da Vinci and Palladio invented the wooden truss and used it in constructing bridges. The first metal arch bridge was made of cast iron and erected at Coalbrookdale, over the Severn river, in 1776. Cast iron was displaced by wrought iron after the investigation carried out for Robert Stevenson when planning the famous tubular bridge across Menai Strait. Later, steel displaced wrought iron, and now ordinary steel is gradually giving way to special alloy steels. At the present time the principal structural materials for bridges are steel, concrete, and masonry.

Bridges may be classified, according to the methods used for supporting the weight, as girder or truss, suspension, arch, and cantilever.

A modern *girder bridge* rests upon strong beams or girders of steel or re-enforced concrete, supported by firm foundations at either end. The girders may be single steel I-beams for small crossings, or *plate girders* built up from steel plates carefully riveted together. Plate girder bridges are the standard type for distances of 20 to 100 feet. The longest plate girder is 130½ feet; another, of 122½ feet, is heavier, weighing 170 tons.

A *truss bridge* may be considered as one composed of enormous girders from which all excess material has been cut away, leaving only a network of braces and connecting members. The ribs of a truss are always arranged to form triangles, because triangular bracing gives the most rigid structure obtainable. Simple truss bridges have been built with spans up to 720 feet in length.

A *suspension bridge* is carried by ropes, chains, or cables, fastened at both ends. This type of bridge has frequently been used by primitive people; it is occasionally used for military purposes; and it has been employed for some of the most famous bridges in the world, notably those of New York City, San Francisco, Philadelphia, and Detroit. Of these, the Oakland Bay bridge at San Francisco, completed in 1936, has the longest span, 4620 feet. The weight of the cables supporting the Delaware River bridge connecting Philadelphia and Camden is 7000 tons. They contain a total of 25,100 miles of wire, a length exceeding the circumference of the earth. The oldest suspension bridge in the United States is the 1057 foot suspension bridge connecting Cincinnati, Ohio, with Covington, Kentucky, completed in 1867.

Arch bridges are so constructed that the load imparts an outward thrust which must be carried at each end by heavy structures, called abutments. In building a bridge of this type, false work or centering of some sort is necessary to carry the load until the arch is completed. It is interesting to note that the first masonry arch across the river Tiber—the Pons Æmilius—was begun about 179 B. C., and in 1911 the longest re-enforced concrete arch then built—the Risorgimento arch, with a span of 328 feet, 1 inch—was completed over the same river. One of the largest arch bridges in America is that over Hell Gate, New York City. It is made of steel, with a hinge at each end to relieve excessive strains. When the foundations for one of the abutments were being sunk, it was discovered that there was a wide crack in the rock, which had been thought to be solid. In order to prevent any settling, a concrete arch was built across the gap, so that the Hell Gate bridge is partially supported by another bridge that is buried 90 feet underground. The Kill van Kull bridge, New York, has the longest steel arch in the world, 1652 feet.

Cantilever bridges consist of trusses arranged like a bracket on a wall, that is, they are supported at one end, while the free arm reaches out over the space to be bridged. In practice, the heavy columns which are to carry the weight are usually erected on strong foundations, with an arm extending in opposite directions so as to give a balanced structure. The shore arm is then fastened to heavy anchor foundations. By placing a cantilever on opposite sides of a river, panel after panel can be added to the free arms until they meet at the center. The greatest bridge in the world of this type crosses the St. Lawrence river at Quebec, with a distance of more than one-third of a mile between the central piers. Construction was begun in 1903. In 1907, when the south cantilever was almost finished, one of the main supporting members gave way and the structure fell into the river. In the new bridge, begun in 1911, an opening of 640 feet was left between the arms. The truss to fill this span was constructed on the shore, floated out under the bridge, and lifted by means of hydraulic jacks. When about 15 feet above the water, the connections at one corner slipped, and the truss, weighing 5000 tons, collapsed and fell into the water. The following year, a second span was successfully raised into place. Seventy-four men were killed at the first accident, and eleven at the second.

The ordinary *bascule* or *jackknife bridge* is a girder or truss, hinged at one end and counterbalanced by weights so that it may be swung up like the blade of a pocketknife.

A *rolling lift bridge* is a bascule which turns up on the rounded ends of its own base instead of on a hinge.

A *vertical lift bridge* usually consists of a truss placed between two towers. Cables or levers connect the truss to counterbalancing weights, so that the power of a comparatively small motor is sufficient to raise the bridge straight up.

A *swing bridge*, erected on a turntable at its center, is sometimes preferred because it gives two channels, one on either side of the open bridge. When closed, a swing bridge is usually a simple truss, but the open bridge is a cantilever.

Viaducts, in the ordinary use of the term, are bridges carried across a valley or other low level, on towers. The towers may be high or low, and the spans are usually comparatively short.

A girder or truss bridge pushes down on its foundation piers, a suspension bridge pulls inward, and an arch pushes outward. A cantilever pushes down on its main pier, but may pull up on the anchorage. In addition to the *dead load* or weight of the bridge itself, the engineer must include in his calculations the *live load* which it is to carry, together with the added strain due to starting and stopping of trains, and a possible wind pressure of 30 or more pounds on each square foot of surface.

Canal Locks. Among the most important structures connected with a canal are the locks. These act as a step or as an elevator to raise or to lower a vessel from one water level to another. They are used where there is a change in the elevation of a canal.

An ordinary lock consists of a rectangular basin provided with heavy, water-tight gates at both ends. The sides of the lock and the top of the gates extend above the highest part of the canal. When the gates at one end are open, those at the other end must be closed in order to hold back the water.

When a vessel, traveling upstream, enters a lock, the gates are tightly closed behind it. Water is then admitted to the lock chamber, and the boat gradually rises until it reaches the upper level of the canal. The gates in front are then swung open, and the way is clear. To lower a vessel, the process is reversed, and the water flows from the lock until the lower level is reached.

Locks are occasionally constructed so that the entire chamber is raised or lowered. Sometimes two such chambers are connected and balanced so that

one is raised when the other is lowered. In such cases only sufficient water is transferred to make the upper chamber slightly heavier than the other, so that the change in position is caused by gravity.

Dam. Any barrier used to stop the flow of a liquid is called a dam. In engineering, however, the term refers to a structure built across a watercourse, and provided with a spillway over which the water confined behind the wall can flow when it rises to the proper level.

By means of a dam, the depth of a shallow stream may be increased until it is sufficient for the passage of boats and barges; water can be stored for the use of municipalities, for manufacturing, or for irrigation; and power can be generated. The last-named purpose has motivated the construction of most of the recent great dams, the power developed being transmitted in the form of electricity.

The design and construction of large dams requires a high degree of engineering skill because of the enormous pressure exerted by the water. This pressure depends not on the volume, but on the height, of the water held behind the dam. Each vertical foot of water imparts a pressure of .433 pounds on every square inch of surface, so that at the bottom of a dam where the water is 100 feet deep there is a pressure of 3.1 tons per square foot.

Few dams are more famous than that across the Nile river at Assuan. Since the dawn of civilization, the years of rich harvests and the periods of famine in the Nile valley have depended on the height to which the river would rise during the annual flood. The average rise has been about 25 feet; 30 feet meant destruction and ruin, while 18 feet meant poor crops and starvation. But now the reservoir behind the dam not only affords control of the river's flow, but supplies enough water to irrigate 6 million acres that formerly were desert.

Dams are built of timber, earth, concrete, masonry, and occasionally of steel. Earth dams frequently have a thin core of concrete, which prevents the water from trickling through the earth and gradually ruining the dam. The center of the Gatun dam was pumped into place by hydraulic dredges which took up the mud from the river bottom and deposited it between walls of stone. The water drained away, leaving a very firm structure.

Automatic dams are frequently used on canals where it is desired to keep the water level as high as possible. Movable dams of the "bear-trap" type

SOME IMPORTANT DAMS OF THE WORLD

Name	Location	Completed	Type	Height Feet	Length on Top Feet	Width in Feet	
						Top	Base
Arrowhead	California	1909	Earth *	222	850	20	950
Arrowrock	Boise R., Idaho	1916	Concrete (a)	349	1,100	15½	238
Ashti	Ashti R., India	1878	Earth	58	12,709	6	182
Assuan	Nile R., Egypt	1934	Masonry	174	6,970	36	92
Barossa	South Australia	1903	Concrete (a)	112	472	4½	42
Bartlett	Verde R., Ariz.	1939	Multiple arch	287	750	20	1,700
Belle Fourche	South Dakota	1909	Earth	122	6,493	19	650
Bonneville	Columbia R., Wash., Ore.	1937	Concrete	170	1,282	40	180
Camarasa	Spanish Pyrenees	1920	Concrete	333	460	21	250
Cataract	Sydney N. S. W.	1908	Concrete (a)	192	811	16½	158
Cheoah	Little Tennessee R.	1918	Concrete	225	725	12	175
Cobble Mountain	Little R., Springfield, Mass.	1930	Earth	245	700	50	1,505
Columbia	Susquehanna R., Pa.	1875	Timber	11	6,847	16	30
Conowingo	Susquehanna R.	1928	Concrete	105	4,700	22	105
Coolidge	Gila R., Arizona	1928	Multiple dome	251	550	4	20
Diablo	Skagit R., Rockport, Wash.	1930	Concrete arch	446	1,180	16	140
Dix River	Kentucky	1925	Rock-fill	278	1,020	20	650
Dnieprostroy‡	Dnieper R., Ukraine, Russia	1932	Arch gravity	200	5,000	73	140
Don Pedro	Tuolumne R., Cal.	1923	Concrete	280	1,040	16	177
El Azucar	San Juan R., Mexico	1945	Earth	138	19,360	26	1,661
Elephant Butte	Rio Grande R., New Mex.	1916	Concrete (a)	305	1,310	18	215
Fort Peck	Missouri R., Mont.	1939	Earth *	242	20,000	13	2,875
Gatun	Panama	1913	Earth	105	7,800	400	2,600
Gilboa	Schoharie Creek, N. Y.	1926	Concrete, earth	160	2,300	15	158
Grand Coulee	Columbia R., Wash.	1942	Concrete	553	4,200	30	490
Grimsel	Central Switzerland	1930	Concrete gravity	373	656	15	224
Hetch Hetchy	Tuolumne R., Cal.	1922	Concrete	427	600	15	298
Hoover	Colorado R., Ariz. Nev.	1935	Concrete gravity	727	1,180	45	650
Kensico	White Plains, N. Y.	1917	Masonry	307	1,843	28	235
Keokuk	Miss. R., Keokuk, Ia.	1913	Concrete	53	4,649	29	42
Lake Cheesman	S. Platte R., Colo.	1904	Masonry	236	700	18	176
Lloyd	Yelmandi R., India	1927	Rubble masonry	190	5,333	19	124
Morena	San Diego, Cal.	1909	Rock-fill	278	520	16	357
Norris	Clinch R., Tenn.	1936	Concrete	265	1,872	30	405
Necaxa No. 2	Necaxa R., Mex.	1911	Earth	190	1,220	54	975
New Croton	Croton R., N. Y.	1906	Masonry	297	1,168	18	206
Olive Bridge(Ashokan)	Esopus Creek, N. Y.	1913	Masonry	252	1,000	26	200
Owyhee	Owyhee R., Oregon	1932	Concrete	417	1,010	30	265
Pacoima	San Fernando, Cal.	1928	Concrete	372	640	10.4	100
Pardee	Mokelumne R., Cal.	1929	Concrete arch	358	1,337	..	241
Poona	India	1872	Masonry	108	5,136	14	61
Roosevelt	Salt R., Ariz.	1911	Masonry	280	1,125	16	158
Salt Spring	Mokelumne R., Cal.	1932	Rock-fill	332	1,300	15	900
Saluda R.	S. Carolina	1930	Earth	208	7,838	25	1,150
San Antonio	Spanish Pyrenees	1916	Concrete	300	670	13	230
Sautet	France	1934	Concrete arch	414	263	..	..
Seminoe	North Platte R., Wyo.	1939	Concrete arch	261	560	15	85
Sennar	Nile R., Upper Egypt	1926	Masonry	130	9,915	15	50
Shasta	Sacramento R., Cal.	1945	Concrete gravity	602	3,500	..	..
Shoshone	Shoshone R., Wyo.	1910	Masonry	328	200	10	108
Sukkur	Indus R., India	1932	Masonry	185	4,725	..	..
Tansa	India	1891	Masonry	118	8,800	12	100
Tieton	Yakima project, Wash.	1925	Earth *	232	900	25	1,200
Wachusett	Nashua R., Mass.	1906	Masonry	228	1,476	25	187
Wilson Dam	Muscle Shoals, Ala.	1925	Concrete	137	4,860	..	105

*With concrete core. ‡Destroyed by Russian army in 1941 to prevent use by invading Germans and later rebuilt.
(a) Called also cyclopean masonry, because, where possible, enormous boulders are set in the concrete.

are equipped at the top with hinged, floating leaves, which rise and fall with the water level so that the depth of flow over the dam is always about the same. On small structures the water usually flows directly over the top, but, in large dams, the excess water passes through control gates and over a spillway. The highest dam in the world is the Hoover dam at Black canyon in the Colorado river, which rises 727 feet above the river bed.

The multiple arch, hollow, concrete dam is a form of structure which is coming into extensive use. The ability of this type to withstand great water pressure depends on the strength of comparatively thin, concrete arches, rather than on the weight of massive walls. The same principle is involved in the multiple dome dam, consisting of concrete forms facing upstream, each one shaped like one quarter of an egg shell cut axially.

Cofferdams are water-tight enclosures open at the top and used where it is necessary to work in places that would ordinarily be covered with water. In order to examine the sunken battleship *Maine*, which lay in Habana harbor at a depth of about 37 feet, an oval cofferdam was built around the vessel so that the water could be pumped away.

Embankments placed parallel to the course of a stream so as to prevent the flooding of the surrounding country are known as *levees*.

The term *dike* originally referred to an artificial ditch or canal. Later, it was also applied to the mound of earth thrown up beside the excavation, and eventually to any embankment or wall, especially one used to prevent floods.

Jetties are dikes built, usually at the mouth of a river or harbor, to direct the flow of the tide or the river current in such a way as to scour out a deeper channel. One of the most important uses of jetties has been to make navigable the mouth of the Mississippi river. The longest jetty in the world, 42¾ miles in length, was built to preserve a channel at the mouth of the Columbia river.

Locomotive. The first locomotive used commercially in the United States was called the *Stourbridge Lion*. It was built in England and was put into service in 1829. The first to be built in America for commercial purposes was the *Best Friend*, which was manufactured for the Baltimore and Ohio railroad in 1830. It was destroyed by an explosion after about seven months of service. In 1831, the *De Witt Clinton* was put into operation. On its first run from Albany to Schenectady, a stretch of 17 miles, it covered the distance in 1 hour and 45 minutes, but the return trip was accomplished in 38 minutes. Its weight was 12,098 pounds, or less than that of a single pair of driving wheels on a standard Pacific type engine of today.

The chief improvements in the locomotive have been devices to secure greater pulling power and more efficiency. These purposes have been effected partly by the use of stronger boilers and *greater steam pressure*. Some locomotives now operate at a boiler pressure of 250 pounds per square inch. Certain ones in Germany have been constructed to use a pressure of 750 pounds. A second improvement has resulted from *superheating the steam*. Superheated steam acts as a gas under pressure and can do a certain amount of work without condensing. A third improvement has been the introduction of *compound cylinders*, by which the engine is changed from the simple to the expansion type. See *Steam Engine*.

Among the largest and most powerful steam locomotives in the world is one built for the Northern Pacific railroad in 1928. It is 175 feet long, weighs 500 tons, generates 6000 horse power and is capable of hauling on the level a train over two miles long. It is driven by two pairs of cylinders, each connected with eight drive wheels. Electric locomotives weighing 600 tons and having a length of 150 feet are not unusual. The greatest speed attained by a locomotive,is 112 miles per hour, which was made in 1893 by the New York Central engine number 999 while hauling the Empire State Express.

In 1937, there were about 47,000 locomotives operating in the United States. This represents a decrease from the maximum of 65,358 in 1924 and indicates a trend toward fewer and more powerful locomotives, but since 1944 there has been a great upsurge in the use of Diesel-electric motive power. In 1952 it handled 65.5 per cent of freight traffic, compared with 32.6 per cent for steam locomotives and 1.9 per cent for other locomotives. The same advance has been made in passenger traffic, with Diesels hauling 71.5 per cent of the traffic in 1952.

In recent years, there has been a conspicuous trend toward the electrification of railroads. In a test made at Erie, Pa., an electric locomotive was pitted against two large steam locomotives of the New York Central railway in a pushing contest. It was found that the electric locomotive was able, not only to stop the two steam locomotives, which had been allowed first to develop a high speed, but forced them backward against the full force of their driving power.

The ordinary electric locomotive takes its power from an electrified line. Some locomotives, however, develop their own electric power either from Diesel engines or from a steam turbine engine.

Locomotives designed for high speed are usually streamlined to reduce air resistance. The necessity of providing for locomotives and cars a level track over or through natural obstacles has set for civil engineers many of the most difficult problems they have had to solve. Most of the great bridges and tunnels of the world have been built for railways and have been among the greatest triumphs of civil engineering.

The following table shows the standard types of American steam locomotives:

Symbol*	Type	Special Use
0–6–0	6-wheel switcher	Switching
2–8–0	Consolidated . .	General freight
2–8–2	Mikado	General freight—sharp curves
2–10–0	Decapod	Heavy freight
2–10–2	Santa Fe	Heavy freight—sharp curves
2–10–10–2	Mallet articulated†	Heavy freight
2–8–8–8–2	Mallet articulated triplex†. . . .	Heavy freight
4–4–0	American . . .	Passenger and freight
4–6–0	Ten-wheeler . .	Passenger, fast freight
2–6–2	Prairie	Heavy passenger, fast freight
4–4–2	Atlantic	High speed passenger
4–6–2	Pacific	Fast heavy passenger, fast freight
4–8–2	Mountain . . .	Heavy passenger

* The first figure in each entry indicates the number of smaller wheels under the front; the last figure denotes the number of trailing wheels under the rear; the intermediate figures indicate the number and the grouping of the driving wheels.

† In this type, the frame is jointed, or articulated, to facilitate the passing of curves.

Skyscraper. The first requirement of a modern skyscraper, and one of the most important, is a firm foundation. If possible, the foundation should rest on bed rock, but, where a heavy structure must be located over sand, soft clay, or peat, the difficulties of obtaining a solid foundation are often very great.

One of the most satisfactory methods is to drive piles through the soft earth until they reach solid rock. Or, if the ground is comparatively firm, a great number of piles may be driven until the total resistance of the earth to further settling of the piles is sufficient to carry the weight of the building. The Illinois Central Railway passenger station in Chicago is thus supported on about 1700 wooden piles, driven to a depth of from 40 to 60 feet by means of one-ton to two-ton drop hammers. In 1920, when an American firm received a contract to build modern steel office buildings in Japan, 13,000 piles of Oregon pine were shipped across the Pacific to form foundations in the city of Tokyo.

HIGH BUILDINGS AND TOWERS

Name and Location	Height in feet
Empire State, New York, N. Y.	1248
Chrysler, New York, N. Y.	1046
Eiffel Tower, Paris, France	984
Cities Service (Sixty Wall Tower), New York, N.Y.	950
Bank of the Manhattan, New York, N. Y.	927
R.C.A. Tower, Rockefeller Center, New York, N.Y.	850
Woolworth, New York, N. Y.	792
City Bank-Farmers Trust, New York, N. Y.	759
Terminal Tower, Cleveland, Ohio	708
Metropolitan Tower, New York, N. Y.	700
Chanin Tower, New York, N. Y.	680
Lincoln, New York, N. Y.	678
Penobscot, Detroit, Mich.	658
American Exchange-Irving Trust, New York, N. Y.	646
Waldorf-Astoria, New York, N. Y.	626
Sherry-Netherland Hotel, New York, N. Y.	620
Mercantile, New York, N. Y.	620
General Electric, New York, N. Y.	616
Singer, New York, N. Y.	612
New York Life Insurance, New York, N. Y.	610
Board of Trade, Chicago, Ill.	605
Prudential Building, Chicago, Ill.	601
U. S. Court House, New York, N. Y.	590
Gulf, Pittsburgh, Pa.	582
Municipal, New York, N. Y.	580
Carew Tower, Cincinnati, Ohio	574
Civic Opera Building, Chicago, Ill.	571
New York Central, New York, N. Y.	565
Continental Bank, New York, N. Y.	562
Pittsfield, Chicago, Ill.	557
Temple, Chicago, Ill.	556
Le Veque Lincoln Tower, Columbus, O.	555
Washington Monument	555
City Hall, Philadelphia, Pa.	548
Equitable Trust, New York, N. Y.	542
Transportation Bldg., New York, N. Y.	542
Ritz Tower, New York, N. Y.	540
Bankers Trust Co., New York, N. Y.	539
Field Estate, Chicago, Ill.	535
No. 1 LaSalle St., Chicago, Ill.	531
Ulm Catnedral, Germany	529
Travelers Insurance, Hartford, Conn.	527
Morrison Hotel, Chicago	526
Cathedral of Learning, University of Pittsburgh	523
Cologne Cathedral, Germany	512
Pyramid of Cheops, Egypt	481

Piles may be of wood, concrete, or steel. One of the most effective types consists of a hollow steel tube, driven with a pile driver. Earth and stones are blown out of the cylinder by compressed air, and the interior is filled with concrete.

When the piles are all in place, the tops are cut off at exactly the same height, and care must be taken that wooden piles are entirely below water level, because, when covered with water, wood is preserved almost indefinitely. The platform type of foundation usually consists of steel beams piled in layers to form a pyramid. Each layer is placed at right angles to that below, and all are covered with concrete.

To support the enormous weight of the skyscrapers of New York City, the foundations are sunk to bed rock by means of open cofferdams or closed pneumatic caissons. The caisson may be a huge timber box or steel cylinder, open at the bottom, but closed at a height of 8 or 10 feet so as to form a working chamber. Above the working chamber the caisson is filled with concrete, which is pierced by vertical shafts for the passage of men and materials. The top of each shaft is closed by an air lock, for, as the earth is removed at the bottom and the structure gradually sinks, the pressure of the air must be raised to prevent the surrounding water from flowing into the working chamber. A depth of 100 feet is about the limit to which the pneumatic caisson can be used, because of the difficulty of working under an air pressure of over 45 to 50 pounds. At these pressures a total of 90 minutes in the caisson is considered a full day's work. When the edges of the caisson reach rock, the working chamber and shafts are filled with concrete, thus forming a solid pillar.

After the foundations have been completed, the steel skeleton is rapidly placed in position. First the massive columns are erected and bolted temporarily to the crossbeams that form the floor. Each piece can be placed quickly in its proper position because at the steel mill, where it was rolled into shape and punched or drilled with rivet holes, it was marked with a number corresponding to the blue-printed plans. Bolts are soon replaced by red-hot rivets which are fixed in place by means of noisy pneumatic hammers.

At each floor the girders extend beyond the wall columns in order to form a short shelf, on which the wall for that floor is carried. Because of this arrangement by which each floor supports its own wall, it frequently happens that offices on one floor of a large building are occupied before the walls either above or below are placed in position. Floors are formed by brick or hollow tile arches, or by concrete slabs, placed between or over the beams. All of the steel skeleton is carefully painted to prevent rust, and, wherever possible, is covered with concrete, plaster blocks, or terra cotta, as protection against fire. The columns especially require this protection because, if they should warp or bend under the action of an intense fire, the entire building would probably be ruined.

Tunnel. An underground passage which may be used for such purposes as railroad, foot, and ordinary vehicular traffic; for conducting water, sewage, and gas; or for pipes and cables. The term tunnel, as generally used, refers to an artificial passageway, horizontal or nearly so, open at both ends, and constructed without removing the surface soil.

Tunnels cut through solid rock with the aid of simple hand tools were built by many of the ancient civilized nations, including the Egyptians, Assyrians, Greeks, Aztecs, Peruvians, and the natives of India. The oldest known tunnels were used as the entrance to a royal tomb or for religious purposes, but by 500 B. C. the Greeks were using tunnels for mining.

The Romans, who surpassed all previous nations as engineers, built tunnels for use as roads, aqueducts, sewers, and mine galleries, not only at Rome, but in what is now France, Switzerland, Spain, Portugal, Algeria, and Turkey. In order to drain Lake Fucinus, the emperor Claudius, about 52 A.D., completed a three-mile tunnel, 9 feet wide and 19 feet high. The Romans understood *fire setting*, which consists in first heating a rock surface by means of fires and then cooling it suddenly with water in order to produce cracks.

During the middle ages every castle had a secret tunnel, serving chiefly as a means of escape in case of defeat. Most of the famous modern tunnels have been built to supply the need for a better and a quicker means of railroad or automobile transportation. But inspection of the table, *Some Important Tunnels of the World*, shows that the longest tunnels are used as aqueducts for the transportation of water and for draining water from mines.

In the construction of large rock tunnels, small sections are first drilled and blasted out. These openings are then gradually enlarged to full diameter. If the first cutting is at the top of the tunnel, it is called a *heading;* if at the bottom, a *drift.* In building the Rogers pass, later named the Connaught tunnel, great speed was required. A small pioneer tunnel, parallel to the main boring, was therefore constructed first, so that, by cutting cross passages, work could be carried on in several sections at the same time. Of an entirely different type are those of which the earliest important example was the railroad tunnel under the river between Detroit, Michigan, and Windsor, Ontario. This tunnel, consisting of two parallel tubes, was built on land, in twenty sections having the form of enormous, hollow, steel cylinders. Each section, 23⅓ feet in diameter and about 262 feet long, was closed at both ends, floated into position, and then sunk to foundations which had been dredged on the river bed. The sections were joined, covered with concrete, and also given a concrete lining. The Detroit-Windsor vehicular tunnel and the Oakland-Alameda tube are later examples of this type.

The first of the great transalpine tunnels, the Mont Cenis, was driven from both ends. The work was so accurate that, when the borings met after 13 years of labor, there was a difference in alignment of only one inch. During the construction of the St. Gotthard tunnel, conditions were so severe that 800 of the workers died. The Simplon tunnel, which now consists of two parallel tunnels 16½ feet in diameter, was most difficult of all. This tunnel passes through the mountains at a depth of 5000 to 7000 feet below the peaks. The pressure was so great that in places great steel beams were necessary to hold the rock walls in place. Cold springs at times poured as much as 17,000 gallons of water a minute into the first tunnel, and, near the center, hot springs were encountered which raised the temperature of the air to such a degree that it was necessary to spray the walls with cold water. The second tube was completed in 1921.

The many miles of tunnel under New York City represent one of the greatest achievements of engineering skill. The New York City extension of the Pennsylvania railroad, which crosses from New Jersey, under the Hudson river to the Pennsylvania terminal, and then under East river to Long Island, has a total length of only 13.68 miles. Yet the average cost of this short extension was almost 6 million dollars a mile. One of the chief engineering problems in the construction of the Holland vehicular tunnel was to provide proper ventilation. Powerful fans change the air completely 42 times each hour.

Construction of tunnels, such as the Pennsylvania and the Hudson and Manhattan tubes, through clay and silt, under a river bed, is much more difficult and dangerous than blasting through solid rock. The use of compressed air is often necessary in the head of the tunnel to balance the pressure of the surrounding water. In one case, where the river bed above the tunnel was very thin, a blow-out occurred, in which a workman was carried by the escaping air up through the bed of the river to the surface of the water, where he was rescued.

One of the greatest aids in soft ground tunneling is the *shield*, which is a short, hollow cylinder slightly larger in diameter than the tunnel. The forward end is closed and is provided with several strong doors through which the workman may pass to excavate, if the nature of the ground permits. The shield is pushed forward by hydraulic rams, and the cast-iron or concrete lining of the tunnel which is thus formed is constructed under the protection of the rear walls of the cylinder. Various unusual expedients are sometimes necessary. In tunneling through soft clay, huge torches have been used to bake the ground hard. In order to drive an opening through wet quicksand, the earth has been frozen by artificial refrigeration.

The largest tunnel in the world is the Rove, which forms a part of the canal between the Rhone river and Marseille, France. It is 4½ miles long and, with a height of 40 feet and a width of 72 feet, it is almost six times as large in cross section as an ordinary railroad tunnel.

The first transportation tunnel in the United States was a part of the Schuylkill Navigation canal, opened in 1821. The first railway tunnel in the United States was 901 feet long. It was constructed in Pennsylvania, between 1831 and 1833, for the Allegheny Portage railroad. Neither tunnel is now in existence.

SOME IMPORTANT TUNNELS OF THE WORLD

Name	Location and Use	Length Miles	Years in Construction	Approximate Cost
Appenine	Italy; Florence Bologna R. R.	11.5	1923-1928	$24,735,000
Arlberg	Austrian Alps; R. R.	6.23	1880–1884	7,500,000
Arthur's Pass	South Island, N. Z.; R. R.	5.38	1908–1912	3,000,000
Brooklyn-Battery	Brooklyn-Manhattan; under East R.; vehicular	1 72	1940–1950	80,000,000
Caldera	Peru, S. A.; R. R.	1.75	–1893	
Cascade	Cascade Mts., Wash.; Gt. N. R. R.	2.6	1897–1900	1,250,000
Cascade, New	Berne-Scenic, Wash.; R. R.	7.78	1925–1928	10,000,000
Choacella	Part of 240-mile Colorado River—Los Angeles aqueduct, costing $230,000,000	18.3	1933–1936	
City No. 1	New York City; Aqueduct	18.11	1911–1914	26,400,000
City No. 2	New York City; Aqueduct	20 0	1928–1932	42,700,000
Connaught	Selkirk Mts., B. C.; Can. Pac. R. R.	5.0	1913–1916	6,500,000
Detroit River	Detroit, Mich.—Windsor, Ont.; R. R.	1 6	1906 -1910	10,000,000
Detroit International	Detroit, Mich.—Windsor, Ont.; vehicular	.95	1928–1930	10,000,000
Elizabeth Lake	Los Angeles Aqueduct, Cal.	5.1	1907–1911	1,088,000
Florence Lake	Southern Cal.; Aqueduct	12.8	1920–1925	17,000,000
Gravehals	Oslo—Bergen, Norw.; R. R.	3.3	1904–1909	
Grenchenberg	Jura Mts., Switz.; R. R.	5 3	1912–1915	3,500,000
Gunnison	Montrose, Colo.; Aqueduct	5 8	1905–1909	2,170,000
Hetch Hetchy	San Francisco Aqueduct, Calif.	18.0	1920–1923	
Holland	New York—New Jersey; under Hudson R.; vehicular	1.75	1920–1927	48,400,000
Hoosac	Hoosac Mts., Mass.; R. R.	4 31	1856–1873	11,000,000
Hudson & Manhattan	New York City—New Jersey	8.50	1875–1911	75,000,000
Jungfrau	Swiss Alps; R. R.	4.47	1897–1912	1,375,000
Khojak Pass	Quetta-Chaman, India; R. R.	2 44	1889–1891	
Loetschberg	Bern-Brig, Swiss Alps; R. R.	9.05	1906–1913	10,000,000
Mersey	Liverpool-Birkenhead; vehicular	2 16	1925–1934	40,000,000
Moffat	James Peak., near Denver, Colo.; R.R.; water system	6.1	1922–1927	14,500,000
Mont Cenis	France—Italy; R. R.	7.97	1857–1872	15,000,000
Mont d' Or	Jura Mts., France—Switz.; R. R.	3.8	1910–1915	4,060,000
Mt. Royal	Montreal, Can.; Can. North. R. R.	3.22	1910–1916	
Newhouse	Idaho Springs, Colo.; drainage and transportation	4.17	1893–1910	
N. Y. City Extension	New Jersey—Long Island; Penn. R. R.	11.7	1905–1910	100,000,000
Pirahy River	Rio de Janeiro, Brazil; Aqueduct	5.25	1911–1913	
Posey (Oakland-Alameda)	San Francisco bay; vehicular, trolley	.67	1926–1928	4,500,000
Ricken	Swiss Alps	5.35	1904–1910	2,500,000
Rothschönberg	Freiberg, Sax.; mine drainage	18.0	1844–1887	
Rove	On Rhone canal, France	4.5	1901–1927	27,000,000
Saint Gotthard	Switzerland—Italy; R. R.	9.33	1872–1882	11,500,000
Severn	England—Wales	4.36	1873–1886	
Shandaken	Gilboa—Allaben, N. Y.; Aqueduct	18.0	1919–1923	12,138,000
Simplon	Switzerland—Italy (Second tunnel built 1912-1921)	12.45	1898–1906	21,000,000
Sutro	Virginia City, Nev.; drain mines	3.79	1869–1878	
Tanna	Japan; under mountains for Tokkaido R. R.	4.85	1918–1932	
Tauern	Austrian Alps; R. R.	5.31	1901–1909	6,062,500
Tequixquiac	Drains City of Mexico	6.25	1880–1898	6,760,000
Transandine	Chile—Argentina	5.0	–1911	

MANUFACTURING

THE word manufacture is derived from the Latin *manus*, "hand," and *facere*, "to make." Literally, it means "made by hand." However, in modern usage, the term no longer imparts its intrinsic meaning, but almost invariably refers to the making of articles by power driven machinery rather than by hand-operated tools. This change in language is representative of far greater and more important changes in social and economic conditions, which were consequent to the Industrial Revolution that originated in England during the latter part of the 18th century.

For proper appreciation of the extraordinary effects of the Industrial Revolution, it is first necessary to consider the systems of manufacturing and the social conditions which this revolution displaced.

The Domestic System. Primitive manufacturing consists of the elemental processes involved in the preparation, for individual or family use, of food, shelter, clothing, ornaments, weapons, and tools. Manufacturing in the home, of products intended solely for domestic consumption, was customary in the earliest times of which there is any record. It was equally characteristic of the pioneers who settled the American West, and is always to be found where individual families must depend upon their own resources. The first advance in manufacturing practice came when some member of a household was able to produce a surplus of meal, cloth, leather, or other commodity, which could be sold outside of the home.

Origin of Handicrafts. Later, with the rise and development of large communities, specialization became possible. Men who were unusually skillful in building, weaving, metal working, or other handicraft were enabled to devote all their energies to their chosen occupations. Thus originated the numerous trades, such as those of carpenter, wheelwright, coppersmith, weaver, fuller, tanner, butcher, and baker. Eventually, the expert workers learned to combine for mutual benefit according to their distinctive handicrafts. Such combinations, which in Europe were known as craft guilds, gradually became very powerful and were able to exercise strict control over the individual members and their products.

As a rule, a master craftsman labored at home or in a shop connected with his dwelling place, carrying on his trade with the aid of apprentices and the help of journeymen who formed the intermediate grade of workers. His products were made to suit the demands of his customers, or were offered for sale to the public under regulations prescribed by the guild to which he belonged. The master generally owned his shop and tools, purchased his raw materials, changed them into the finished product, and disposed of the goods himself.

The Outwork System. The next step in the organization of manufacturing came with the growth of the outwork system. By this arrangement, raw materials owned by a merchant were distributed or "put out" among home workers, who made and returned the finished product and received payment for their labor. Under these conditions, the buying of raw materials and the selling of completed goods were controlled by the merchant. The workman, however, owned the tools required for production and was, to a certain extent, master of his time. He usually owned his home and a piece of ground, so that a shortage of work at his craft allowed him to give more time to his farm.

Hand Power and Machines. All of the foregoing systems of domestic production are still in existence. Bread is baked and clothing is made in many homes. And, frequently, a woman who has acquired unusual skill as a cook or as a seamstress devotes her spare time to preparing food or clothes for her neighbors. In almost every town, carpenters, cabinetmakers, tinsmiths, blacksmiths, tailors, and many other skilled craftsmen are to be found working with their own tools and in their own workshops in order to fill custom orders. Panama hats, Turkish rugs, Navajo blankets, and the fine laces of Switzerland, Italy, and Ireland are still prepared by the painstaking action of skilled fingers. Nor has the outwork system been entirely discarded. In a modified form it is still the basis of modern, successful, merchandising concerns which sell knitting machines and yarn to home workers, and buy, for resale, all of the hosiery which they are able to produce. Nevertheless, all of the foregoing examples are exceptions to the general rule that, today, manufacturing is done in factories equipped with complicated, power driven machinery. This change from handwork to the factory system of production was the outstanding feature of the Industrial Revolution.

Manufacturing before 1780. In the chapter on the history of commerce, it has been shown that manufacturing, transportation, and commerce are interdependent and have developed together from the earliest historical times. When, by 1750, England had become the chief commercial nation of the world, the most important products of her industries were woolen textiles, fabricated to a large extent from the fleece of domestic sheep.

Cloth making was a domestic industry in which the wool was washed, carded, and spun into yarn by women. The processes in use differed from those employed in the days of ancient Greece only because the spinning wheel had been substituted for the distaff and spindle sometime during the 15th century. Almost every cottage contained a loom, on which the yarn was woven into cloth by the master of the house. The methods of weaving, like those of spinning, had changed very little for centuries, although in 1733 John Kay invented the "fly shuttle," which made the process much more easy and rapid.

As several spinners were required to keep a weaver supplied with yarn, the weavers were usually glad to make cloth from yarn "put out" by a merchant. In this way the workers were able to keep continuously occupied, while the merchant insured a steady supply of cloth with which to meet the increasing demands of commerce. Fulling and finishing of woolen fabrics were generally done in a fulling mill located on the banks of a stream.

Practically all other operations were performed in the homes, although occasionally a merchant would erect and equip a weaving shed wherein a considerable number of hired weavers could work together under his supervision. Production of cotton cloth was small, the finest cotton goods being imported from India.

In the iron industry, charcoal furnaces were still extensively used, although the practice of smelting with coke, as introduced by Abraham Darby about 1735, was gradually spreading. This new demand for coke stimulated production of coal. In operating the coal mines, Newcomen's engine was found to be valuable for pumping out water which accumulated in the tunnels and galleries. Power for the operation of slitting mills and for producing the air blast for furnaces was obtained by water wheels. For this reason, ironworks were usually located beside streams.

Economic Conditions. A review of the general economic conditions existing in England about 1763 shows that commerce was actively increasing, transportation was being facilitated by the construction of turnpikes and canals, capital was accumulating, and industrial production, while very important in the aggregate, represented the contributions from farm homes and from many small shops or works, quite widely dispersed throughout the land. The country as a whole was fundamentally agricultural.

Living conditions were comparatively stable, because, if unable to obtain employment at his trade, a skilled worker could generally depend upon his small farm for the necessities of life.

At home, England possessed what seemed to be an adequate supply of coal, iron ore, and wool; her colonies were capable of producing large quantities of cotton, sugar, and natural dyes. All of these raw materials are adapted to large scale operations, and, as the demands for commercial products continued to increase, the need for machinery and improved methods of production was commonly recognized.

Epoch-making Inventions. In 1767, James Hargreaves invented his spinning jenny, capable of spinning eight threads of cotton instead of one. Arkwright, a barber by trade, followed, in 1769, with the roll-drawing spinner, which operated by water power, and therefore became known as the water frame. This machine produced thread strong enough to be used for the warp of cotton cloth, but insufficiently fine for the higher grades of muslin.

Ten years later, Samuel Crompton combined the best features of the jenny and the roll-spinner in a new power machine which, because of its hybrid origin, he called a "mule." The mule established the muslin industry in England. It also made it possible to spin cotton thread faster than the weavers could change it into cloth on the hand looms.

Improvements in the speed of weaving began in 1785 when Edmund Cartwright, a clergyman, obtained a patent for a power loom. This machine at first was far from successful; in fact, a practicable power loom did not come into use until about 1803. The great demand for cotton, caused by the application of the power loom, could not have been supplied at a reasonable cost had not Eli Whitney, in 1793, invented his cotton gin, whereby cotton fiber could be quickly separated from the seeds. It is interesting to note that these great inventions were all concerned with the manufacture of cotton, rather than of woolen fabrics. The use of power for spinning and weaving wool did not become general for several years after the beginning of the 19th century.

Water Power and Steam. In order to use the new textile machinery, many cotton mills were erected in the northern parts of England, where water power was most available. But the necessity of locating beside a waterfall was removed by Watt's condensing engine, invented in 1765 and greatly improved in succeeding years. Steam boilers heated by coal fires became a source of unlimited power. As the cost of transporting coal was greater than that of moving textiles or other finished commodities, the coal fields gradually became the center of manufacturing industries.

The iron trade also was greatly stimulated by the use of coal and of steam power. For example, the annual production of iron was doubled within eight years after the substitution of the steam engine for water power as a source of the air blast required in smelting. In 1783, Henry Cort invented the grooved rolling mill, and, in the following year, introduced the puddling process for making wrought iron from pig iron.

Thus, in response to the demands of commerce for large quantities of cheap textiles, we find that, in the last half of the 18th century, machines were invented which permitted of an increased volume of production. Steam engines were developed to drive the machinery. Cort's inventions made possible a more extensive application of iron, and from the improved iron many new types of machines and more efficient engines were constructed.

Effects of the New Inventions. Manufacturing by machinery, in buildings especially designed for that purpose, required a far greater outlay of capital than was necessary to provide the simple tools used by manual laborers. Nevertheless, costs of production were so greatly reduced by this method that a development of the factory system was inevitable. The widespread domestic system practically disappeared, because necessity forced the workers to leave their rural homes and to concentrate near the factories. The laboring population was gradually transplanted from the land to the cities. Master craftsmen, skilled in all branches of their trade, were no longer needed. For the factory system of production depends upon the use of labor-saving machinery wherever possible, and upon a systematic division of any complete manufacturing process into the proper number of parts. Each succeeding step is then performed by a worker who is able to acquire a high degree of skill in the accomplishment of a single operation. Under this system, production increased enormously, old industries expanded, and new ones came into existence.

Automation. Industrial development since World War II has been marked by the rapid progress made by automation, a new word meaning the use of machinery or mechanical devices instead of men in a production system. By the use of electronic equipment, the flow and quality of production can be regulated and co-ordinated. Production principles found effective in speeding the output of war materials are now used in civilian industries. Machines can operate continuously at higher speeds and more efficiently than men, and they do not tire as men do.

New models of specialized automatic labor-saving machines are constantly being introduced into industrial plants engaged in the mass production of standardized products. Development of mechanical ways of moving and handling materials has likewise contributed to the reduction of labor engaged in these operations. By the wider use of automatic controls, or the control of machines by other machines, many industries are becoming self-regulated. Not only does automation save labor, but it makes possible a better quality product. High-speed electronic computers and data-processing machines have helped to cut down the large clerical forces formerly required for the important work of handling information.

Whether automation presents an opportunity for labor or is a threat to it remains to be seen. If our economy continues to expand, the new machines may, through increased production, create more jobs than they eliminate. It seems inevitable that some readjustments will be necessary, but, as Norbert Wiener remarked, automation wisely applied holds promise of "more human use of human beings."

Industrial Advantages. Europe became the workshop of the world, and, until 1894, England surpassed all other nations in manufacturing. The advantages which caused her superiority are worthy of note because they are those which, today, will insure the success of any properly directed manufacturing concern. England controlled a plentiful supply of cheap *raw materials*. Her *workers* were skillful and adaptable. Her methods of *production*, because of the many great inventions and the early adoption of the factory system, were the most efficient known. She had, in her colonies and also in continental Europe, a ready *market* for her finished goods. And, as a means of *distribution*, her highly skilled commercial organization was second to none.

British Industrial Centers. Textiles are, as they always have been, the chief product of British manufacture. Before the advent of machinery, wool was the principal fiber used, but, early in the 19th century, cotton took the lead. Cotton was first imported into England in 1298 for use in making candlewicks. By 1801, England produced more cotton goods than did all of continental Europe. Manchester became the cotton manufacturing center of the world. Leeds is now the center of the

British woolen industry, of the manufacture of ready-made clothing, and of leather. Leicester is renowned for the production of woolen hosiery, as Nottingham is for cotton hosiery and for machine-made net. Silk weaving and dyeing is located chiefly in Derbyshire.

The iron and steel industry in England is second in importance only to that of textiles. Blast furnaces and rolling mills are concentrated at Middlesbrough, Newport, and Barrow, while Birmingham and Sheffield have become world famous for their manufactures of fine steel and of steel products. An example of extreme specialization is Redditch, whence a large part of the world is supplied with needles and fishhooks. The greatest shipbuilding district in the world is located along the banks of the Clyde river. The heart of the British ceramic industry is at Burslem in north Staffordshire.

INDUSTRIAL GERMANY

Germany's industrial revolution did not begin until the formation of the empire in 1871. But, when once begun, the transformation from an agricultural to an industrial basis was the most rapid and complete ever known. In 1845 Germany mined less coal than either France or Belgium. In 1880, Spain had more steam tonnage than Germany. Even as late as 1882, more than one-fourth of the German textile workers operated under the domestic system. But, by 1895, over 90 per cent were employed in factories. In 1871, about 64 per cent of the population of Germany was rural, while 36 per cent lived in cities. During the succeeding 40 years the intensive development of manufacturing caused towns to grow rapidly while the rural population remained stationary. In 1910, 60 per cent of the people lived in cities.

Fuel and Iron. Germany possessed or controlled abundant supplies of iron and coal. Nevertheless, her iron ore, derived chiefly from Lorraine and Luxemburg, contained a high proportion of phosphorus and was thereby rendered unsuitable for the production of Bessemer steel. This difficulty was removed in 1878 when Thomas and Gilchrist invented their basic method of making steel, by which phosphorus is removed from the molten metal and retained in the slag. When finely ground, "Thomas slag" becomes valuable as a fertilizer, so that the invention stimulated both manufacturing and agriculture, and was of fundamental importance to Germany.

Chemical and Other Industries. The German dye and fine-chemical industry, although depending primarily on the by-products from the coke ovens, is quite widely distributed, with the chief factories located on waterways at Ludwigshafen, Leverkusen (near Cologne), Frankfort, Hochst, and Berlin. The heavy-chemical industry is centered about the potash beds of Stassfurt. The largest salt works in the country is at Schonebeck.

Most of Germany's electrical machinery is made at Berlin and Nuremberg. Porcelain is produced chiefly at Meissen, Zwickau, and Berlin. Crefeld rivals Lyon as a center of the silk industry. Shipbuilding is important at Stettin, Hamburg, Kiel, and Lubeck. Textile factories tend to concentrate near the coal fields, but the industry as a whole is scattered over the entire country. Chemnitz is called the Saxon Manchester. As a nation devoted to manufacturing, Germany's policy has been to produce highly finished goods in which the greatest proportion of the cost is due to the application of skilled labor.

OTHER EUROPEAN NATIONS

France. In France the innovations which had so quickly transformed industrial conditions in England were adopted with much less haste. In 1848, factory methods of production were not yet customary, and typical French manufacturing was done in private workshops or in small establishments. One of the chief reasons why steam power was not more quickly applied in France was an insufficient supply of coal.

The famous French steelworks at Le Creusot were founded by royal charter in 1782, but this enterprise was not financially successful until the management was taken over by the Schneider family in 1836.

Production of textiles and of clothing is the most important branch of French manufacturing. Roubaix, Tourcoing, Fourmies, Reims, and Amiens are the chief centers of the wool industry. Mulhausen, in Alsace, and Rouen lead in the production of cotton fabrics. Paris has become the center of the production of jewelry, perfumes, gloves, shoes, and porcelain. Lyon is at the heart of the great French silk trade. Saint Etienne is known for the production of silk ribbons; Troyes, for hosiery; and Grenoble, for kid gloves. Lille is the largest manufacturing city of the North.

Switzerland. Switzerland, with very little coal or iron, is distinctly a manufacturing country which is forced, by a shortage of raw materials, to produce highly finished articles, such as silks, fine shoes, watches, and intricate machinery. The famous Geneva watches are so named because Geneva is the commercial center of the watch trade. They are made chiefly in the towns of Le Locle, La Chaux de Fonds, Bienne, Saint Imier, and Porrentruy. A shoe factory at Schonenwerd, near Olten, is said to be the largest in Europe. Saint Gallen is noted for the production of embroidered linen. Zurich and Basel are centers of the silk industry. Electricity generated by water power is extensively employed, notably in the production of aluminum at Rheinfelden.

Belgium. This country, where both coal and iron are available, was the only section of Europe which was able to follow the industrial pace set by England during the first half of the 19th century. Liege is one of the most successful metallurgical and manufacturing cities in Europe. It is famous for the production of all types of steel products, especially firearms. The production of textiles is even more important than that of steel and machinery. Cotton manufacturing is centered at Ghent, the making of linen at Ghent and Tournay, and the spinning and weaving of wool at Verviers.

Scandinavia. Sweden and Norway are noted for the production of wood pulp, matches, and paper, and for their electrochemical industries. In Norway electricity is used to manufacture large amounts of nitrogenous fertilizer at Odde, Notodden, and Sarpsborg. Stockholm, Goteborg, and Norrkoping are the chief industrial towns of Sweden. Perhaps the most famous manufactured product is the pure Swedish iron, reduced from domestic ore with charcoal from the extensive forests.

Czechoslovakia. This nation possesses a better supply of coal than of iron. Bohemia, however, is noted for its iron industry and especially for the manufacture of fine glassware, of which Eger is the center of production. Small articles of glass, such as buttons, beads, and imitation jewels are produced in enormous quantities at Gablonz.

Western Europe was the most important manufacturing district in the world. In 1880, the United Kingdom led all the other nations in this branch of industry, but by 1894 the United States assumed first place.

The highly developed production in Czechoslovakia far exceeds its domestic needs, and agricultural products, led by sugar, provide raw materials of great importance to its industry. The beer industry is world famous as are the spirits. malt and foodstuff industries. Metallurgical industry thrives here because of the abundant supply of iron ore and coal. Output of steel in 1946 was approximately 1,850,000 short tons; of pig iron, 1,050,000 short tons. The Skoda steel works at Pilsen are the largest in Europe. Other industries are glass, porcelain, pottery making, timber, paper and cellulose industries.

MANUFACTURING STATISTICS BY STATES, 1953

Source: Bureau of the Census.

States	All employees		Production workers			Value added by manufacture[1] 000 omitted
	Number (average for the year)	Salaries and wages, total 000 omitted	Number (average for the year)	Man-hours, total 000 omitted	Wages, total 000 omitted	
Alabama	228,179	$ 697,865	197,217	380,367	$ 550,894	$ 1,311,436
Arizona	24,066	99,998	17,113	36,548	69,368	231,128
Arkansas	80,525	219,463	68,126	134,236	171,376	427,209
California	1,058,796	4,703,644	797,996	1,604,721	3,203,432	8,153,142
Colorado	60,220	237,137	46,269	93,841	167,807	438,466
Connecticut	457,583	1,914,279	363,144	756,362	1,393,974	3,192,556
Delaware	58,550	255,801	33,817	68,176	118,736	378,975
Dist. of Columbia	19,499	90,075	9,781	19,391	37,297	150,687
Florida	110,616	333,015	90,134	180,217	246,511	690,920
Georgia	303,367	848,075	263,447	517,355	650,485	1,545,467
Idaho	23,482	87,781	19,558	39,143	70,238	166,904
Illinois	1,316,089	5,668,441	1,003,889	2,039,317	3,901,970	10,111,624
Indiana	686,646	2,903,853	553,928	1,114,095	2,180,370	5,205,348
Iowa	166,274	642,766	130,011	264,734	465,703	1,179,513
Kansas	137,572	567,027	107,039	222,103	415,734	1,000,724
Kentucky	150,319	532,300	124,405	244,876	397,182	1,213,002
Louisiana	152,549	533,448	121,987	247,186	386,663	1,179,569
Maine	110,187	354,377	96,733	197,274	288,390	583,855
Maryland	261,948	1,014,318	205,621	413,793	719,048	1,854,582
Massachusetts	741,457	2,743,880	594,325	1,185,366	1,972,574	4,630,013
Michigan	1,231,334	5,919,426	971,442	1,987,301	4,327,145	9,781,647
Minnesota	214,494	868,804	161,252	330,935	603,780	1,554,405
Mississippi	93,374	238,431	82,234	159,345	194,224	457,251
Missouri	405,061	1,552,445	314,145	621,328	1,083,365	2,786,829
Montana	17,768	71,975	14,683	28,395	56,937	142,045
Nebraska	57,558	210,973	45,006	93,247	152,862	401,398
Nevada	6,503	28,900	4,723	9,893	20,891	67,306
New Hampshire	88,771	272,833	77,589	152,822	221,870	427,126
New Jersey	853,101	3,583,419	657,259	1,320,039	2,478,978	6,451,055
New Mexico	12,753	57,539	10,350	22,148	39,391	129,248
New York	2,053,428	8,419,085	1,555,434	3,053,837	5,546,020	14,410,234
North Carolina	446,265	1,201,031	395,554	760,806	973,921	2,274,019
North Dakota	7,814	24,379	5,398	9,996	15,958	46,765
Ohio	1,420,095	6,352,819	1,106,329	2,264,391	4,586,641	11,192,103
Oklahoma	86,256	337,352	60,089	123,859	209,819	553,816
Oregon	132,385	556,923	112,887	321,857	448,287	985,834
Pennsylvania	1,591,505	6,288,730	1,278,772	2,541,645	4,603,268	10,793,641
Rhode Island	152,019	529,587	130,151	257,131	409,350	824,482
South Carolina	223,396	612,971	201,047	404,250	513,537	1,056,243
South Dakota	10,430	36,898	7,619	16,122	26,920	80,703
Tennessee	275,276	903,478	228,422	452,532	666,619	1,685,237
Texas	420,468	1,628,705	319,637	661,708	1,121,836	3,486,240
Utah	35,045	126,890	26,878	51,506	89,860	272,449
Vermont	38,811	143,227	32,765	69,636	110,225	246,754
Virginia	256,057	791,625	217,783	424,413	616,717	1,629,938
Washington	190,214	823,147	151,903	290,379	614,962	1,482,007
West Virginia	133,923	522,965	108,419	212,296	393,764	1,105,374
Wisconsin	480,640	2,004,059	373,108	761,633	1,420,970	3,635,768
Wyoming	7,213	33,601	5,516	11,018	23,233	54,099
Total	17,092,881	$68,590,060	13,500,934	27,065,569	$48,979,102	$121,659,136

[1]Value of products shipped less cost of materials, supplies, fuel, electricity, and contract work.

SUMMARY OF MANUFACTURES FOR MAJOR INDUSTRY GROUPS, 1953

Source: Bureau of the Census

Industry	Production workers			Value added by manufacture[1]
	Number (average for the year)[1]	Man-hours, total 000 omitted	Wages, total 000 omitted	000 omitted
Food and kindred products	1,059,095	2,160,257	$ 3,435,455	$ 11,937,510
Tobacco manufactures	87,176	165,704	213,310	987.073
Textile mill products	1,060,398	2,085,500	2,910,348	5,411,769
Apparel and related products	1,105,498	1,994,996	2,652,212	5,414,627
Lumber & products, exc. furniture	658,352	1,235,784	1,803,186	3,500,524
Furniture and fixtures	309,910	629,451	972,725	2,046,805
Paper and allied products	441,608	949,567	1,646,492	4,463,237
Printing and publishing industries	474,006	924,397	2,013,924	5,916,432
Chemical and allied products	536,124	1,093,799	2,102,610	9,320,348
Petroleum and coal products	175,770	350,552	820,992	2,795,373
Rubber products	218,853	432,359	866,215	2,021,443
Leather and leather products	338,355	629,498	896,502	1,711,066
Stone, clay and glass products	430,888	873,011	1,538,450	3,752,912
Primary metal industries	1,102,455	2,252,974	4,867,388	11,003,954
Fabricated metal products	915,614	1,884,551	3,555,086	8,143,660
Machinery, except electrical	1,307,312	2,743,740	5,685,694	13,380,729
Electrical machinery	851,443	1,702,904	3,077,463	7,876,186
Transportation equipment	1,529,924	3,154,956	6,731,078	14,534,323
Instruments and related products	212,102	433,752	823,564	2,169,354
Miscellaneous manufactures	686,051	1,367,817	2,366,408	5,271,811
All industries, total	13,500,934	27,065,569	$ 48,979,102	$ 121,659,136

[1] Value of products shipped less cost of materials, supplies, fuel, electric energy, and contract work.

PROFITS OF MANUFACTURING CORPORATIONS BY INDUSTRY GROUPS

Source: Federal Trade Commission and the Securities and Exchange Commission.
(Amounts estimated, in millions of dollars)

Industry Group	Profits before Taxes			Profits after Taxes		
	1953	1954	Per cent Change	1953	1954	Per cent Change
Food	$1,886	$1,817	− 4	$870	$883	+ 1
Tobacco	338	329	− 3	138	156	+13
Textile mill products	660	345	−48	286	114	−60
Apparel and finished textiles	189	156	−17	86	71	−17
Lumber and wood products	320	286	−11	178	156	−12
Furniture and wood products	211	154	−27	92	68	−26
Paper and allied products	1,005	970	− 3	450	479	+ 6
Printing and publishing	377	357	− 5	182	184	+ 1
Chemicals	2,397	2,283	− 5	1,053	1,199	+14
Petroleum refineries	2,876	2,758	− 4	2,177	2,230	+ 2
Products of petroleum and coal	80	52	−35	34	26	−24
Rubber	476	393	−17	205	200	− 2
Leather	121	116	− 4	54	53	− 2
Stone, clay and glass	892	883	− 1	405	466	+15
Primary nonferrous metals	909	787	−13	464	460	− 1
Primary iron and steel	2,183	1,442	−34	912	728	−20
Fabricated metal	1,106	818	−26	503	394	−22
Machinery (excl. elec.)	2,239	1,796	−20	934	853	− 9
Electrical machinery	1,744	1,374	−21	681	684	0
Transportation equipment (excl. auto.)	826	814	− 1	302	402	+33
Motor vehicles and parts	2,803	2,319	−17	1,010	1,097	+ 9
Instruments, etc.	462	428	− 7	185	208	−12
Miscellaneous	302	248	−15	138	126	− 9
All manufacturing*	24,403	20,934	−14	11,340	11,232	− 1

(*) Figures are rounded and will not necessarily add to totals.

MANUFACTURING IN THE UNITED STATES

The development of successful manufacturing requires, among other things, an adequate supply of capital and of labor, a steady market for the finished products, and regular means of transportation. None of these was available in the American colonies during the early period of their existence. Furthermore, almost all of the colonies were founded as commercial enterprises which were expected to serve their promoters and the homeland by becoming a source of raw materials and a market for manufactured goods.

First Colonial Manufactures. In the early colonial days of America, each home was of necessity self-sufficient. Grain was ground, wool was spun and woven, and hides were tanned only in order to supply the needs of the family. However, as the population increased and towns developed, these industries were divided among the members of each community. Each settlement was soon furnished with mills for grinding grain, for sawing lumber, and for the fulling and finishing of woolen cloth. Tanneries, also, were erected in many communities. The first sawmill was built at Dorchester (Mass.) in 1628. The first New England tannery was located at Lynn in 1629, and the manufacture of shoes was begun there in 1635.

Expansion of New England Industry. The American colonies as a group were essentially agricultural. But, in New England, where the land was not well adapted to farming, a large proportion of the settlers were forced to gain a livelihood by other means. Fishing, which, from the first, was an industry of primary importance, gave rise to a demand for ships. The finest materials with which to construct ships were available in the forests, and shipbuilding soon became one of the chief industries.

From fishing and shipbuilding, the New Englanders quite naturally advanced to maritime trade, which was carried on at first chiefly with the West Indies. These islands were glad to exchange their surplus sugar and molasses for salt fish and lumber. Thus, in addition to purely local manufacturing industries which sprang up in all of the settlements, New England developed others which were based on the necessity of equipping the ships, supplying food for the sailors, providing cargoes for export, and utilizing the commodities that were imported.

A ropewalk to supply vessels with cordage was erected in Boston in 1641, and, at many places along the coast, salt for the preservation of meat and fish was prepared by evaporating sea water over wood fires. Bakers found employment in shops devoted to the production of sea biscuit, or hard-tack. Rum was so extensively used on shipboard that the expense for liquor issued regularly to sailors was generally as great as the cost of their bread, and the production of rum by fermenting and distilling the West Indian molasses became a thriving New England industry. Since practically all commercial commodities, whether liquid or solid, were packed and shipped in barrels, the manufacture of barrels and barrel staves, buckets, and similar forms of cooperage from the white oak of New England became exceedingly profitable.

Ironworks. Iron was sorely needed in the colonies, not only to provide ships with anchors, bells, cannon, and shot, but also to supply the population with nails, hardware, cooking utensils, iron barrel hoops, and similar products. The earliest successful attempt to meet the demand was made at Lynn, Massachusetts, where a company organized by the son of Governor Winthrop erected a blast furnace in 1644. The first product from the furnace was a cast-iron kettle of about one quart capacity, made in 1645. In 1648 a refining forge was added to the equipment, so that refined iron products then became available. The making of nails, hammered from rods of iron obtained from slitting mills, was a domestic industry almost as widespread as the production of textiles

Growth of Manufacturing. The colonial population, which in 1640 numbered 25,000, increased to one million during the succeeding century, and amounted to 2¼ million in 1775. Manufacturing developed at a corresponding rate. Iron furnaces and refining forges became almost as common as sawmills, gristmills, and fulling mills. The ability of the colonial foundrymen is shown by the fact that in 1753 they melted and recast the bell for the Pennsylvania statehouse, which afterward became famous as the Liberty Bell. Four of the signers of the Declaration of Independence were financially interested in the iron industry. The Washington family owned a one-twelfth interest in the Principio ironworks of Maryland.

England encouraged the manufacture of pig iron, but passed laws against the production of steel and steel products, as well as that of other articles which competed with British industry. Although these prohibitory laws checked the growth of manufacturing industries, enforcement of them was found to be almost impossible except in the vicinity of the larger cities where the crown officers were stationed.

The Revolutionary War greatly stimulated American manufacturing, because raw materials accumulated and the supply of English products, on which the country had largely depended, was cut off. Necessity caused the growth of various industries. But, when peace was concluded, English manufacturers flooded the country with their products at prices so low that many American concerns were ruined.

Textiles. Competition of American made cloth with that of British manufacture was especially difficult, because the colonies were at first unable to utilize the newly invented textile machinery. England not only prohibited the exportation of designs or models of the machines, but even endeavored to prevent the emigration of mechanics skilled in the industry. However, in 1789, Samuel Slater, who had been employed in Arkwright's factory, came to America. He went first to Philadelphia, where a comparatively large amount of cotton spinning was carried on. Failing to interest the manufacturers in that city, he went to New York and then to Rhode Island, where, in 1790, on the falls of the Pawtucket river, he built for Moses Brown the first power driven cotton spinning mill in the United States. Andrew Jackson called Slater the "father of American manufacturers."

In 1805, there were only four cotton mills in America. But the passing of the Embargo act of 1807, followed by the Nonintercourse act and the War of 1812, prevented foreign commerce and again stimulated manufacturing. Twelve new spinning mills were opened in 1808; in 1811, spindles to the number of 80,000 were in use, and 10,000 bales of cotton were spun; in 1815, the spindles numbered 500,000. In 1814, Francis Cabot Lowell devised a power loom similar to those which he had seen while visiting England, and erected at Waltham, Massachusetts, the first complete cotton factory in the world. Practically all power mills were located on waterfalls, although steam engines came into use as a source of power after 1810. Most of the early mills obtained their cotton from the West Indies, because the Southern states marketed their product in Liverpool.

Tariffs and Railroads. At the close of the War of 1812, British manufactures were for a second time thrown on the American market at prices which brought disaster to many growing industries. After 1816, these industries received protection through a series of tariff acts, and manufacturing again expanded.

Even more important than the tariff, however, in its influence upon manufactures, was the development of railroads. The iron industry was directly affected, because the railroads proved to be

the greatest consumers of iron products. Iron T rails were first rolled in 1844, in Maryland. Bessemer steel was first made on a commercial scale in 1864; in the following year, the Chicago Rolling Mills produced the first American Bessemer steel rails. Besides thus stimulating iron and steel manufactures, through enlarging the market for their products, the railroads promoted many types of industry by furnishing the necessary means for the interchange of goods between manufacturing centers and distant agricultural regions. The cotton growing South and the rapidly expanding agricultural regions of the West afforded rich markets where the demand for manufactured products seemed unlimited. By 1860 the annual production of agricultural implements alone amounted to 17.8 million dollars.

Inventions and Industrial Progress. While the development of such agricultural machinery as the McCormick reaper added greatly to the farmers' ability to raise grain on a large scale, many other great inventions opened the way for new forms of manufacturing. (See table of *Modern Inventions.*) To choose a single example, the invention of the sewing machine laid the foundation for the great modern clothes making industries, and, when the machine was developed, it revolutionized the process of making shoes.

Manufacturing after the Civil War. During the Civil War, the lack of the customary supply of raw material from the Southern states checked the production of cotton goods, although other branches of manufacturing were unusually active. The coming of peace introduced an era of industrial progress in which large scale production was developed to a degree never before attained, and the United States advanced steadily to first rank among manufacturing nations. In 1820, America produced only 2 per cent of the world's pig iron; a century later the proportion had increased to 54 per cent.

America's Chief Manufactures. Twelve groups of related industries, each of which has an annual production in excess of one billion dollars, account for over 96 per cent of all American manufactures. In the following list, the principal groups are ranked in order of importance as shown by the census of 1940. For 1950 figures see pages 1349 and 1355.

GREAT MANUFACTURING INDUSTRIES

Group and Important Divisions	Value
Food and kindred products	$10,618,025,930
Meat packing	2,648,325,552
Flour and other grain-mill products	649,943,088
Dairy Products	867,753,713
Bread and other bakery products	1,211,023,755
Canning and preserving	625,368,583
Confectionery	297,761,813
Textiles and their products	7,255,693,272
Cotton goods	917,854,874
Woolen and worsted goods	698,468,246
Silk and rayon goods	360,891,265
Women's clothing	1,066,427,037
Men's clothing	865,330,367
Chemicals and allied products	6,687,631,132
Petroleum refining	2,461,126,549
Chemicals	839,750,366
Drugs and medicines	364,985,404
Perfumes and cosmetics	147,465,585
Paints and varnishes	434,960,890
Soap	302,634,474
Fertilizers	185,684,328
Rayon and allied products	247,065,556
Iron and steel	6,591,530,456
Steel works and rolling mill products	2,720,019,564
Blast furnace products	550,802,313
Transportation equipment	4,930,769,569
Automobiles and trucks	4,039,930,733
Steam and electric railroad cars	168,381,877
Ship building	327,387,099
Aircraft	279,496,844
Machinery	4,981,563,899
Foundry and machine shop products	1,942,716,706
Electrical machinery and supplies	814,587,749
Paper and printing	4,598,032,599
Printing and publishing	2,124,116,893
Paper goods	1,707,193,784
Pulp	933,015,664
Nonferrous metals and their products	2,572,854,496
Refined copper and other metals	956,572,486
Alloys	445,060,017
Aluminum manufactures	206,944,167
Jewelry	71,418,667
Forest products	2,389,781,991
Lumber and planing mill products	1,083,179,046
Furniture	538,781,581
Boxes, wooden packing	87,353,766
Stone, clay and glass products	1,440,151,489
Stone industries	75,811,785
Cement	192,611,304
Clay industries	229,077,092
Glass	310,547,065
Leather and leather products	1,389,513,718
Leather, tanned, curried and finished	346,437,554
Boots and shoes	734,673,111
Tobacco manufactures	1,322,189,139
Rubber products	902,328,802
Rubber tires and inner tubes	580,928,993
Miscellaneous industries	1,162,958,308
Fur goods	190,426,981
Household furnishings	139,433,114

Distribution of Manufacturing. As the preceding table shows what manufactures in the United States have the greatest annual value, the next point of interest is, "Where are these industries chiefly located?" Inspection of the table, *Manufacturing Statistics by States*, shows that twenty-one states each had in 1950 an annual production exceeding one billion dollars in value. To these states is to be credited over 86 per cent of all national manufactures. New York led with manufactured commodities valued in excess of 10 billion, followed by Pennsylvania with more than 8 billion, and Ohio, Illinois, and Michigan producing over 7 billion each. California exceeded 5 billion, and New Jersey passed the 4-billion mark.

According to the Bureau of the Census, the first census of manufactures covered the year 1809, and was then taken at ten-year intervals up to 1899. From 1904 to 1919 it was taken every five years, and from 1921 to 1939 every other year. The 1947 census of manufactures was the first since 1939. Present legislation provides for a complete census covering 1953 and every fifth year thereafter. An annual survey is part of this program.

Localization of Manufacturing. Economic factors such as raw materials, supply of power and labor, markets, and distribution facilities usually determine the location of manufacturing industries. Cotton and woolen mills require a moist atmosphere, while other industries depend on skilled labor or raw material supply. Water power and access to cheap coal were formerly major factors in attracting industry. Due to electric power today and its easy transmission, power requirements no longer force industries into certain areas. The West Coast today, with only 4 per cent of American industry, promises a future because of climate, availability of hydroelectric power, and future market demands.

Westward Movement of Industry. As the center of American population has moved westward, it has been followed, although with less speed, by the center of manufacturing. The early settler in the "West" obtained his ax, spade, and kettles from New England. Today the Western farmer obtains his plow or thresher from Illinois. The center of production of flour and gristmill products has moved from New York to Minnesota. Here the mills are close to the great wheat producing areas, power is available, and markets are easily accessible. Slaughtering and meat packing, which, as a separate industry, originated in Cincinnati about 1818, is now centered in Chicago. Kansas City, Kansas, ranks second in this industry, with Omaha, Nebraska, third. In these locations, the industry is close to the Western cattle raising area, its source of raw material.

Manufacturing in the South. One of the most notable developments connected with American manufacturing progress has been that of the production of cotton goods in the Southern states. North Carolina and South Carolina both rank in value of cotton manufactures above Massachusetts, which in 1920 was easily the leader. In 1880, North Carolina, South Carolina, and Georgia, together produced only 6.2 per cent of American cotton products. In 1910, their combined output equaled 29.7 per cent, and, in 1939, 58.8 per cent, of the total. In the production of iron and steel also the South is advancing steadily. A new process by which paper may be made from slash pine grown in the South is the basis of an expanding industry. Large increases in chemical and other industries requiring cheap power are taking place as the result of the development of the Tennessee Valley begun in 1933 under government initiative.

While easy access to raw materials has been the leading cause of the migration of certain industries to the South, the hope of obtaining labor at low wages has been an important motive. Recent governmental studies have shown, however, that wages have tended to level out between the regions and that differences within single states are considerably larger than between averages for North and South.

Distribution of Industry. The following table shows, for each of a number of important industries, which state ranks first in value of goods produced. When figures are given, they indicate the relation which the industry within a state bears to that of the entire country. The name of a city in parenthesis indicates the municipality which leads all others in a given industry.

CENTERS OF INDUSTRIAL PRODUCTION*

Industry or Product	Leading State	Per Cent of Total
Agricultural implements	Illinois	49.5
Aircraft and parts	California	32.0
Automobiles and trucks	Michigan (Detroit)	56.6
Buttons	New York	37.6
Canned and dried fruits and vegetables	California	29.2
Carbon paper and typewriter ribbons	New York	48.3
Cement	Pennsylvania	19.4
Chemicals	New Jersey	22.9
Cigars	Pennsylvania	35.4
Cigarettes	North Carolina	51.3
Clocks and watches	Illinois	24.5
Clothing, Men's	New York (New York)	29.9
Clothing, Women's (outer)	New York (New York)	67.0
Condensed and evaporated milk	Wisconsin	26.0
Cotton goods	North Carolina	27.8
Cutlery and edge tools	New York	23.4
Electrical machinery	Pennsylvania	20.8
Electrical appliances	Ohio	30.2
Fertilizer	Virginia	10.4
Firearms	Connecticut	54.8
Flour and grain mill products	Kansas	10.7
Furniture, household	New York	11.5
Furs	New York	90.0
Glass	Pennsylvania	13.6
Glue and gelatin	Massachusetts	24.8
Iron and steel	Pennsylvania	29.7
Jewelry	New York	35.1
Leather	Massachusetts	19.9
Linoleum	New Jersey	25.6
Lumber	Washington	16.7
Marble and stone	Vermont	14.6
Meat packing	Illinois (Chicago)	18.1
Motor cycles and bicycles	Ohio	42.8
Paints, varnishes, and lacquers	Illinois	16.4
Paper and paperboard	New York	11.6
Petroleum refining	Texas	28.4
Pianos	New York	33.7
Pins, needles, hooks and eyes, other fasteners	Connecticut	30.0
Printing and publishing	New York	20.8
Printing presses	New York	30.3
Radios and phonographs	Illinois	27.1
Rayon and allied products	Tennessee	24.2
Rubber boots and shoes	Massachusetts	38.6
Rubber tires and inner tubes	Ohio (Akron)	46.1
Sewing machines	Illinois	22.4
Shoemaking	Massachusetts	19.3
Soap and glycerin	New York	9.8
Steam and electric railroad cars	Pennsylvania	24.1
Sugar, Beet	California	27.1
Sugar refining	New York	20.5
Tanning materials and natural dyestuffs	New Jersey	29.3
Textile machinery	Massachusetts	38.4
Turpentine and resin	Georgia	58.8
Wood pulp	Washington	16.4
Wool textiles	Massachusetts (Lawrence)	27.2

*Based on U. S. Census of Manufactures.

GROWTH AND SPECIALIZATION OF INDUSTRY

The 20th century witnessed a remarkable increase in specialization and an extraordinary rise in industrial efficiency. These were largely the result of the application of inventive genius and scientific research to the problems of production. Of chief importance was the exploitation of the possibilities in electricity as a means of transmitting power.

The Electrical Age. Power in the form of electricity can be used *when* and *where* it is wanted far more readily than power delivered directly from steam engine or water wheel. It facilitates the ready and precise control of machine processes, thereby making possible an increasing use of automatic machinery. In the first quarter of the 20th century electrification in American industry rose from 4 per cent to 70 per cent. It later became almost universal. Electricity used in factories but developed in central stations increased from 182,562 horse power in 1899 to 15,868,828 horse power in 1925—87 fold. The result has been a pronounced growth in production accomplished by a decreasing number of workmen. Wages have risen, yet many manufactured articles have become cheaper. At the same time, by making power available at long distances from its generating source, electricity has obviated the need for locating industries in centers of congested population. New industrial communities may be semi-rural in character, with marked improvement in living conditions.

The marked advance in the field of electric energy production in the United States is shown by the fact that the total production in 1940 was 141,837,010,000 kilowatt hours, while in 1950 it had risen to 329,141,343,000. Production by the type of prime mover used in 1950 was hydro 95,938,317 kwh, steam 229,543,366, and internal combustion 3,659,660,000. Fuel consumed in the production was coal 91,877,770 tons, oil 75,420,490 barrels, and gas 628,918,834,000 cubic feet. By far the greater proportion of this energy was supplied by privately-owned public utilities. The total number of power-generating plants in 1950 was 3,867, of which 1,458 were hydro, 1,051 steam, and 1,358 internal combustion.

Specialization and Mass Production. The automobile industry and possibly the assembly line methods of shipbuilding and plane construction in World War II are the best examples of specialization and mass production. Operations are analyzed into their simplest constituent parts and each of these is performed by a worker, with or without a special machine. His work is confined, mechanical, and highly specialized.

New Industries and Research. Through the expenditure of many millions of dollars on organized scientific research, industrial firms have evolved or perfected many important new materials and new products which have become the basis of new industries. Examples are the camera, synthetic lacquer, the radio, and a cheap method of producing aluminum. The electrical, rubber, and automobile industries have risen in the 20th century from very small beginnings to gigantic proportions, automobiles reaching the first place among American industries in 1925. Synthetic nitrates, rayon, and airplanes have likewise forged ahead under the powerful stimulus of well-directed research.

Manufacturing and Agriculture. In 1899, one out of every 16 persons in the United States, or 6.2 per cent of the population, was employed in manufacturing. The proportion increased moderately thereafter whereas the proportion of persons engaged in agriculture steadily declined. Not only, therefore, is manufacturing becoming more important because of the largely enhanced value of its product, but it produces a growing proportion of the total output of the country's industries, and it employs an increasing percentage of the working population. This condition became almost inevitable when the last of the rich American agricultural lands were settled. Fear is frequently expressed that manufacturing is making progress at the expense of agriculture. For any given locality this may at times be true, but, considered more broadly, manufacturing and agriculture must develop together. The great industrial cities could not exist for more than a day, or at most a week, if their incoming supply of food should be cut off, while the agriculturist, who finds his chief market in the industrial centers, would be unable to produce and distribute his crops if he did not have the advantages afforded by countless factory products.

The situation has been further affected by the recent enormous increase in the population of the United States, which between the 1940 and 1950 censuses increased more than 19 millions, the greatest rise in the nation's history.

LEADING MANUFACTURING CITIES OF THE UNITED STATES

Source: Bureau of the Census
Census of Manufactures 1947. Revised, 1950

City[1]	Establishments	All employees		Production workers		Value added by manufacture[2]
		(Average for the year)	Salaries and wages	(Average for the year)	Wages	
	Number	Number	$1,000	Number	$1,000	$1,000
New York, N. Y.	37,870	940,235	$2,917,572	741,247	$2,025,160	$5,520,425
Chicago, Ill.	10,240	667,407	2,091,275	532,130	1,502,085	3,823,562
Philadelphia, Pa.	5,244	328,630	932,184	268,359	682,299	1,759,264
Detroit, Mich.	3,272	338,373	1,141,084	281,515	878,259	1,831,171
Los Angeles, Calif.	5,445	167,156	512,849	132,163	362,063	931,319
Cleveland, Ohio	2,813	223,641	722,300	181,670	533,247	1,289,995
Baltimore, Md.	1,638	120,929	335,589	97,656	243,235	667,323
St. Louis, Mo.	2,330	172,946	462,809	141,232	336,051	911,107
Boston, Mass.	2,825	101,722	279,941	79,510	190,306	546,249
Pittsburgh, Pa.	1,083	81,415	237,251	65,257	171,323	420,944
Washington, D. C.	428	17,815	55,872	10,007	27,691	99,067
San Francisco, Calif.	1,990	61,574	201,536	47,781	143,618	410,326
Milwaukee, Wisc.	1,719	133,051	398,058	108,372	297,677	753,882
Buffalo, N. Y.	1,165	87,279	255,553	71,746	195,946	511,953
New Orleans, La.	643	35,302	82,559	29,053	60,192	163,585
Minneapolis, Minn.	1,310	61,942	173,580	48,451	121,120	361,496
Cincinnati, Ohio	1,319	97,511	270,129	77,383	190,913	492,955
Newark, N. J.	1,874	92,291	279,535	73,605	198,909	525,540
Kansas City, Mo.	956	46,683	126,955	35,941	86,702	266,342
Indianapolis, Ind.	882	79,805	237,357	63,062	167,816	431,028
Houston, Texas	779	40,563	118,699	31,214	82,225	257,050
Seattle, Wash.	1,060	50,214	157,377	40,597	118,140	242,640
Rochester, N. Y.	814	99,934	294,251	76,311	207,671	486,322
Denver, Colo.	772	30,876	83,028	24,166	58,890	162,391
Louisville, Ky.	588	55,575	144,936	46,024	108,201	350,199
Columbus, Ohio	583	41,367	114,687	31,970	79,094	222,072
Portland, Oreg.	887	33,803	101,058	27,081	75,583	195,164
Atlanta, Ga.	586	36,172	85,714	29,379	60,756	190,127
Oakland, Calif.	701	31,998	100,390	25,601	74,885	207,569
Jersey City, N. J.	601	37,347	111,199	29,673	79,656	248,598
Dallas, Texas	942	34,245	85,437	26,965	58,193	209,201
Memphis, Tenn.	460	33,160	81,859	26,873	59,563	189,940
St. Paul, Minn.	601	40,631	126,270	32,273	82,557	272,751
Toledo, Ohio	526	59,500	189,040	49,021	144,558	330,666
Birmingham, Ala.	392	26,484	68,206	21,687	49,943	129,972
San Antonio, Texas	442	14,411	28,619	11,714	20,179	62,828

For footnotes, see page 1354.

LEADING MANUFACTURING CITIES OF THE UNITED STATES—Con.

Source: Bureau of the Census

Census of Manufactures 1947. Revised, 1950

City[1]	Establishments	All employees		Production workers		Value added by manufacture[2]
		(Average for the year)	Salaries and wages	(Average for the year)	Wages	
	Number	Number	$1,000	Number	$1,000	$1,000
Providence, R. I.	1,180	61,230	156,118	52,188	119,758	262,822
Akron, Ohio	342	76,534	233,069	61,409	178,140	367,844
Omaha, Nebr.	425	25,399	70,746	19,870	50,379	157,479
Dayton, Ohio	497	75,843	247,916	62,197	189,645	416,008
Syracuse, N. Y.	393	35,264	100,899	28,256	74,449	167,310
Oklahoma City, Okla.	292	8,566	22,937	6,198	14,182	49,765
San Diego, Calif.	293	18,553	55,798	13,620	37,425	91,062
Worcester, Mass.	574	46,847	136,804	37,834	100,815	215,807
Richmond, Va.	336	28,068	66,163	24,148	50,213	205,130
Fort Worth, Texas	382	30,495	78,902	25,108	58,532	133,952
Jacksonville, Fla.	267	12,221	27,144	9,971	19,324	65,219
Miami, Fla.	380	7,086	19,045	5,170	12,768	35,288
Youngstown, Ohio	192	29,477	90,271	25,307	74,140	137,047
Nashville, Tenn.	317	21,726	46,287	17,445	31,858	93,698
Hartford, Conn.	378	34,536	98,694	29,453	78,618	162,942
Grand Rapids, Mich.	574	44,179	132,593	37,635	103,735	227,670
Long Beach, Calif.	262	8,116	24,603	6,347	17,823	70,201
New Haven, Conn.	444	33,461	91,533	27,742	67,893	149,242
Des Moines, Iowa	304	14,088	38,898	10,437	26,040	77,316
Flint, Mich.	131	53,770	167,516	46,649	137,504	318,171
Salt Lake City, Utah	312	7,940	21,181	6,031	14,272	42,302
Springfield, Mass.	364	28,210	82,078	22,426	59,077	128,325
Bridgeport, Conn.	446	54,976	157,884	44,858	121,161	275,651
Norfolk, Va.	184	10,336	27,691	8,374	20,208	54,080
Yonkers, N. Y.	208	15,865	46,512	12,938	34,989	79,521
Tulsa, Okla.	275	7,940	22,027	5,820	14,382	43,685
Scranton, Pa.	244	16,604	36,354	14,411	28,464	57,837
Paterson, N. J.	722	27,713	81,482	23,841	64,279	139,247
Albany, N. Y.	187	10,499	28,463	8,121	19,559	62,956
Chattanooga, Tenn.	276	30,572	69,586	26,537	54,310	120,029
Trenton, N. J.	296	30,323	84,668	26,000	66,965	153,458
Spokane, Wash.	218	6,532	18,993	4,885	13,324	35,953
Kansas City, Kans.	160	19,298	56,883	15,197	42,866	127,123
Fort Wayne, Ind.	212	30,868	[3]	23,956	[3]	[3]
Camden, N. J.	224	38,909	116,696	30,216	82,057	196,069
Erie, Pa.	258	24,976	73,226	20,669	55,674	129,058
Fall River, Mass.	312	29,120	63,773	26,936	55,259	111,443
Wichita, Kans.	287	9,626	25,971	7,463	18,123	51,034
Wilmington, Del.	163	15,823	46,886	13,163	34,962	70,456
Gary, Ind.	82	35,576	[3]	30,649	[3]	[3]
Knoxville, Tenn.	189	19,273	41,935	16,797	32,564	71,336
Cambridge, Mass.	368	27,684	79,236	21,444	52,970	153,422
Reading, Pa.	307	27,111	67,362	23,000	53,144	115,436
New Bedford, Mass.	230	31,736	74,502	28,956	63,899	127,731
Elizabeth, N. J.	227	17,212	50,950	14,294	38,660	100,901
Tacoma, Wash.	269	12,963	40,385	11,131	32,138	83,916
Canton, Ohio	188	32,835	91,606	27,554	75,279	158,213
Tampa, Fla.	267	14,417	30,294	12,469	23,992	51,839
Sacramento, Calif.	149	5,716	17,046	4,553	12,764	37,014
Peoria, Ill.	190	13,652	37,861	11,059	28,452	120,249
Somerville, Mass.	151	7,480	20,963	6,059	15,264	45,688
Lowell, Mass.	214	18,127	43,017	16,053	34,624	78,056
South Bend, Ind.	192	34,757	116,937	29,691	96,758	191,886
Duluth, Minn.	146	10,424	28,257	8,851	22,427	42,298
Charlotte, N. C.	233	13,515	30,817	11,349	21,990	61,089
Utica, N. Y.	177	15,800	41,697	13,963	33,780	69,957

[1]Includes 92 cities with 100,000 or more inhabitants in 1940, listed in order of population size.

[2]Value of products shipped less cost of materials, supplies, fuel, electricity, and contract work.

[3]Withheld to avoid disclosing figures for individual companies.

MANUFACTURES OF THE UNITED STATES, 1950

By Selected Representative Products

Product	Value added by Manufacture	Value of Products Shipped
Asbestos products	$143,627,000	$250,672,000
Aluminum	208,045,000	567,918,000
Bags, paper	146,171,000	423,932,000
Bags, textile	81,146,000	359,083,000
Ball and roller bearings	282,397,000	453,556,000
Batteries, storage	120,419,000	313,484,000
Beet sugar	80,950,000	268,177,000
Beverages, non-alcoholic	491,793,000	891,896,000
Biscuits, crackers, and pretzels	325,826,000	603,669,000
Book printing	83,718,000	131,792,000
Boxes, paperboard	682,241,000	1,667,735,000
Boxes, wooden	146,113,000	309,768,000
Bread and other bakery products	1,313,402,000	2,604,627,000
Brick and hollow tile	164,224,000	220,794,000
Brooms and brushes	95,853,000	199,412,000
Candles	9,681,000	17,708,000
Cane sugar refining	116,262,000	825,134,000
Canning and preserving, except fish	776,011,000	1,955,768,000
Carbon paper and inked ribbons	30,098,000	57,500,000
Carpets and rugs	88,337,000	171,435,000
Cheese, natural	74,281,000	454,696,000
Chemical products	230,286,000	479,169,000
Chocolate and cocoa products	89,009,000	356,883,000
Cleaning and polishing preparations	198,476,000	369,898,000
Computing machines	260,684,000	345,360,000
Concrete products	336,064,000	606,677,000
Confectionery products	410,779,000	979,197,000
Corsets and allied products	175,125,000	331,165,000
Cottonseed oil	110,373,000	471,931,000
Cutlery	126,852,000	176,581,000
Dresses	512,474,000	1,121,423,000
Earthenware food utensils	60,894,000	81,805,000
Electric lamps	165,170,000	257,136,000
Envelopes	86,532,000	159,338,000
Farm machinery (except tractors)	530,642,000	1,094,128,000
Footwear, except rubber	812,113,000	1,726,857,000
Footwear, rubber	86,123,000	139,556,000
Frozen foods	89,153,000	227,834,000
Furniture:		
Household, wood	601,239,000	1,135,930,000
Household, upholstered	245,462,000	500,439,000
Metal house furniture except upholstered	157,474,000	337,338,000
Office furniture, wood	21,499,000	42,579,000
Office furniture, metal	95,500,000	152,423,000
Glass containers	264,811,000	455,902,000
Glass, flat	201,555,000	301,094,000
Greeting cards	82,425,000	126,303,000
Gypsum products	124,070,000	203,584,000
Handbags and purses, leather	64,740,000	151,020,000
Hats, fur-felt	56,252,000	124,688,000
Hard-surface floor coverings	99,308,000	196,237,000
Hardware	507,878,000	847,046,000
Hosiery, full-fashioned	383,778,000	652,587,000
Hosiery, seamless	165,890,000	350,671,000
Ice cream and ices	284,113,000	641,840,000
Iron and steel forgings	262,232,000	528,775,000
Jewelry, costume	120,617,000	200,364,000
Leather tanning and finishing	318,543,000	950,021,000
Lighting fixtures	277,362,000	599,731,000
Lime	48,370,000	91,105,000
Linseed oil	27,030,000	174,296,000
Lithography	322,499,000	526,705,000
Locomotives and parts	223,775,000	646,202,000
Luggage	60,466,000	129,447,000
Lumber, planing mill products	1,829,858,000	3,521,721,000
Matches	38,338,000	65,800,000
Mattresses and bedsprings	161,234,000	386,821,000
Men's and boys' suits and coats	572,534,000	1,241,204,000
Metal barrels, drums, and pails	$72,831,000	$183,049,000
Millinery	99,651,000	186,664,000
Millwork plants	370,215,000	805,736,000
Motorcycles, bicycles	52,098,000	116,794,000
Motors and generators	573,436,000	1,000,059,000
Musical instruments	23,604,000	38,126,000
Pianos	33,687,000	66,792,000
Needles, pins, fasteners	123,545,000	189,550,000
Newspapers	1,705,628,000	2,435,088,000
Optical goods	73,830,000	116,242,000
Paints and varnishes	489,968,000	1,216,918,000
Paper and board mills	1,305,471,000	3,202,400,000
Pencils, lead and crayons	26,855,000	49,716,000
Pens and mechanical pencils	77,137,000	118,215,000
Periodicals	690,048,000	1,175,057,000
Petroleum refining	1,484,441,000	9,140,427,000
Phonograph records	56,852,000	82,106,000
Photographic equipment	327,880,000	506,787,000
Pickles and sauces	126,982,000	373,876,000
Plastic products	473,350,000	874,106,000
Plated ware (*see* Silverware)		
Plumbing fixtures and fittings, metal	257,110,000	463,548,000
Plywood plants	212,703,000	418,123,000
Printing, commercial	1,091,190,000	1,698,361,000
Pulp mills	440,305,000	1,010,735,000
Railroad and street cars	204,078,000	561,642,000
Roofing materials	173,418,000	413,495,000
Rubber industries	742,969,000	1,318,610,000
Rubber, synthetic	109,081,000	246,550,000
Rubber tires and inner tubes	763,787,000	1,724,704,000
Saws	50,310,000	75,448,000
Scales and balances	42,426,000	63,097,000
Scientific instruments	128,951,000	188,874,000
Seafood, canned	91,677,000	251,303,000
Sewing machines	105,346,000	168,728,000
Shipbuilding and repairs	326,767,000	566,349,000
Shortening and cooking oils	127,149,000	685,095,000
Signs and advertising display	142,301,000	236,933,000
Silverware and plated ware	139,487,000	262,572,000
Soap and glycerin	454,993,000	890,856,000
Soybean oil mills	114,445,000	597,015,000
Sporting and athletic goods	125,256,000	226,464,000
Surgical and medical instruments	34,417,000	51,125,000
Surgical appliances and supplies	151,836,000	309,287,000
Telephone and telegraph equipment	303,970,000	482,903,000
Thread mills	67,039,000	179,829,000
Tin cans and other tinware	342,210,000	1,076,424,000
Tobacco:		
Chewing and smoking	64,071,000	147,603,000
Cigarettes	493,049,000	1,353,087,000
Cigars	146,707,000	311,439,000
Toilet preparations	300,712,000	474,206,000
Tools, hand	166,063,000	267,876,000
Tractors	540,181,000	1,242,647,000
Transformers	242,739,000	423,951,000
Truck and bus bodies	82,881,000	163,804,000
Typewriters	113,764,000	141,609,000
Vacuum cleaners	101,309,000	174,286,000
Wallpaper	19,925,000	41,596,000
Watches and clocks	171,275,000	341,423,000
Window and door screens	66,780,000	151,755,000
Wire drawing	420,761,000	1,063,756,000
Wire and cable, insulated	116,079,000	309,697,000
Woolen and worsted fabrics	512,009,000	1,423,539,000
Women's and children's underwear	185,590,000	574,443,000
X-ray and therapeutic apparatus	31,688,000	44,395,000
Yarn mills, cotton system	283,638,000	781,028,000
Yarn mills, wool, except carpet	129,304,000	425,055,000

LUMBERING

The lumber industry of the United States began in pioneering days in Maine, which held the lead for more than 200 years. With the increase in population and the westward trend of the people, the industry grew rapidly and the center of production shifted, first to New York about 1850, and then to Pennsylvania in 1860. From there it moved to Michigan, Minnesota, and Wisconsin, which from 1870 to 1895 were the principal lumber-producing states. Then the South sprang into the lead, notably Mississippi and Louisiana, but it was overtaken in 1920 by the West, particularly Oregon and Washington, an area which still dominates the industry. Oregon has been the leading lumber state since 1938.

The production of lumber is divided between the coniferous, or softwood, trees and the broadleaf, or hardwood, trees. In a general way, soft woods may be considered as the structural material used by carpenters, while hard woods are more extensively utilized by cabinetmakers. The distinction, however, is not sharp, because some of the so-called "hard woods" are, in fact, softer than certain of the so-called "soft woods."

Total lumber production in 1955 was 39,105,000,000 feet board measure, of which 31,599,000,000 feet was softwood and 7,506,000,000 was hardwood.

Industries depending on forest products are widely distributed throughout the United States. California manufacturing plants use the largest amount, followed by New York, Washington, Illinois, and Michigan.

On the basis of the quantity cut, yellow pine has been for many years the most important timber, although the amount of Douglas fir standing in forests in the United States is greater than that of any other single kind of wood. For the first time, in 1949, more Douglas fir was cut than yellow pine.

In recent years, the lumber industry has come to realize that trees are a crop and it engages in extensive tree planting, even maintaining nurseries to supply the seedlings.

CHIEF LUMBER PRODUCING STATES

State	Total Cut Millions of bd. ft.	Principal Wood Cut	Per Cent Total Cut*
Oregon	5,202	Douglas Fir	62.5
Washington	4,542	Douglas Fir	77.3
California	1,955	Ponderosa Pine	48.9
Alabama	1,750	Yellow Pine	89.2
Georgia	1,612	Yellow Pine	92.2
Mississippi	1,482	Yellow Pine	80.3
Arkansas	1,373	Yellow Pine	78.0
North Carolina	1,339	Yellow Pine	75.8
Texas	1,271	Yellow Pine	89.9
Louisiana	1,076	Yellow Pine	61.5
Virginia	1,050	Yellow Pine	63.6

*Percentage which cut of specified wood forms of total wood for state.

PRODUCTION OF LUMBER IN THE UNITED STATES

Rank 1940	Species of Timber Cut	Production Millions of Board Feet		Chief producing states with percentage produced by each, 1940
		1949	1940	
29	Alder	.....	29	Wash. 56.0, Oreg. 43.1.
23	Ash	121	84	La. 12.0, S. C. 10.9, Mich. 7.2.
31	Balsam fir	.....	13	Vt. 41.0, Me. 24.8, Minn. 21.5.
21	Basswood	103	100	Wisc. 24.7, Mich. 20.5, W. Va. 18.7.
17	Beech	256	123	W. Va. 13.4, Pa. 12.9, Ohio 9.6.
19	Birch	152	171	Wisc. 27.5, Mich. 27.0, Me. 14.0.
14	Cedar	.....	294	Wash. 45.1, Oreg. 22.9, Cal. 16.7.
24	Chestnut	.....	68	N. C. 35.5, W.Va. 24.1, Va. 21.1.
20	Cottonwood	217	154	Minn. 20.4, Miss. 17.9, Ark. 11.4.
9	Cypress	239	405	Fla. 30.0, La. 16.9, S. C. 13.6.
2	Douglas fir	9,074	7,121	Wash. 49.3, Oreg. 45.7.
22	Elm	144	92	Mich. 25.7, Wisc. 20.6, Ohio 9.5.
6	Hemlock	1,177	716	Wash. 30.8, Wisc. 19.0, Mich. 14.9.
26	Hickory	102	35	W.Va. 18.3, Miss. 12.5, Ark. 10.4.
16	Larch	224	131	Mont. 57.5, Idaho 21.5, Wash. 16.5.
25	Lodgepole pine	.....	47	Wyo. 44.3, Colo. 39.1, Utah 6.4.
30	Magnolia	.....	26	Fla. 29.4, La. 21.8, Tex. 18.5.
8	Maple	508	463	Mich. 33.5, Wisc. 16.2, W. Va. 9.7.
4	Oak	2,518	1,467	Va. 12.3, Ark. 10.7, La. 8.0, Tenn. 7.8.
3	Ponderosa	3,715	3,613	Oreg. 44.2, Cal. 26.4, Wash. 10.5.
7	Red gum	.....	479	La. 23.4, S. C. 17.3, Ark. 13.0.
11	Redwood	744	389	Cal. 99.9, Oreg. 0.1.
10	Spruce	346	402	Wash. 37.1, Oreg. 21.2.
13	Sugar pine	380	363	Cal. 80.9, Oreg. 19.1.
28	Sycamore	48	32	Miss. 21.3, La. 12.4, Ark. 9.1.
15	Tupelo	290	228	La. 21.2, S. C. 18.5, Miss. 12.1.
27	Walnut	23	34	Mo. 22.1, Ind. 18.2, Ohio 11.3.
18	White fir	759	121	Cal. 55.2, Oreg. 15.0, Idaho 13.7.
5	White pine	1,119	1,124	Idaho 37.5, N. H. 11.9, Me. 11.7.
1	Yellow pine	8,259	10,163	Ala. 15.4, Ga. 14.3, Miss. 11.7.
12	Yellow poplar	556	376	Va. 22.4, N. C. 14.6, Ga. 11.6, W.Va. 11.0.
	All others	539	71	
	All lumber cut	31,613	28,934	Oreg. 18.0, Wash. 16.0, Cal. 6.8, Ala. 6.1.

MANUFACTURES OF CANADA

Summary of major groups of manufactures and their gross value, 1953

Product	Gross Value	Product	Gross Value
Food and beverages	$3,479,479,000	Textile products (except clothing)	$ 699,414,000
Transportation equipment	2,094,175,000	Printing, publishing, etc.	543,143,000
Iron and steel products	2,090,093,000	Mineral products	407,526,000
Paper products	1,552,797,000	Rubber products	290,729,000
Wood products	1,279,573,000	Leather products	221,745,000
Non-ferrous metal products	1,242,349,000	Tobacco products	214,145,000
Chemicals and allied products	872,850,000	Knitting Mills	162,900,000
Electrical apparatus, supplies	845,343,000	Miscellaneous industries	262,461,000
Petroleum and coal products	812,832,000		
Clothing (textile and fur)	699,704,000	Total value all products	$17,771,758,000

The history of civilization is frequently divided into periods distinguished by the materials used among the people then living. Thus a period when only skins of animals were worn for clothing is regarded as more primitive than a period when cloth was woven of wool, cotton, or some other substance.

Judged by such a standard, the present age far excels all previous ones. Materials which were used earlier are now prepared in more efficient ways and are applied to more various purposes. The ancient art of pottery, for example, has been enriched in modern times by many new processes and products. Moreover, many materials have in recent times been discovered, and many others have been created by aid of the science of chemistry. The latter include such substances as aniline dyes, linoleum, and portland cement.

Familiar as are most of these products, their source and the manner of their preparation are practically unknown to the average person. Yet there are few subjects on which information is more interesting and more generally useful.

The almost infinite number of different objects manufactured and the additions to that number which are being made practically from day to day render it quite impossible to give an exhaustive record of these products. Those, however, which are among the best-known and most widely employed have been selected and treated in the following section, where each will be found described in such a way as to show clearly and concisely its source, history, manufacture, and uses.

Arc Lamp. A device producing intense, bluish white light that is much used for illuminating streets, factories, and large, open spaces. Light is produced by the flow of an electric current between the slightly separated ends of two carbon rods. The tips of the rods become white hot and give off carbon vapor, which serves to conduct the current across the gap. This flaming path, in which the temperature is above 6500° F., is curved in the form of an arc, whence the name *arc light.*

The carbons are usually made from petroleum or gas coke. They are gradually burned away and must be renewed after from 100 to 150 hours of service. Should the arc become broken, the upper rod automatically drops against the lower and is again pulled up to the proper distance by means of a magnet. When the carbon rods contain some salt, such as calcium fluoride, the vapor becomes intensely colored and is known as a *flaming arc.*

Because the arc light requires rather frequent cleaning, and renewal of the carbons, it is being replaced in many cases by gas-filled tungsten lamps, which give more light from the same amount of electricity.

Attar, or Otto, of Roses. A rare and expensive oily perfume obtained by distilling the petals of several species of roses. It is produced chiefly in India, Bulgaria, Persia, and Turkey. About 40,000 roses are required to yield one ounce of attar, which is so fragrant that the use of one drop is often sufficient in making a gallon of cologne.

Bakelite. An artificial material used in the preparation of varnishes and as a substitute for amber and hard rubber. It is formed by chemical reactions between carbolic acid and formaldehyde, and was discovered by L. H. Baekeland. It is made in two initial forms, distinguished in name by the letters *A* and *B*. *Bakelite A* is soluble and fusible; *bakelite B* is insoluble, but plastic, so that it can easily be molded. Both of these initial forms are changed under the action of heat and pressure to *bakelite C*, which is hard, insoluble, infusible, and possessed of high insulating properties.

Baking Powder. A mixture of chemicals substituted for yeast in order quickly to make light and porous cakes, biscuits, and similar foods. Nearly all such powders are combinations of *baking soda*, or *sodium bicarbonate*, with some acid substance. Starch comprising about 25 per cent of the whole serves to keep the mixture dry. The acid material is usually cream of tartar, a salt of phosphoric acid, or alum. When the powder becomes wet, a chemical reaction takes place which results in the production of carbon dioxide. This gas is also produced when bread is raised by yeast. As the gas cannot escape when generated within a thick dough or batter, it produces a porous, open structure in the cooked product, making it lighter and more easily digestible.

Bell. A hollow, cup-shaped vessel suspended from the closed end and giving forth sound when struck. The materials used in small bells range from glass to steel, but large bells are usually cast by pouring melted *bell metal* into molds of clay. Bell metal is an alloy of copper with various proportions of tin, to which small amounts of other metals may be added. Sometimes several weeks must elapse before the metal is cool enough to allow the removal of the mold without danger to the casting. The characteristic tone by which one bell is distinguished from another depends, not only on its size, shape, and thickness, but also on the proportion in which the constituent metals are alloyed.

The largest bell ever made, the 220-ton Tsar Kolokal of Moscow, was never rung because, before it was finished, an 11-ton piece fell from its side. The first large bell, 6½ tons in weight, was cast in 1400. The largest bell in the Western hemisphere is the Bourdon, weighing 18¼ tons, in the Rockefeller carillon, Riverside church, New York City. One of the most famous is Big Ben, weighing 13 tons, in Westminster palace, London. The Liberty Bell is the most famous of all bells in the United States.

Bells, as known today, were used first during the 4th century as a summons to religious exercises. At present, most of the large and famous bells belong to churches, but the uses of bells, especially for sounding signals, are very numerous. Sound is usually caused by rocking the bell until it strikes a metal clapper. Very large bells remain at rest and are struck by a moving hammer. Many famous clocks have tuned bells that strike the hours, while, on ships, each half hour is indicated by a fixed number of strokes on a bell. Sailors are often warned of dangerous waters by a wave-rocked *bell buoy*. A *curfew* bell was sounded originally in England as a signal that it was time to "cover the fire" with ashes and to retire for the night.

Books. The earliest known records in the form of writing are the inscriptions on tablets of baked clay which were excavated from the ruins of the ancient Chaldean city of Nippur. Such tablets were probably in use about 6000 B. C. Inscriptions cut in stone, wood, or other more or less durable substances continued to be employed for special purposes long after more convenient materials were in general use. One of the earliest of these materials was papyrus, made from a plant that grew chiefly in Egypt. An extant Egyptian papyrus manuscript, called the *Papyrus Prisse*, dates from about 2000 B. C. From 400 B. C. to 600 A. D., the greater part of all writing was done on papyrus. Another material often used in this period was parchment, which was made principally from the skins of sheep, goats, or calves. Scrolls made of papyrus or parchments were prepared in the form of strips, sometimes 120 feet long. For convenience, these long strips were rolled on two sticks. The change from rolls to piles of leaves came with the more general use of parchment. The books of the Christian monasteries were usually written on this material.

Printing on paper by means of engraved blocks was practiced by the Chinese as early as 50 B. C. The name of the first European to print from movable type has been the subject of controversy for several hundred years. According to the Dutch, the

honor belongs to Lourens Janszoon Coster, of Haarlem, Holland; but works printed by Coster have never been identified. In 1450, at Mainz, Germany, Johannes Gutenberg operated a printing shop, where he first experimented with letters carved from wood and later used types carved or cast from metal. Some books may have been printed from movable type at an earlier date, but the first book known to have been so printed is the Gutenberg Bible in Latin, completed about 1455.

The first book printed in English was a history of Troy, probably made at Bruges, Flanders, in 1474, by William Caxton. Early in 1476, Caxton established a press in the almonry of Westminster, London, and the next year brought out *Dictes and Sayings of the Philosophers*, the first book printed in England. The first press in the New World was established at the city of Mexico in 1544; the first one in the territory now embraced by the United States was built at Harvard college in 1639.

The making of a book was at first a comparatively simple process. In modern times, however, it has become a complex and highly specialized form of industry.

Manuscripts and Proofs.—When the author's typewritten manuscript or copy is sent to the printer, it is placed in the hands of the operators of typesetting machines. These machines automatically cast the type and deliver it arranged in a column, face up, on a long narrow tray called a *galley*. An inking roll is passed over the type, and an imprint, or *proof*, is made on sheets of paper. These *galley proofs* are sent to the author, who makes whatever corrections he wishes.

Electrotypes.—The type in the galleys is next made up into pages; titles, headings, and page numbers are inserted; and a final proof is made in order to show how each page will look. If this proof is satisfactory, an electrotype is made of each page. This is done by pressing the type upon a wax-surfaced plate so that each letter leaves its impression on the soft surface. This wax mold is then dusted with graphite so as to conduct electricity. It is then connected with the negative pole of a battery or dynamo and is placed in a plating solution, where it receives a thin coating of copper.

In order to strengthen this thin copper shell, which is an exact duplicate of the type for one page, the wax is removed and the back is filled with electrotype metal, which is composed chiefly of lead.

Sixteen or thirty-two of these electrotyped pages are locked into a large iron frame and placed on the printing press. These *electros*, or plates, are so arranged that when a sheet of paper is printed on both sides and is folded, the pages will be in proper sequence.

Paper.—The paper for printing is selected with careful regard to the kind of printing to be done and to the number of pages in the book. Ordinary type matter may be printed on rough stock, in order to obtain greater bulk for a few pages, or on smooth stock, if a larger number of pages is to be included in the finished volume. The various grades of smooth stock are known in the trade under the names machine finish, supercalendered, thin text, and India bible.

Illustrations.—For general use, these are of two kinds: *line cuts*, which are zinc etchings in coarse line; and *half tones*, or copper etchings in fine screen. Line cuts may be printed in with the text matter on all but the very coarse papers. Finer line cuts and all half tones, whether black or in two or more colors, must be printed on specially surfaced papers.

Folding and Pressing.—As the sheets come from the presses, they are passed to folding machines, which automatically cut them apart and deliver them in folded sections called *signatures*. These signatures consist of 8, 16, 24, 32, or 64 pages, depending upon the thickness of the paper used. Heavy papers are usually folded in 8's and 16's; thinner papers in 32's; and India bible or thin text stocks in 32's and 64's.

After folding, the signatures are compressed in bundles by machinery in order to remove the air and to make each section firm.

Tipping.—At this stage of the process, any specially prepared pages of illustrations and other *inserts* are *tipped*, or pasted, into the sections. This operation is performed by machinery if the illustration is to go on the outside of the section; handwork is necessary if the illustration goes on the inside, in which case the folded section must first be slit open to receive the insert.

While the pasting operation is under way, the white or colored flyleaves for the front and the back of the book are cut and are pasted to the first and the last section. These sections are re-enforced with muslin strips pasted around the binding edges of the first and last sections and the flyleaves. They are strengthened also by *whipstitching*, that is, by stitching through and through the section at the binding fold. These processes impart strength to the leaves which will hold the book in the cover.

Gathering.—Some books must be gathered by hand because of their peculiar size or shape or because they are printed on very thin or very thick paper. For large quantity editions, gathering is performed by machines wherever possible. Each of these machines contains a series of 32 or more *pockets*, or small bins, in which piles of the various sections are arranged in sequence; underneath the bins passes a traveling belt, or *conveyor*. This belt has an intermittent motion, each movement carrying it a distance equal to that from one bin to the next. At each movement, metal arms having fingers, or *grippers*, take from the bottom of each pocket one copy of the section it contains. This copy is dropped automatically on the traveling belt, falling upon a copy of the section carried forward from the preceding bin. In this manner, completely gathered books are delivered upon a table at the end of the moving belt.

Sewing.—Next in sequence is the operation of sewing the assembled sections together. A girl opens each section at its center and hangs it on one of a series of swinging steel arms. The arm carries the section into the sewing machine, the needles of which are curved in form and are preceded by a series of *punches*. The punches pierce the section at the back fold, and the sections are sewed together by a looped stitch, each section being *locked* to the next. As the sections thus sewed together come out of this machine, they are cut apart into separate complete books.

Smashing.—This step consists of compressing the books in powerful machines, not unlike enormous pincers. It removes the impress of the type made in printing and reduces the books to a uniform thickness in order that they may properly fit the covers which are being prepared.

Trimming, Coloring, and Gilding.—Trimming the edges is performed in machines having one or more heavy steel knives operating on the guillotine principle. Any *coloring* or *gilding* of edges is then in order. Plain coloring consists in spraying, sponging, or brushing the top or three edges with a pigment or aniline color while the books are arranged in piles on a table or are in presses. *Sprinkling* is done by spraying or brushing a pigment color over the edges through a coarse screen. *Marbling* is the most difficult and expensive of coloring processes. For this operation, books are carefully *jogged up*, that is, arranged in clamps which hold bundles of books to a thickness of 18 inches. These bundles are dipped into a vat containing a solution of gum tragacanth, upon the surface of which has been sprinkled a variety of water colors. These colors lie on the surface like oil spots upon water. Many different effects, or *patterns*, can be obtained by changing the combination of colors and by *combing* the colors in the vat with huge wooden or wire combs.

Gilding edges is the most delicate and expensive of all edge finishing. The trimmed books are placed in wooden clamps, or presses, horizontally arranged.

Edges are *scraped* with steel tools to obtain perfect smoothness, and a thin *filler* is applied, consisting of paste and a bit of color. After this coating is dry, the gold is applied in thin sheets over a *sizing* of egg albumin. When dry, the gold is burnished by hand with an agate or a bloodstone.

A thin coating of flexible glue is now applied to the backs or binding edges of the books, and superfluous thread ends are trimmed off.

Rounding and Backing.—These operations are performed in a power driven machine, into which the books are fed one at a time, horizontally, back edge first. Rollers convex the back and concave the front edge. Clamps grip the book just forward of the binding edge, compressing it to the depth of the cover thickness to be used, and, at the same time, the machine shapes the *joints* on each side of the back which provide for the fit-up of the cover.

Lining-Up.—This process consists in the reenforcing of the book with one or more thicknesses of coarse crash, or *super*, and with a strong paper on the back. The crashes and paper are applied with flexible glue. Machines do this work quite as efficiently as it can be done by hand, provided the books are not of unusual size or bulk. In order to give a finished appearance to the volumes, *headbands*, or small ornamental pieces of book cloth, striped cotton, mercerized cotton, or silk, are prepared in strips and are affixed by glue or paste to the top and bottom of the book backs.

Casing-In.—The book is now ready for the cover. The operation of combining book and cover is called *casing-in*. This is accomplished by either of two methods: (1) All ordinary cloth books are cased-in by the simple operation of *pasting-off*. First the back leaves and then the front leaves of the book are attached to the cover by paste or glue. The cover is thus left free from the back of the book. (2) Books bound in leather or artificial leather and sometimes cloth schoolbooks and catalogues are often *cased-in-tight-back*. A coating of glue is applied to the backs of such books, so that the covers are affixed only to the backs. Then, after the books have been thoroughly dried, the front and back leaves are pasted-off as in process (1).

Pressing.—After the covers have been thus attached, the books must be *built-in* in presses. The books are held between wooden boards having metal edges which project one-eighth of an inch on each side. These edges fit into the space along the back, or binding edge, between the ridge formed in the rounding and backing operation and the edge of the pulpboard used for stiffening the cover. This process imparts a neatly creased joint, or hinge, which permits the cover to open freely.

After the volumes have dried in the presses from 6 to 24 hours, they are removed, examined for defects, incased in jackets or wrapped individually, and packed in cartons or cases.

Bottle. A hollow vessel with a narrow neck and no handles. In olden times, bottles were made by sewing up the skin of some animal, leaving one natural opening, such as the leg. Today, bottles are usually made of glass, either by hand or by machinery. In the hand process, expert glass blowers collect the proper amount of molten glass on the end of a long tube; blow a bubble of air into the soft mass; drop the material into a hot mold; and, by further blowing, force the glass to the required shape. The blowpipe is then broken off, and, after the rough top of the bottle is smoothed with a special tool, the glass is slowly and carefully cooled. Bottles are now generally made by machines which automatically copy the hand process. Some of these are capable of producing 1200 dozen in one day. Small orders or special types are still made by hand.

Bread. A staple form of baked food, made from the flour or meal of some grain, in such manner that the product has a more or less porous structure. This is the modern *leavened*, or raised, bread. In general, the term bread includes any product made by baking a mixture of flour or crushed cereal and water. Wheat flour, because of its gluten, makes the best bread, although there are many special kinds made from other cereals. The common and standard form in the United States consists of a light-colored loaf made from wheat flour and raised with yeast. It is essentially a starch food as it normally contains a little more than one-half its weight of starchy compounds, about one-tenth of protein, 1.1 per cent of salts, 1 per cent of sugar, and only 1.3 per cent of fat, the remainder being water. Because of its low fat content, bread is usually eaten with butter. Corn bread and hot bread are familiar forms in those Southern states where, because of climatic conditions, the ordinary loaf will keep but a short time.

To understand the well-known process of bread making, it is necessary to know of what flour is composed and why yeast causes the dough to rise. Good wheat flour contains about 75 per cent starch and between 11 and 12 per cent of a nitrogenous material called *gluten*. Starch mixed with water must be heated to form even a weak paste; but wet gluten is very tough and elastic, acting somewhat like soft rubber in binding the flour and water into a dough. A cake of *yeast* contains thousands of microscopic vegetable cells or yeast plants. These will grow rapidly in a dilute solution of sugar if certain salts and substances containing nitrogen are also present.

When yeast is stirred into dough and warmed, it finds conditions exactly suitable for growth and proceeds to develop rapidly. During growth, the yeast produces certain substances which cause the sugar to break down into *alcohol* and *carbon dioxide*, which is the same gas that causes the bubbles in soda water. As the carbon dioxide cannot escape through the heavy elastic mass, the dough *rises*, that is, swells up, because of the internal pressure of the gas. It is then *kneaded* in order to break up the large irregular bubbles and to distribute them evenly through the mass. Raising and kneading are repeated, usually two or three times, until the dough seems sufficiently light. It is then cut, and worked into pieces which about half fill the pans. When set in a warm place, the dough rises to the top of the pan and is ready for the oven. During the foregoing process of fermentation, the gluten becomes much less tough and rubbery. A temperature between 78° and 82° F. is best for the growth of yeast. Greater heat often leads to the development of bacteria which produce acetic and lactic acids, thus causing the bread to become *sour*.

The first effect of the heat of baking is to expand the small bubbles of gas so that the loaf becomes larger, lighter, and more porous. The yeast is killed, and much of the alcohol and water are driven off as vapor. The starch grains expand and break, thereby becoming much more digestible. The starch on the surface, which is exposed to the high temperature of the oven, is largely changed to dextrin and some is still further changed to caramel. To these chemical changes are due the distinctive color and taste of the crust. Within the loaf, the temperature does not rise much above 212° F. because of the presence of water, which cannot exceed that temperature, the excess heat being exhausted in converting the water into steam.

As bread is a starchy food, it should be well chewed in order that the starch may be changed by saliva to simpler and more digestible compounds. Bread ranks among the most nutritious of staple foods; a pound loaf contains more energy-producing units (calories) than a pound of fish, a pound of potatoes, and a quart of milk, combined.

Brick. A building material made by shaping, drying, and baking a prepared mixture of clay and sand. Brick was made and used in Babylon, where there were neither forests nor quarries, over six thousand years ago, and was probably the first material used for permanent construction. The earlier forms, like the present adobe brick used by

the Indians of the Southwestern states, were merely sun dried and could be used only in regions where rain seldom fell. Straw was customarily mixed with the clay in order to bind it together. This was the case among the ancient Egyptians, who, according to the Biblical account, forced their Israelite captives, not only to make the customary number of bricks, but also to find the necessary straw.

At present, bricks are made chiefly by machinery. The clay is mixed with the proper amounts of sand and water, pressed into form, dried in the air or in drying tunnels, and finally heated to a cherry red in kilns which are usually about 30 feet in diameter by 12 feet high. The firing requires from 6 to 10 days. Some kinds of brick are formed from dry clay by enormous pressure, but most kinds are made by the wet process. In one type of machine, capable of an average daily production of 10,000 to 150,000 brick, the clay is compressed by a screw and is forced out in a long bar that is cut to the proper length by wires. The size varies somewhat but approximates $2\frac{1}{4} \times 4 \times 8\frac{1}{4}$ inches.

The red color of common brick is due to iron oxide. Brick that is almost white may be obtained by adding lime to specially selected clay. Other shades are obtained by the addition of various minerals. *Facing brick* is carefully finished by repressing and is used on the exterior of buildings where a fine appearance is desired. *Fire brick* is made from special clay which will undergo a very high temperature without softening or fusing.

Butter. A food product consisting chiefly of fat which is separated from milk by churning and is worked into a compact mass. Fat in the form of tiny globules is found in the milk of healthy cows in amounts which vary from 2 to 6 per cent, the average being somewhat under 4 per cent. The process by which it is changed into butter is much the same whether carried on in the farmhouse or at the butter factories, or *creameries*. It consists of separation, ripening, churning, and working.

Butter can be churned from milk, but it is much more satisfactorily made by separating the cream from the milk and churning the cream. This is frequently done by allowing the milk to stand until the lighter particles of fat rise to the top, where they may be collected. A much quicker and more efficient method involves the use of a *centrifugal separator*, in which the milk flows into a bowl or hollow spindle rotating from 6000 to 17,000 times per minute. The heavier skim milk is thrown towards the edge and passes out by one pipe, while the cream runs from another pipe near the center. Cream containing 30 to 33 per cent of fat is considered the best for churning.

Because sweet cream yields a butter of very mild flavor, it is usually allowed to sour or ripen, before churning. Ripening is due to bacterial growth which, to a large extent, develops the typical butter flavor and also causes better churning. Cream that has become sour in the natural way often contains harmful bacteria which produce unpleasant flavors. This danger is avoided by using, as a *starter*, a culture containing only such bacteria as have been found to give good results.

When sufficiently ripened, the cream may be churned by hand or in the large revolving, power-driven cylinders used in creameries. Churning causes the tiny particles of fat to combine and become larger, finally attaining such size that they can no longer remain suspended in the liquid. The butter then *breaks*, or separates from the buttermilk in grains about the size of wheat.

The natural yellow color of the fat is due to coloring matter absorbed from the green food of the cows. If their food is changed to dried grass and grain, as often happens in winter, the color of the butter becomes much lighter. In order that the appearance may be uniform, artificial color is often added. The most important butter color is made by boiling the seed of the *annatto* plant with an oil such as cottonseed. A small amount of this colored oil is usually added to the cream before churning. Standards for color vary greatly. Butter exported to South America is often almost red.

When churning is complete, the buttermilk is drawn off and the butter is washed with clean, cool water. Salt is then added, chiefly for flavor, in amounts which are usually between $\frac{3}{4}$ and $1\frac{1}{2}$ ounces per pound of fat. Salted butter does not become moldy so quickly as the unsalted product.

The grainy mass of butter is then worked by hand or under rollers. The purposes of this process are to eliminate any remaining buttermilk, to mix the salt evenly, and to incorporate the proper amount of water so thoroughly that it will not separate. Too much working spoils the grain and leaves a soft, oily butter. The finished product is usually packed in tubs or one-pound cartons.

Renovated, or *process* butter, is prepared by melting strong butter which is no longer acceptable for food, refining the clarified fat, and rechurning it with milk or skimmed milk.

Button. A piece of metal, bone, ivory, or other substance, usually employed for fastening clothing by being pushed through an opening called a buttonhole. The term is used also to designate any small knoblike projection or similar object.

Buttons were first used as ornaments in Europe during the 13th or the 14th century. Later, they served to hold loops of cord, a practice which led to the modern buttonhole. The two principal types are perforated buttons, meant to be attached by sewing, and buttons having on the reverse side a projection or shank, by which the attachment is made. Buttons are usually disk-shaped, but they may have many other forms.

Bone buttons have long been known, but many modern substitutes have also come into use. Several factories, located chiefly at Rochester, N. Y., and at Newark, N. J., are devoted to the production of *vegetable ivory* buttons, made from the kernels of *tagua* or *corozo* nuts, the seed of a South American palm tree. These become hard when heated. Pearl buttons are cut from the lustrous shells of certain species of oysters and mussels. Many of these come from Japan and from the Mississippi river. Disks are drilled from the shell, which is first softened by soaking. Holes are then bored in the disks, the rough back is ground or split away from the mother-of-pearl, and the back and edges are polished. The finished buttons are fastened to cards. Metal buttons and cloth covered buttons are made by machinery.

Buttons of special pattern or design are often worn to indicate membership in some organization or adherence to some political party. The rank of a mandarin is shown by the color and the material of a button worn on his hat.

Cable, Submarine. A telegraph line laid under water. The earliest experimental cables of this type were laid across rivers and ponds, but the first commercially successful cable was laid across the Strait of Dover in 1851. Scotland and Ireland were connected in 1853, and the next year saw Sweden joined with Denmark and Italy with Corsica. The success of these comparatively short lines encouraged attempts to lay a transatlantic cable. Such a line was completed in 1858, but, after a few weeks of use, it ceased to give satisfactory service.

Through the perseverance of Cyrus W. Field, a successful cable was finally completed in 1866 between Heart's Content, Newfoundland, and Valentia, Ireland. These places were selected because they permitted the smallest mileage of cable and because the intervening ocean bed was soft and level. There are now several cables between North America and Europe.

A cable consists of a central strand of twisted copper wires, called the core, which is covered with gutta percha or rubber. Next comes a layer of jute wrapping surrounded by galvanized steel wires. These add strength and afford protection against

anchors, sharp stones, and the attack of fishes. The outer layer is of jute filled with material to make it waterproof. In deep water, such a cable may be less than an inch thick, but, in shallow places, where there is more danger from waves and from ships' anchors, it is usually much better protected.

In 1902, an English cable was completed in the Pacific Ocean between British Columbia and Australia. In 1903, an American cable was laid between San Francisco and the Philippines.

A small strand of wire, over 2000 miles long, can carry only currents which are far too weak to operate ordinary telegraph instruments. The effectiveness of the current is multiplied by surrounding the copper core with a thin layer of permalloy. Two sending keys are used in cabling. One sends a signal corresponding to the dots of the telegraph code; the other sends the dashes. The receiver, called a *syphon recorder*, consists of a slender, carefully adjusted, hollow needle, one end of which dips in ink while the other marks on a moving band of paper. Dot signals move the needle to one side, and dashes pull it to the other. The result is a wavy line, from which the message can be deciphered.

With the first cables, it was possible to telegraph in one direction at the rate of about 7 words per minute. At present, messages can be automatically sent in both directions at the same time at the rate of 2500 letters each minute.

Calico. Cheap cotton cloth printed with a colored pattern. The name comes from Calicut, a city of India, whence the process of decorating cloth by means of a hand stamp moistened with dyes was introduced into Europe. Calico printing is now done almost entirely by machinery.

Cambric. A thin, finely woven, linen cloth, which receives its name from the town of Cambrai, France, where it was originally made. It is used chiefly for handkerchiefs and fine underclothing and as an embroidery linen. Cotton cambric is a similar fabric of plain weave, one surface of which is smooth and easily sheds dust.

Canvas. A strong, coarse cloth, originally made from hemp but now woven also from linen and cotton. Canvas is used to a large extent for awnings, sails, and tents. For oil painting, artists require a canvas of heavy linen. Fine, light grades, called *duck*, are made into summer clothing.

Castor Oil. A clear, thick, almost colorless oil, chiefly known as a reliable cathartic. It is obtained by crushing and pressing the seeds of the castor oil plant. Castor oil is an important ingredient in many transparent soaps. When properly treated with sulphuric acid and ammonia, it is used, under the name of *Turkey red oil*, to prepare cotton for dyeing and printing.

Cellophane. A transparent, paper-like substance widely used for wrapping articles placed on sale. While protecting the articles, it does not interfere with their display to customers and often enhances their attractiveness. The invention of cellophane is due to J. E. Brandenberger, a Frenchman, whose experiments extended from 1900 to 1912. A moisture-proof product was developed in the Du Pont laboratories in 1927.

Cellophane, like rayon, is made from cellulose obtained from wood pulp or cotton linters. By treatment with acids or other chemicals, the raw material is made soluble in alcohol or ether. The solution, after purification, is pressed through a thin slit and emerges as a sheet, which becomes solid on the evaporation of the volatile solvent.

Celluloid. An artificial material which was invented in 1869 by the Hyatt brothers of Newark, N. J. It is used as a substitute for more expensive substances, such as bone, ivory, and hard rubber, which it can be made to resemble very closely. It is produced from some pure form of cellulose, such as tissue paper or cotton fiber, which is treated with a mixture of nitric and sulphuric acids. The resulting *nitrocellulose* is carefully dried and is then kneaded in a mixing machine with alcohols and camphor until it becomes plastic. It is then worked between rollers and afterward pressed and dried. The final product may be transparent or opaque and can be given any desired color. Celluloid can be applied to paper, cloth, or leather to produce a very smooth, waterproof surface. It has a high degree of inflammability, but this may be markedly decreased by mixing with the celluloid a proportion of plastic casein.

Cement, Portland. A fine gray or white powder made by heating and grinding definite proportions of lime and clay. After mixture with water, it gradually sets to form a rocklike mass. The white variety is made from specially selected clay. The name portland is due to Joseph Aspdin, a bricklayer of Leeds, England, who, in 1824, patented the method of making cement and thought that the hardened product bore a slight resemblance to a famous building stone found on the Isle of Portland.

Sometimes the raw materials are found already combined in the proper proportions in certain kinds of rock. But usually clay and some substance rich in lime, such as limestone, chalk, or marl, after being dried and weighed, are carefully mixed and finely ground. Then the powdered product goes to the kilns, which are revolving steel cylinders sometimes 200 feet long. These are lined with fire brick and heated within by a burning blast of pulverized coal, crude oil, or natural gas to a temperature between 2500° and 3000° F. This intense heat causes the powder to fuse slightly, and, as the kilns have a slight slope, the mass works its way downward through the flame and is discharged as clinkers. After cooling, the clinker is ground sufficiently fine to meet the standard requirement—that at least 78 per cent of it shall pass through a sieve having 40,000 holes to the square inch. Before the grinding is complete, a small amount of plaster of Paris or gypsum is added in order to control the time required for the cement to harden.

This exceedingly fine powder is portland cement. It is usually sold in bags which contain approximately one cubic foot and weigh 94 pounds each. When mixed with water, the cement sets rather slowly. Within a few hours, it becomes stiff enough to resist the pressure of a finger and thereafter gains rapidly in strength for the first 30 days, continuing to gain, though much more slowly, for at least two years. Cement sets because of a chemical action that takes place when water and the dry powder are mixed. The exact nature of this change, however, is not known.

Portland cement is used in enormous quantities in making concrete for the construction of buildings, bridges, dams, tunnels, and conduits, as well as for sidewalks and permanent roads. See *Concrete*.

Chocolate. A valuable food product obtained from the seeds of the cacao tree, which is indigenous to the tropical parts of the western hemisphere. Chocolate was used by the natives of Central America long before Columbus crossed the ocean, and it is said that, when Cortez conquered Mexico, he found the emperor of that country drinking chocolate from a golden cup. When cultivated, the cacao attains a height of about 20 feet, although the wild trees are sometimes twice this size. The fruit is a red or yellow melon-shaped pod, between 6 and 8 inches long, which grows directly from the trunk or older branches. It has a rough, thick rind that covers a mass of seeds embedded in a sweet, sticky pulp. The seeds, from which chocolate, cocoa, and cocoa butter are made, are about the size and shape of an almond kernel and are covered with a thin brown shell.

When the fruit is ripe, the rind is cut open, and the seeds and pulp are removed and thrown into piles or into sweating-boxes, where they are allowed to ferment for several days. After the fermentation, which improves the flavor and makes the pulp

easily removable, the seeds are cleaned, dried, packed in bags, and shipped to the markets of the world.

When the cocoa beans arrive at the factory, they are first roasted like coffee in long revolving cylinders. This develops a pleasant aroma and also makes the shell dry and brittle. After roasting, the beans pass first to crushing machines, where they are broken, and then to cleaners, where the germ of each bean and the shells are removed. The clean, broken kernels of the roasted beans, called *cocoa nibs*, are then ground to a smooth paste under heavy stone rollers. If this pasty mass is run into flat molds, it hardens to the well-known dark cakes of *bitter chocolate*. When the chocolate mass is ground with a large proportion of sugar, the resulting product, which is sometimes flavored with vanilla or spices, is *sweet chocolate*. When milk or milk powder is included in the mixture, the result is *milk chocolate*.

Cocoa nibs and bitter chocolate contain about 50 per cent of a hard, yellowish white fat called *cocoa butter*. Because of the large amount of fat, many people find that the drink made from chocolate is too rich. In making *cocoa*, about one-half or two-thirds of the cocoa butter is squeezed out from the warm chocolate by means of a hydraulic press. The resulting cake is broken and ground very fine, giving *cocoa powder*, which usually contains only 20 or 25 per cent of fat.

Candy is covered with a coating of chocolate by being dipped into the soft, warm material. Ordinary sweet chocolate cannot be used for this purpose because it will not melt easily. For candy making, a special product called *dipping* or *coating* chocolate is prepared by adding extra cocoa butter to sweet chocolate. This mixture can be melted in hot water.

Chocolate contains a stimulating alkaloid called theobromine, which is closely related to the caffeine of coffee and tea. For this reason, some people find it difficult to sleep after drinking cocoa. But the various drinks and other products prepared from chocolate have a high food value and are usually considered wholesome and nutritious.

Coke. The substance which remains when soft coal is heated so as to expel the volatile materials which it contains. Coke is usually hard, gray, and porous, and it burns with intense heat and a smokeless flame. It was first made to supply the need of a smokeless fuel, but today a large proportion of all coke is used for the production of iron from its ore. It is more satisfactory than anthracite for this purpose because it burns freely in the blast furnace and contains only a small amount of sulphur, which is harmful to iron.

The original method of making coke was to pile soft coal in heaps, which were lighted and allowed to burn until most of the volatile matter was given off. Next came the practice of heating the coal in dome-like furnaces, which were known as *beehive ovens* because of their shape. These ovens make good coke, but, because they allow the volatile matter to escape, they are being supplanted by modern *by-product* coke ovens, which recover gas, ammonia, and coal tar. The gas is burned for light and heat; the ammonia is used for refrigeration or is made into a valuable fertilizer; and, from the coal tar comes a long list of dyes, medicines, explosives, and roofing and paving materials. A ton of coal gives 15 to 25 pounds of fertilizer and from 5 to 14 gallons of tar.

The principal areas in the United States which supply good coking coal are the Connellsville section in Pennsylvania, the Pocahontas field in West Virginia, and the Trinidad and Glenwood Springs fields of Colorado.

Concrete. Artificial stone produced by the setting, or hardening, of a mixture of portland cement, sand, pebbles or broken stone, and water. When steel rods or other forms of steel are placed within this mass in order to add to its strength, we have *re-inforced concrete*. The sand used should be clean and free from dust. The stone, preferably sharp, should range in diameter from ¼ to not more than 1¼ inches. The cement, sand, and water form a mortar which fills up the air spaces and binds the stone to a rocklike mass. The materials are mixed in various proportions, depending on the strength required and the amount of wear the surface will receive.

A 1-2-4 mixture, so called because it contains one part of cement, two of sand, and four of stone, all by volume, is generally used for re-inforced concrete walls and engine foundations. For basement walls and foundations, grain and coal bins, and the lower layer of sidewalks and of floors, a ratio of 1-2½-4 is satisfactory. A 1-2 mixture, without stone, is used for the wearing surface of walks and floors. Walks and floors of but one layer, fence posts, and watering tanks are best made of the proportions 1-2-3. The ingredients are carefully mixed and wet with the least amount of water that will allow the mixture to run together, if the maximum strength is desired. It is then spaded into molds, or *forms*, and requires three to ten days to set. An especially hard, quick-setting concrete, which will take a polish like granite, is made by putting the mixture into forms and adding a minimum of water, which is distributed throughout the mass by a process of high-frequency vibration. Concrete continues to gain in strength for about two years.

Concrete is a structural material of great value because it can be made into almost any desired shape and because when set, it has the strength and permanency of stone. It is comparatively cheap and can be prepared when and wherever needed from materials that are usually available. Roads, dams, bridges, and foundations for buildings provide its largest uses. See *Cement*.

Corduroy. A thick, strong, cotton cloth characterized by a corded or ribbed surface of velvet-like texture. Its excellent wearing qualities make it especially suitable for clothing subject to hard usage. The name, meaning king's cord, was first applied to the material in the 17th century, when it composed the uniform of the French king's huntsmen. Because of the ridged appearance, the name corduroy is sometimes applied also to a road or bridge made of logs laid transversely.

Cork. The outer layer of the bark of an evergreen species of oak. The larger proportion of good cork comes from Spain and Portugal, although the cork oak grows throughout northern Africa and southern Europe. It attains an average height of about 30 feet with a thickness of 2 feet through the trunk.

As the tree grows, layers of dead cells accumulate on the surface of the bark. This growth is cork. It is gathered by making cuts around the trunk just below the branches and just above the ground. These are joined by several vertical cuts, so that each layer of cork can be pried loose. The first stripping, known as virgin cork, is taken when the tree is about 20 years old. It is of poor quality. Succeeding growths are cut at periods of 8 to 10 years, with an average yield of about 45 pounds. The best cork is produced after the tree is 40 years old, and, when carefully done, the process is not injurious to the tree, which lives for 150 years or more.

The slabs of cork are dried for a few days and then steamed or placed in boiling water. This treatment softens the rough outer coating so that it may be scraped off. It also extracts tannin and other soluble matter, increases the bulk and elasticity, and flattens the curved pieces so that, after drying, they may be packed in bales.

Cork is a soft, light, elastic material that is highly resistant to the passage of electricity, heat, water, or air. It is so generally used as stoppers for bottles and jugs that stoppers made of other substances are usually called corks. Because it weighs only one-fourth as much as water, it is used for floats on

fishing nets, in life preservers, and for artificial limbs. Insoles for shoes are often made of cork. Ground cork affords an excellent insulating material and, mixed with thickened linseed oil, is used in the manufacture of *linoleum*. A valuable black pigment is made from burnt cork.

Cotton. A product of the cotton plant, which is probably more generally useful than any other textile fiber. Wool is required chiefly for warm clothing, and silk is demanded because of its beauty, but, while cotton can be made into products almost as warm as wool or as attractive as silk, it also serves for countless purposes where the cost of other fabrics would be prohibitive. Under the microscope, each cotton fiber is seen to resemble a flattened, twisted tube, and it is this characteristic twisted structure which makes cotton so satisfactory for spinning into threads. Columbus found it used by the natives of South America for making cloth, and it had already been employed in India for at least 3000 years. It is a tropical plant, but grows best in a reasonably moist, temperate climate which is free from frost for at least 6 months of the year. North and South America, Egypt, China, India, and Russia all produce important parts of the world's cotton crop, most of which grows between the 36th parallels north and south of the equator.

The plant is a perennial and, in tropical countries, often produces crops for many years; but, in the southern part of the United States, where a large proportion of all cotton is grown, it is treated as an annual. Seeds are planted early in the spring, and the plant, which belongs to the same family as the hollyhock, attains a height of from 2 to 10 feet but is usually about 4 feet tall. When the flowers open, they are cream or yellow, but the color changes to pink on the second day. Before the end of the third day, they usually fall to the ground, leaving a tiny green boll, or seed pod, which grows to about the size of a hen's egg. When ripe, the bolls burst open, and the cotton is ready for gathering. If the bolls were all to ripen at the same time, a great saving could be made by mechanical picking. But, while the work of some picking machines has been very promising, none has so far been a complete success, and the expense of harvesting the crop by hand is one of the largest items in the cost of production. An expert can pick 200 pounds or more in a day, but the average is only about 100 to 125 pounds. Cotton picking time in the Southern states extends from about August 25 to December 10.

The cotton worm, the boll weevil, and the pink cotton-boll worm are the worst enemies of the cotton plant and have caused enormous losses. The most generally used remedies have been insecticides such as paris green and kerosene emulsions. More recently, calcium arsenate, applied as a dust or powder, has proved of great value.

The collected cotton is taken to a ginning mill where the fiber is separated from the seeds and compressed into bales. There are two kinds of gins,—the *saw gin*, which is most generally used, and the *roller gin*, used for treating long-fibered cotton. The saw gin, invented by Eli Whitney in 1793, consists of a set of circular saws with fine teeth which catch the fiber and pull it through an opening too small for the seed to follow. The standard domestic, 500-pound bale, of about $28 \times 42 \times 56$ inches, is covered with coarse jute cloth and bound with steel straps. For export these bales are compressed to about 30 pounds per cubic foot. The average production of cotton in the United States is about 185 pounds per acre.

There are many varieties of cotton, all of which are graded according to the length and the fineness of the fiber. A rough commercial classification may be made into four general types. *Upland* cotton is the standard product and fills about $\frac{2}{3}$ of the world's cotton requirements. Its fiber is between $\frac{3}{4}$ and $1\frac{1}{4}$ inches long, white, and easy to work. *Peruvian* cotton is long, rough, hairy, and well adapted for mixing with wool. *Egyptian* cotton has strong, silky fibers between $1\frac{1}{8}$ and $1\frac{5}{8}$ inches in length. Much of it has the tawny color characteristic of balbriggan underwear and natural ecru curtains, but one of the most widely cultivated varieties is white, so that these products are now usually dyed. Egyptian cotton of the finest quality is grown by irrigation in the Imperial valley of California and the Salt River valley of Arizona.

The finest and longest fibers are those of sea-island cotton, which grows chiefly on the sea islands and coast regions of South Carolina, Georgia, and Florida. It averages $1\frac{3}{4}$ inches in length and is suitable for the finest thread and lace. The seeds of this variety are smaller than those of the upland cotton and are black instead of green.

When the bales reach a cotton mill, they are opened as needed and are mixed so that the quality will be uniform. The packed fiber is then loosened and passed through many mechanical processes, technically known as carding, drawing, slubbing, roving, spinning, and doubling. In the various machines the cotton is formed into a lap much like that of cotton batting. The fibers are carded until they all run in the same direction, and the broad lap is divided into narrow slivers, which are reduced, combined, and redrawn until uniform in size, when they are twisted into yarn or thread. The spinning machines are of two types, called ring spinners and mules. They often have thousands of threads, or bobbins.

The finished threads are then fitted to the great looms and woven into cloth. Preparation of spool, or sewing, thread is also an important branch of the industry. *Mercerized* cotton, invented by John Mercer of Lancashire, England, is produced by treating the thread or cloth, while under tension, with caustic alkali. The fibers shrink and become stronger, more transparent, and almost like silk in appearance. *Absorbent* cotton is made by dissolving from the fibers the natural waxlike material which they contain, so that they become soft and very porous. Cotton is almost pure *cellulose* and is used in great quantities for making artificial silk, celluloid, and many explosives.

Cottonseed Oil. The most valuable product obtained from the seed of the cotton plant. It is occasionally extracted by means of gasoline or some other volatile liquid that will dissolve fat, but usually it is squeezed out of the carefully prepared seed under the enormous power of the hydraulic press. The *crude* oil so obtained is *refined* by treatment with a dilute solution of caustic soda, which removes most of the coloring matter and all of the sharp-tasting fatty acids. These impurities settle to the bottom of the refining tank in a thick, soapy mass, called *foots*, from which the oil is drawn off and washed with water to remove all traces of alkali.

The dark, foggy liquid that runs from the press becomes, by this process, a clear, golden yellow oil with a pleasant taste and odor. If it has been carefully prepared from good seed, it will probably be classed as *prime summer yellow* cottonseed oil, which is the standard grade in the markets of the world. When the color or odor is below standard, it is called *off* oil. Refined oils are classed commercially as summer yellow, summer white, winter yellow, and winter white. The white oils are made from the yellow by bleaching with fuller's earth. At a temperature of 38° to 32° F., summer oils become thick because of the formation of palmitin crystals. For this reason, they are not considered satisfactory salad oils. *Winter* oils have been chilled and pressed to remove these crystals and, consequently, will remain bright and clear at 32° F. Any of the refined products may be *deodorized* by blowing the liquid with steam at high temperatures.

Enormous quantities of prime cottonseed oil are used in the manufacture of oleomargarine and lard

compounds. The winter oils are prepared chiefly for table use. Grades below edible standard in color or flavor are usually made into toilet soap. The foots are used in the preparation of laundry soaps and soap powders. If treated with acid and distilled, the foots yield light-colored fatty acids for the soap industry and a residue of pitch used in roofing tars.

Cottonseed oil was first produced by Dr. Otto, of Bethlehem, Pennsylvania, in 1768, but its value as a food product was not generally appreciated until about 1855. Since that time, the industry has had a remarkable growth due to the continuous discovery of new uses for the various crude products.

Cottonseed Products. For every pound of cotton that is grown, about two pounds of cottonseed are produced. This seed was for many years considered a nuisance and was wasted or burned. It is now a very important part of the cotton crop because it yields food for man, food for cattle, and food, or fertilizer, for growing plants. The dark greenish seeds, about the size of a pea, are covered with short fiber, or *linters*, which is removed by machinery after the seeds have been carefully sifted and cleaned. After delinting, they pass to the *huller*, where they are cut into pieces, beaten, and sifted until the *hulls* are separated from the meats which they contain. The meats are then crushed between heavy rolls, cooked with steam, formed into cakes, and placed in a hydraulic press, where the oil is squeezed out under a pressure of almost 4000 pounds per square inch. The hard, dry cakes which remain are ground into *cottonseed meal.*

One ton of seed yields about 315 pounds of oil, 920 pounds of meal, 600 pounds of hulls, 80 pounds of linters, and 85 pounds of dirt and waste which have no value. The linters are used as a filler for pads and cushions, for making paper, for mixing with wool in shoddy and cheap felt, and in the manufacture of celluloid, guncotton, and smokeless powder. The hulls often serve, like sawdust, for a packing material and are added to concentrated cattle foods to give bulk. The meal is valuable both as a fertilizer and as a rich food for all farm animals, while the oil, which is most important of all, has many uses in the production of edible and technical products. See *Cotton, Cottonseed Oil.*

Dyes and Dyeing. The art of dyeing, or applying color in a more or less permanent form to cloth and other substances, is very ancient. In 1000 B. C., the city of Tyre was already famous for its purple dye, which later became the badge of royalty.

The dyes formerly used were natural products obtained from many sources. *Indigo* was prepared from a plant; *logwood*, from the heart of a tropical tree; *madder*, which gave the famous *Turkey red*, from a root; *cochineal*, from the dried bodies of female insects which live on certain cactus plants; and *Tyrian purple*, from a species of shellfish.

Artificial dyes originated in England in 1856, when Perkin first prepared from aniline the lilac color *mauve.* Similar products which followed were accordingly known as aniline dyes. The term *coal-tar dyes* is now more customary because the basis for most of these colors is benzol, carbolic acid, naphthalene, and other compounds obtained from the tar which results when coal is distilled for the production of gas and coke. Thousands of artificial dyes have been made by chemists, so that the production of madder, indigo, and other natural products is now of minor importance.

Silk and wool combine directly with dyes much more readily than does cotton. In order to produce fast colors, certain substances, called *mordants*, are often used, which can combine both with the fiber and with the dye. Alum, iron salts, and tannin are among the many materials used for this purpose. The fabric is first dipped into a solution of the mordant and is then passed to the dye vat, where it takes up the desired color.

Eau de Cologne. A famous perfume, called in English Cologne water, which was originally made in Cologne by an Italian named Farina. It consists of pure alcohol to which are added several aromatic oils that impart a pleasant and refreshing odor.

Enamel. A glasslike substance fused upon the surface of metal, glass, or other material as a means of protection or of decoration. The familiar enameled kitchen ware is made by baking a smooth coating of enamel upon an iron base. Transparent enamels are usually called glaze. The art of enameling was practiced even in the time of the Egyptians and the Babylonians. It has led to the production of exceedingly beautiful articles, many of which have the appearance of gold covered with a pattern of bright-colored jewels. Enamel is used for glazing some varieties of pottery and of brick. Clock and watch dials are usually enameled. The type of paint known as enamel gives, when dry, a hard, glossy surface resembling that obtained by fusion.

Fire Extinguisher. Any device intended for use in stopping combustion and in extinguishing flame. Under ordinary conditions, fire is due to a violent chemical reaction between combustible material and oxygen of the air. Therefore, any means which will cut off the supply of oxygen from the flame will usually put out the fire.

One of the most common and easily available fire extinguishers is a bucket of water. The water should be spread over the burning material with a sweeping motion, rather than hurled in a mass at the flame. A well-known type of extinguisher consists of a strong metal tank partly filled with a solution of baking soda in water. A hose and nozzle is connected with the top of the tank, and a small, loosely stoppered bottle of sulphuric acid is placed above the solution. When the container is inverted, the acid reacts with the soda to form carbonic acid gas under considerable pressure. This forces out the water in a steady stream.

Many of the most dangerous fires result from the careless handling of gasoline and kerosene. For fighting such fires, water is of little value, but *carbon tetrachloride* is very effective when sprayed from a hand pump or even when sprinkled from a bottle. This chemical, however, should not be used in closely confined or unventilated places, because it may generate dangerous gases. Sand is often successfully used to smother an oil fire which has spread out over a large surface. *Quick action* is most important in fighting a small fire. Consequently, the prompt application of several handfuls of flour, cement, or similar powder may often prevent serious damage.

A bucket of slightly moistened sawdust mixed with two or three pounds of washing soda will often serve to extinguish an oil fire in a deep container where sand would sink and be of no value. When clothing is afire, a blanket, a rug, or an overcoat wrapped closely about the person will usually extinguish the flame.

Fireless Cooker. A cooking device which usually consists of an oven surrounded on all sides by thick layers of insulating material. It is designed to keep the heat where it is needed and thus maintain the proper cooking temperature without wasting fuel.

Heat may be produced within the oven by means of electrical resistance coils, but it is usually supplied by placing stones, heated to the proper temperature, at the top and the bottom of the oven with the container of food between them. As the heat from the stones cannot quickly escape through the nonconducting walls, the temperature of the oven falls very slowly, and the food is thus cooked with a minimum amount of fuel.

Flour. The finely ground meal of wheat or other grains. When used alone, the word refers to wheat flour. *Graham flour* is made from the entire wheat

kernel, but, if the outer layer of bran is removed before grinding, *whole wheat* flour is produced.

The white flour most used for bread making is no longer prepared, as it was for centuries, by crushing the grain between moving stones. In a modern flour mill, wheat which has been carefully cleaned and then moistened or dried to the proper condition is passed through a series of four or five steel rolls, each of which is adjusted to break the pieces a little smaller than the one before. Between each *break*, the fine particles of flour are sifted out, and the coarser pieces, or middlings, are also cleaned and sifted. The purpose of this complicated process is to get as much high grade flour as possible and to eliminate the bran.

After being sifted through fine silk bolting cloth, as many as forty different streams of flour are finally reunited into standard grades called first patent, second patent, first clear or bakers, second clear or low grade, and red dog, the lowest grade of flour made. Standard patent flour, which is the bread flour usually found on the market, includes the first three grades. About 25 per cent of the wheat, consisting of shorts and bran, is classed as offals. Shorts are the fine particles of bran mixed with some flour. The germ is also separated because it contains much fat and, if ground into flour, is likely to develop an unpleasant flavor.

Because of the gluten which it contains, wheat flour makes better bread than that made of other cereals. But the quality of the gluten is just as important as the quantity. Red dog contains about 50 per cent more gluten than the high grade patent flours, but it will not make good bread. The quality of the bread which it yields is the final test of a flour. Crackers and macaroni are important food products made almost entirely from flour. Macaroni flour, or *semolina*, is rather coarsely ground from *durum* or other hard wheat.

During the World War, the United States Food Administration ordered that 100 pounds of wheat should be milled so as to yield at least 74¼ pounds of a product which was officially called 100 per cent flour and popularly known as *war flour*. This should not be confused with 100 per cent extraction flour, which, as previously explained, is Graham flour. Rye flour is an important food product, especially in Europe. Corn flour and potato flour find limited uses, and banana flour is well known in the countries where the fruit grows. See *Bread*.

Gas, Artificial. A combustible gas used for light or heat. It may be classified according to its methods of production as coal gas, water gas, oil gas, air gas, and acetylene.

When soft coal is heated in a closed container, it gives off inflammable gas. *Coal gas* produced in this manner was known as early as 1691, but it was first used in 1792 by William Murdock to light his home in Cornwall, England. Pall Mall, London, was, in 1807, the first street to be lighted with gas, while Baltimore, in 1821, was the first American city to use the new system.

Much coal gas is obtained as a by-product in the manufacture of coke. Large amounts are also produced in retorts built specially for that purpose. Before it can be used, the gas passes through cleaning devices which remove such impurities as tar, ammonia, sulphur, and carbon dioxide. It is then stored in huge tanks, from which it passes to the distributing pipes.

Water gas, which is used in many cities, is made by blowing steam through a furnace full of white hot anthracite or coke. The steam is decomposed and combines with the carbon of the fuel to produce hydrogen and carbon monoxide, gases which burn with great heat. Coal gas and water gas are of chief importance in public gas systems.

Oil gas is produced by heating suitable oils until they break down into permanent gases. These may be purified and compressed into cylinders. *Pintsch* and *blau* gases are of this type. *Air gas* is formed by blowing air through a volatile, inflammable liquid such as gasoline, until the air contains enough vapor to burn. This type is often used in detached houses.

When it was the custom to obtain light directly from burning gas, it was often necessary to add to the gas quantities of hydrocarbons such as ethylene and benzene in order that the flame should produce a certain fixed degree of brightness or candle power. The use of the more efficient incandescent mantles, which require only that the burning gas supply heat sufficient to make them glow, made desirable a standard for gas which should be based on *heating value* rather than on candle power. The change to such a standard was hastened by the World War, when all available benzene was needed for the production of explosives. See *Acetylene*.

Gelatin. A hard, transparent, yellowish white, nitrogenous substance, without taste or smell, which swells when in contact with cold water. It dissolves in hot water and, when the solution is cooled, sets to a stiff, jelly-like mass. Gelatin is formed by the action of boiling water on connective tissue, cartilage, ligaments and tendons, skin, hoofs, and bones. By one commercial process, the selected tissues are washed, soaked in warm diluted soda lye for about ten days, and then heated in an air-tight compartment. They are next washed in revolving drums, bleached by fumes of burning sulphur, and rewashed to remove all sulphur, after which the gelatin is dissolved out with boiling water. Color is removed by means of bleaching charcoal, and the clear hot solution is poured out in thin layers, which, after setting, are cut into small sheets and dried on nets.

Isinglass is a very pure form of gelatin, obtained from the swimming bladders of sturgeon and other fish. It should not be confused with the thin, transparent sheets of mica, which are sometimes incorrectly called isinglass. Ordinary *glue* is impure gelatin, of great value as an adhesive. Many photographic processes require gelatin, which is used to hold the sensitive silver salts on plates and films.

The value of gelatin as a food was for a long time greatly overestimated, for it has been shown that animals, when fed on it exclusively, die of starvation.

Glass. A hard, noncrystalline, artificial substance, usually transparent or translucent, made by melting together a mixture of various materials. The principal ingredients used in glassmaking are: *sand* or other forms of pure silica; *lime* or lead oxide; and some form of *alkali*. Many other materials enter into the production of special kinds of glass. Bottle glass usually contains aluminum. The addition of manganese gives a brown color; cobalt yields a blue; and even gold has been used to produce a particularly beautiful ruby glass. One of the most important characteristics of glass is that it does not melt at any fixed temperature, but softens gradually as the heat increases, and loses plasticity as it cools.

Great care is taken that the materials used shall be as free as possible from iron, which imparts a green color to the finished product. The selected ingredients are melted in a furnace together with a small amount of broken glass or *cullet*, which lowers the melting point of the mixture. The furnaces were formerly huge pots of clay, but now are usually large rectangular tanks.

Plate glass is made by casting molten glass upon large iron tables, where it is flattened by rollers, and then placed in annealing ovens to cool. For mirrors and windows, the sides of the rough plate are ground and carefully polished, but the unfinished plate is quite satisfactory for use as a cheap roofing glass.

In the process of making *window glass*, a large lump of the molten substance is gathered from the furnace on the end of an iron pipe and is then blown by compressed air to a bubble which gradually stretches out in the form of a great bottle. The bottom is then softened by heating and is blown open by air pressure. The blowpipe is broken from the

neck, and the shoulder of the bottle is cracked off, thus leaving a cylinder. The cylinder is opened by being cut on the inside with a diamond, cracked along the cut by means of a piece of hot metal, and placed in a kiln where the heat is sufficient to soften the sides so that they may be flattened. The process is now performed almost entirely by machinery.

Flint glass, in spite of its name, is the softest of the ordinary types. It is usually made from silica, potash, and lead oxide and, because of its brilliancy, is used for tableware and cut glass. A flint glass containing a large proportion of lead forms the *strass* used for making imitation jewels.

Optical glass must be cooled very slowly to prevent distortions due to internal stresses which are caused by unequal contraction.

Safety glass is made by inserting between two sheets of plate glass a sheet of transparent celluloid, which is securely attached to the two glass plates by adhesive material. Glass of this type has become standard for motor car windows.

New types of glass developed in laboratories include a flexible glass, which bends without breaking; a "shrunk" glass with an extremely low rate of expansion when heated; and an "invisible" glass, which transmits light with more than 99 per cent completeness and will not reflect light from any angle. The last named glass consists of plates fastened together by an invisible varnish in a layer having a thickness of one-fourth of the wave length of light. Waves of reflected light are cancelled, as it were, when meeting waves of oncoming light in the layer of varnish.

Glass which transmits ultra-violet rays is made by including as ingredients boric oxide, excluding lead, and diminishing the proportion of ferric oxide.

Expert glassblowers can work the material into almost any form. Models of flowers are accurately made from colored glass, and cloth has been woven from finely drawn glass threads. Colored streaks or spots are produced by adding threads and pieces of colored glass while the material is still soft. Frosted effects are obtained by using a sand blast or hydrofluoric acid. Initials and delicate outlines are marked by a small, rapidly turning wheel. *Cut glass* has its designs sunk into it by sharp edged wheels, or the pattern may be molded and the slightly rounded edges sharpened on a grinding wheel.

Glucose. Commercial glucose is a clear, thick, sirupy liquid, which is about two-thirds as sweet as sugar. In Europe it is made chiefly from potato starch, but in the United States it is produced almost entirely from corn, whence the name corn sirup. The corn is ground under water to obtain the starch, which, after being cleaned, is treated with hydrochloric acid. Under the influence of the acid, the starch molecules combine with water and break down into glucose together with some dextrins and other products. The acid is then neutralized, and the thin liquid is bleached, filtered, and finally concentrated under vacuum to the required consistency.

Repeated experiments by government experts have shown that glucose is in no way inferior to cane sugar in healthfulness. For table use, it is usually flavored with about 15 per cent of sirup obtained from sugar refineries. Large amounts of glucose are required by canning and preserving industries and in the production of candy.

Glycerin. A sweet sirupy liquid without color or odor. It is the principal by-product of the soap and candle making industries, resulting from the decomposition, under heat, of fats with alkali or acid. Glycerin can be obtained from any fat, such as cottonseed oil, lard, or even butter. It is purified by distillation with superheated steam, the pure substance boiling at a temperature (554° F.) higher than the melting point of tin. It does not evaporate easily, but, instead, takes moisture from the air. For this reason, it is added to tobacco, shredded coconut, candy, and inking pads, to prevent drying.

Glycerin is a good solvent for many organic materials and may be used instead of alcohol in the preparation of flavoring extracts. Tea and coffee stains can often be removed by first moistening the spot with glycerin and then applying soap and water. Mixed with litharge, or lead oxide, glycerin makes a valuable cement. Glycerin is used in medicine to allay inflammation. It is valuable also as a cosmetic and is used extensively in the preparation of nitroglycerin for explosives.

Gold Leaf. Extremely thin sheets of gold, used chiefly for gilding. These sheets average $\frac{1}{200000}$ inch in thickness, so that, in this form, an ounce of gold will cover almost 100 square feet.

In making gold leaf, an ingot of gold about an inch wide is first flattened between steel rollers to a long ribbon having the thickness of very thin paper. This ribbon is cut into squares, which are stacked with a sheet of vellum or tough paper between adjacent pieces. The pile is enclosed in a parchment case, placed on a marble table, and beaten with a heavy hammer until each piece has spread to a square having a size of about 3½ inches. These squares are quartered.

Each small piece is next placed between layers of *goldbeater's skin*, a tough membrane prepared from the intestines of cattle. The skins are dusted with fine plaster of Paris to prevent sticking, and beating is continued with a lighter hammer until the gold is again about 3½ inches square. Another quartering and beating then yields foil of the proper thickness. The final pieces are trimmed to about 3¼ inches square and are packed between leaves of dusted paper in books, each containing 25 pieces.

Gold used for beating is usually about 23 carats fine. A small amount of alloy gives the desired color, but, as impure gold does not yield so much foil, adulteration with cheaper metals is seldom practiced.

Gunpowder. An explosive mixture of saltpeter, charcoal, and sulphur. The origin of this product is unknown, but it was probably not the invention of a single person. The Chinese apparently knew of the mixture at the beginning of the Christian era, but, in Europe, Friar Roger Bacon, of Oxford, seems to have been the first to write of its properties. About 1313, a German monk named Barthold Schwartz demonstrated that it might be used for propelling missiles. Cannons existed at least as early as 1326. However, gunpowder was not generally used in warfare until the 16th century.

Standard United States Army black powder contains 75 per cent saltpeter, 15 per cent charcoal, and 10 per cent sulphur. When such a mixture explodes in the breech of a gun, about 43 per cent of it is changed to hot gases, which, by their expansive force, exert an enormous pressure. The large amount of smoke is due to the remaining 57 per cent of solid particles which are thrown out.

In the manufacture of gunpowder, the carefully prepared materials are mixed dry. They are then moistened, and ground under heavy rollers. After grinding, the *meal* is placed between plates of hard rubber in a hydraulic press. High pressure yields a dense, quick-burning powder; lower pressure gives one that acts more slowly. The cakes from the press are broken up into grains, which are sifted and then polished in revolving barrels. After a second sifting, the grains are dried and packed in containers.

Brown, or *cocoa, powder* was developed for use in heavy guns. It is usually in the form of prisms about 1½ inches long and having a hole through the center in order to increase the burning surface. Partially charred rice straw, which gives a brown color to the powder, is used instead of charcoal. *Blasting*, or *mining, powders* are coarser products and usually contain a smaller proportion of saltpeter. Chile saltpeter, or sodium nitrate, is sometimes used instead of the more expensive potassium salt.

These explosives have been almost entirely supplanted by superior products of the smokeless powder type, which are made so that practically all the products of explosion are gases. Smokeless powders are more powerful and less bulky than the black gunpowder and do not leave a large residue of mineral matter. They are usually prepared from materials of the type of guncotton and nitroglycerin modified in such a manner as to retard the speed of explosion. The first smokeless powder for sporting purposes was made in 1867 by Schultze, a German. A Frenchman named Vieille produced the first successful military smokeless powder in 1886, and, in 1889, Richard von Freeden invented a hard-grained sporting powder.

Heating and Ventilating Systems. Heating is ordinarily accomplished by means of open fireplaces, stoves, hot-air furnaces, steam, hot-water, and the vacuum-vapor systems. The hot-air furnace is an *indirect* heater, because the air is warmed by it before entering the room. The other systems are *direct*, because they are placed within the rooms to be heated. A radiator or other heating unit located within a room at the opening of a fresh air intake would be classed as a *direct-indirect* system.

The open fire is a pleasant source of warmth, but it is exceedingly expensive because most of the heat goes up the chimney. It does, however, afford good ventilation. A base-burner stove furnishes one of the most efficient methods of heating, but it requires a large amount of space and is unpleasant on account of the dust that arises when coal is applied and ashes are removed.

With the hot-air furnace, air is generally admitted from outside the building through an intake pipe and passed over a heating surface connected with the fire box. The heated air expands, becomes lighter, and, rising up through the distributing pipes, passes through registers, or grated openings in the floor or wall, into the rooms to be warmed. This system has the advantage of providing fresh air, but it is not always reliable. When a strong wind is blowing, it is a common experience to find that rooms on the windward side cannot be heated. This is usually because the wind leaks into the room through small cracks around the windows and baseboards. The slight pressure then becomes sufficient to prevent warm air from rising in the pipes. The use of storm sash during cold weather has often seemed to double the value of a hot air furnace.

A pipeless furnace has but one large register, placed in the floor directly above the heating plant. From the center of the register, the warm air rises to the ceiling, spreading in all directions. The outer edge of the register is connected as an intake through which the cool air near the floor is drawn to the furnace. The pipeless furnace can heat thoroughly only those rooms into which the warm air finds an easy path. It is therefore most satisfactory where the rooms are few—though not necessarily small—and where the door openings extend to the ceiling.

Steam, hot water, and vacuum-vapor systems use hollow radiators to give off the heat, and a furnace to generate it. The two are connected by a series of pipes. These systems deliver heat where it is needed, without reference to the direction of the wind. Steam radiators do not operate until the water in the boiler has been heated to the boiling point and sufficient pressure generated to force the steam through the pipes. Hot-water systems begin to radiate soon after a fire is started, because, as the water in the furnace becomes warmer, it becomes lighter and is pushed upward through the radiator by the heavier, cooler water entering the furnace from below. Hot-water radiators must be larger than steam radiators to warm the same space because they usually operate at 140° F. to 180° F. compared with 212° F. for steam.

At the ordinary atmospheric pressure of 14.7 pounds per square inch, water boils at 212° F. If, by creating a partial vacuum, this pressure is reduced to 1 pound, the boiling point becomes 101.8° F. The vacuum-vapor system takes advantage of this fact and is practically equivalent to a steam system operating under a vacuum produced by automatic valves or other devices. Under these conditions the water gives off vapor at comparatively low temperatures, and the vapor, meeting but little resistance, quickly flows to the radiator.

Comparative Cost of Heating

System	Initial Cost	Fuel Required
Hot air	1.0	1.0
Pipeless furnace	⅔	1.0
Steam	2.0	¾
Hot water	2⅔	⅔
Vacuum-vapor	3⅓	⅝–⅔

It is impossible to say which system is the best because the answer depends on the conditions and surroundings in which it is to be used. An approximation of the relative cost is given in the above table.

Distribution of heat from a central station as practiced in various communities is often very satisfactory, especially where exhaust steam is available from some large power plant. The use of gas for fuel is convenient, but in some regions gas is more expensive than coal. Similarly, electric heating, which, considered by itself, is almost ideal, is uneconomical except in certain districts which have a large excess of water power as a source of electricity.

According to various calculations, the hourly supply of fresh air in a living room should be from 700 to 1000 cubic feet for each person. But the problem of ventilating the house ordinarily receives very little attention because doors and windows are so frequently opened that the air seldom becomes unwholesome. However, the air in most American homes generally contains about one-half as much moisture as it should contain, or, in technical terms, the *relative humidity* is too low. A living room temperature of 68°–70° with a relative humidity of 60–70 is considered best from the standpoint of health and efficiency.

The prevalence of colds, sore throat, and pneumonia in the United States can to a large extent be attributed to the custom of living in dry, overheated rooms. If the percentage of moisture in the air of these rooms were increased, a lower temperature would be used, for, when the air is very dry, the temperature must be from 7° to 10° higher than would otherwise be comfortable.

In hospitals, theaters, and schools, fresh air is usually provided by means of power driven fans. This air is sometimes cleaned and provided with the proper amount of moisture by means of washing devices. Many commercial establishments, such as candy factories, weaving mills, and offices where color printing is done, find it necessary to install air-conditioning apparatus so that, in winter and in summer, the atmosphere of the operating rooms shall always have the same degree of temperature and humidity. By this means the quality of their product is kept uniform.

Ink. A colored fluid used for writing or printing. Standard writing ink is usually prepared from an extract of nutgalls, a solution of copperas or iron sulphate, and a solution of some gum, such as gum arabic. The gum is added to the extract, which contains gallic acid, and the iron salt is then poured into the mixture. A fine, light-colored precipitate is formed, which is prevented by the gum from settling. A small amount of disinfectant is generally added to prevent the growth of molds.

Such an ink produces writing of a light blue color, which, from the action of oxygen in the air, changes in about a week to intense, permanent black. In order that the writing may immediately have a strong, dark color, a solution of some coal-tar color is often added. Fountain pen inks should contain no sediment. Therefore, in making this type of ink, certain aniline colors, especially nigrosine, are extensively used.

Red ink may be prepared by dissolving eosin and a small amount of gum in water. Gold, silver, and bronze inks may be made by grinding the metallic leaf to extreme fineness in a heavy sirup, such as honey or glucose. The powder is then washed, and suspended in a solution of gum arabic. India ink consists of a stick of finely divided carbon mixed with gum, which is rubbed with water. Lampblack made from pines and mixed with gum was the base of ink used by the Arabs.

Inks used for printing usually consist of the proper color or pigment mixed with linseed oil or resinous varnish. Lampblack and gas black are the best pigments for printing black, while the colored inks are generally made with coal-tar dyes.

Lacquer. This term is generally used today of the synthetic, quick-drying lacquers having a pyroxylin base, which came into wide use about 1923. In distinction from paints and varnishes, its base is an artificially prepared material, pyroxylin. This is made by stirring cotton linters or high grade tissue paper in sulphuric and nitric acid. The excess acid is separated out by centrifugal machines, leaving pyroxylin, a nitrate of cellulose. This is dissolved in wood alcohol, ethyl acetate, acetone, or some other solvent, and pigments are added. The first of these lacquers to be marketed was called duco.

The principal advantage in the use of lacquer is the speed with which it dries. It reduces the time necessary for finishing automobile bodies from several weeks to three days or less. It is also much more durable and less susceptible to scratching than varnish. Its employment on automobiles has made possible the use of colors at moderate prices, since baked enamel, formerly used on metal bodies, lent itself only to black, colors being affected by the baking heat. On the other hand, lacquers do not take as high a gloss as varnishes and baked enamel.

Lead Pencil. The ordinary lead pencil consists of a long, narrow stick of "lead" held in a small circular case, usually composed of wood, but which is frequently made of paper or of metal. The "lead" pencil contains no lead whatever, the marking element being in reality graphite. This was introduced about 1565, when a graphite mine was discovered at Barrowdale, in Cumberland, England. The black mark of a graphite pencil was much superior to that made by metallic lead, which had been used for this purpose from early times by the Romans, the Aztecs, and many other peoples. The new material, under the designation of black lead, gradually displaced the older type.

In the process of manufacture, the graphite is first reduced to an extremely fine powder by crushing. It is then suspended in water and mixed with the proper amount of fine clay. The water is removed by filtering the mixture, and the paste is then forced through perforated plates until it is sufficiently smooth. Finally, the pasty mass is forced, under hydraulic pressure, through a die, from which it emerges as a continuous string of the required size. This string is straightened and is cut into pieces which are packed in trays and baked in ovens until dry. They are then ready for the customary wooden casings or for use in the popular metallic cases equipped with a screw for advancing the lead.

Red cedar or other soft wood is prepared for the casings by being cut into slats 7 inches long, 2 inches wide, and ¼ inch thick. On the surface of the slats, grooves are cut parallel to the long side and just deep enough to receive half the thickness of the lead. Glue is then applied to the grooved surface; a strip of lead is placed in the groove; and a second grooved slat is placed over the first so as to form an oblong block. The dried blocks are then fed to a milling machine, from which they emerge as perfectly shaped lead pencils. These are varnished or painted, the ends are trimmed smooth and, frequently, tipped with a metallic cap holding a rubber eraser.

Leather. The skin from an animal, tanned or treated so that it is more or less soft and flexible when dry. It differs from raw skin in that it does not decompose quickly and does not yield glue when treated with boiling water. Leather may be prepared from any skin, but cattle, sheep, and goats are the chief sources of supply. The skins of the larger animals, such as cattle and horses, are called hides.

A raw skin consists of three layers. That on the outside is hard and scaly; that on the inside is composed of connecting and fatty tissues. Between these is the true skin, a layer of gelatinous fibers from which leather is made.

In preparation for tanning, skins are softened by soaking in water, the hair is loosened by treatment with milk of lime, and the layers of hair and fatty tissues are scraped off with knives. Further soakings are usually given to remove any excess lime. After these preliminary treatments, the inner skin is ready to be *tanned*, or changed to leather.

This change is usually accomplished in one of three ways: by soaking the skin in a solution of tannin extracted from oak or hemlock bark, sumac leaves, quebracho, or other vegetable material; by soaking in a solution of metallic salts, such as aluminum or chromium; by treatment with fish oils. The first method is called *tanning*; the second, *tawing*; and the third, *chamoising*. As the use of tannin is much older than other methods, the word tanning is used as a general term to include all processes.

The tannin process often requires from 4 to 8 months, while tawing with chromium salts can sometimes be completed in a few hours or days. As chrome tannage yields a very durable leather that is soft, light, and almost waterproof, it has become very popular in this country. Most glazed kid, such as that used for women's shoe tops and gloves, is chrome tanned. *Vici kid* is a proprietary name now generally used to describe any black, glazed, chrome-tanned kid. *Sole leather*, *harness leather*, and *belting leather* are produced from heavy cowhides by both methods of tanning.

Chamoising yields soft, pliable, light-colored wash leather of the chamois, doeskin, and suède type. These are made by working fish oil into the skins until all of the moisture is displaced. An oxidation process then occurs, during which the skins are changed to leather. The excess fat, known as *degras* when pressed from the skins, and as *sod oil* when washed out, is highly valued for dressing leather. *Chamois* was originally made from the skin of a small antelope of that name, which lives on the highest mountains of Europe and southwestern Asia. It is now made mostly from sheepskins. *Ooze* refers to leather having a suède finish.

Patent leather is made by applying many coats of oil and nitrocellulose varnish to well tanned skins tightly stretched on frames. The process is not controlled by a patent. *Cordovan leather* is soft, firm, fine-grained, and nearly waterproof. It was originally made in the Spanish city of Cordoba, but is now prepared in many countries from horsehide. Any required color is produced by dyeing. *Russian leather* is tanned with willow and birch bark. It has a peculiar odor due to the oil of birch bark tar with which it is finished.

Morocco was originally a fine red leather made in the vicinity of Morocco from goatskins. Today it is colored leather made from sumac-tanned goatskins which have been worked to bring out the grain. It is considered by bookbinders to be both the most durable and the most beautiful covering for books. *Levant morocco* is the finest and most expensive grade. When the grain of Levant morocco is crushed until the surface is smooth and polished, it is known as *crushed levant*. *French morocco* is made from sheepskin. *Buffing* is the grain, or outside split, from calfskin. It is much used for binding books.

Artificial leather, which has the appearance and many of the characteristics of the more expensive

material, is usually made of cloth coated with some waterproof, flexible substance, such as a preparation of cellulose nitrate. The surface is grained by means of a die.

Lighting Devices, Electric. Illumination by electricity is accomplished by three principal types of lamps,—filament, gaseous, and phosphorescent. The oldest and commonest is the so-called incandescent or filament lamp, in which a current flows through a filament, usually of tungsten, inside a glass bulb either empty of gas or filled with an inert gas. The current heats the filament until the filament glows brilliantly. The filament is looped, each end being connected with a small wire sealed into the neck of the glass bulb.

The gaseous type depends on sending a current of electricity through a glass tube filled with an inert gas, the current causing the gas to glow throughout its entire volume. The terminals for the current are placed at opposite ends of the tube. Different gases produce different colors. They also vary greatly in illuminating efficiency per unit of current. Mercury vapor gives off white light with a bluish tinge, neon a reddish-orange light, argon lamps a green glow, sodium vapor a yellowish light. The glass tubes may be molded to spell words, thus making these lights especially adaptable for advertising signs.

The phosphorescent lamp consists of a glass tube whose inner surface is coated with a phosphorescent substance. Upon the inner surface of the tube are projected invisible ultraviolet rays, which, upon striking the phosphorescent coating, causes it to glow. The advantages of the phosphorescent electric light include greater approximation to daylight, a wider range of possible color, high lighting efficiency, and long life.

The earliest electric lamps used platinum-wire filaments. In 1860, J. W. Swan, an Englishman, exhibited lamps using carbonized threads of paper. Thomas A. Edison, working independently, produced in October 1879 a carbon filament lamp, which was the first to succeed commercially.

In carbon filament lamps it was necessary to exhaust the air from the glass bulb in which the filaments were placed. Otherwise the carbon would burn.

Edison's early lamps used a filament of carbonized bamboo fiber. Later, the filaments were made by forcing a solution of cotton through a fine hole. The threads thus formed were hardened and were changed to carbon by heating. Improvements followed steadily. In 1907, a lamp with a filament made from powdered metallic tungsten was placed on the market; in 1911, stronger filaments of drawn ductile tungsten appeared; and, in 1913, the efficiency was greatly increased by filling the bulb with an inert gas, formerly nitrogen but now chiefly argon. These gas-filled bulbs, unlike the vacuum lamps, become hot when in use because the gas conducts some of the heat from the center to the sides. Nevertheless, they last longer and give more light for less cost than any of the older types.

Lime. A caustic, infusible material which, when pure, consists chiefly of calcium oxide. It is made by roasting limestone, chalk, marble, shells, or other forms of *calcium carbonate*, to a bright red heat. *Carbon dioxide gas* is given off and the residue is lime, or, as it is often called, *quicklime*. The burning is done in lime kilns, some types of which operate continuously while others must be cooled and emptied before another batch can be made.

When lime is mixed with water, chemical combination takes place. Much heat is given off and the lime swells to a powder known as *slaked lime*, or, chemically, as calcium hydroxide. *Milk of lime* consists of slaked lime suspended in a large excess of water. Ordinary *whitewash* is milk of lime to which a size, such as glue or flour, is usually added. *Air slaked lime* has been exposed to the atmosphere, from which it absorbs carbon dioxide and moisture until it falls to a powder. Pure lime which combines easily with water and makes a smooth stiff paste is known as a *fat lime*.

Lime is used principally for making mortar. It is also extensively employed for softening hard water, for neutralizing acid soils, for making bleaching powder and glass, for purifying sugar, in metallurgical operations, and for many other purposes.

Linen. Thread or cloth made from fibers of the flax plant. It is noted for its smoothness, luster, strength, and durability. Well preserved linen cloths have been found in Egyptian mummy cases which were more than 4000 years old. Linen is not easily dyed, consequently it does not hold stains so permanently as cotton, wool, or silk.

In preparing the fiber, the seeds are removed from the plant and the flax is placed either in pools of stagnant water, in streams, or upon a moist meadow. The wet straw ferments, and, during this process, called *retting*, the woody core becomes soft, so that it may be easily removed. When retting is complete, the flax is passed through machines which break the hard parts without injuring the fiber, which is then *scutched*, or beaten until clean and free of foreign materials. The purified flax is combed, or *heckled*, so as to separate the long, straight fibers, called *line*, from the short tangled *tow*. The line is then ready for spinning and weaving, and the tow is used in making cordage or the cheaper fabrics.

Linen thread is used almost exclusively in the manufacture of handmade lace. Table linen, when woven so as to show a pattern, is known as *damask* because of a resemblance to the famous patterned silks of Damascus. The snow white color is obtained by bleaching. Other linen fabrics include fine cambric, shirting, and handkerchief cloth, as well as the coarser butcher linen, crash, and huckaback.

Linen is much used for towels because it absorbs water quickly. As the result of this property, a spot of moisture usually shows on the opposite side of a linen fabric more quickly than it does on cotton. A more reliable method of distinguishing between the two is to put a drop of salad oil on the cloth and press it between blotting paper. Linen becomes more transparent than cotton.

Linoleum. A floor covering made by fixing on a sheet of canvas a mixture of oxidized linseed oil, ground cork, and other materials. The oxidized oil alone is also known as linoleum.

When thin layers of linseed oil are exposed to air, or when air is blown through the oil under proper conditions, oxygen is absorbed and the fluid gradually changes to a tough, elastic solid somewhat similar to rubber. This oxidized product is ground by machinery, mixed with cork, resin, and coloring materials, and fixed upon burlap by means of hot rollers. A decorative pattern is usually printed on the smooth surface.

Better grades of linoleum are made up of a mosaic of colored pieces so that the pattern extends through to the back. These pieces are united into a single layer by the pressure of hot rolls. Good linoleum provides a smooth insulating floor covering which is comfortable to walk on, easy to clean, and much more durable than oilcloth, which it has largely displaced.

Linseed Oil. The most useful of all paint oils. It was probably known in ancient times and was undoubtedly used for paint in the 7th century, but its real value was not generally appreciated until about 1400, when oil painting came into general use.

Linseed oil is dissolved from the crushed seed with naphtha, which has a low boiling point and can easily be removed from the oil by heating. The product is known as *raw linseed oil*. It ranges in color from light amber to dark yellow-brown and has rather an unpleasant odor and taste. Enormous quantities are used in making paint; at least seven and one-half gallons are required for every 100 pounds of white lead. *Boiled linseed oil* is produced when the raw oil is boiled with the addition of certain chemicals, such as manganese dioxide, which hasten the rate of the drying. This form is used chiefly for interior paints. *Refined linseed oil*

receives special treatment which removes any sediment-forming material and gives the lighter color which is demanded by the makers of fine varnish.

Besides its exceptional value in the paint industry, linseed oil is required for the manufacture of patent leather, for waterproofing cloth, such as oiled silk, and for making many of the imitation leathers which are often used for automobile tops and book bindings. It is an important ingredient in linoleum and oilcloth, while thousands of gallons are used in printing and lithographic inks. The value of the oil for these purposes is due entirely to its ability to absorb oxygen from the air and thereby change from a liquid to a tough, elastic solid. Oils having this property to a high degree are called drying oils. In addition, linseed oil has minor uses in medicine.

After the oil has been removed from the seed, the residue is known as *linseed oil cake*. When ground, this is called *linseed meal*, a very rich and valuable cattle food, at least four times as nutritious as hay. Linseed meal is also used to some extent as a fertilizer.

Liquid Air. A pale blue liquid, similar to water in density, used for producing very low temperatures. As the name indicates, it is prepared by liquefying air through subjection to high pressure, about 120 times the atmospheric pressure being required for air at normal temperatures. As pressure increases, the temperature falls. The oxygen in the air liquefies at −182.9° C., and the nitrogen at −195.7° C. In evaporating, the liquid absorbs heat, thereby producing very low temperatures. If the oxygen from liquid air is allowed to boil and evaporate off, the nitrogen still remains. Nitrogen is thus obtained for the manufacture of ammonia, cyanamid, and other compounds.

Luminous Paint. A mixture usually consisting of barium sulphide and zinc sulphide together with an exceedingly minute amount of some salt of radium. It has the valuable property of being visible in the dark. The mixture is used as a paint, or as a powder in small glass containers, to mark the hands and dials of clocks and watches, and the position of keyholes, lighting fixtures, gun sights, and other objects the visibility of which in the dark is often desirable.

Before the discovery of radium, luminous paint was generally prepared from mixtures of calcium sulphide with bismuth, from calcium tungstate, or from other materials phosphorescent only after an exposure to daylight. During the World War, the radium paint was extensively used in the front line trenches as it is visible for only a very short distance.

Radiolite is a commercial preparation containing the hexagonal zinc sulphide, called Sidot's blende, and radium. On the hands and dial of a "radiolite" watch there is less than $\frac{1}{1000}$ milligram of radium. Reckoning radium at about $100,000 per gram, there is from five to ten cents' worth of the element on such a watch. This radium gives off each second some 30,000 alpha particles, which strike the zinc sulphide and cause it to become luminous.

Match. A short, slender piece of wood or other inflammable material tipped with some combustible substance which will ignite by friction. Modern matches come under two general classes: safety matches, which must be rubbed on a specially prepared surface; and "strike anywhere" matches.

One of the earliest types of match consisted of a long splinter of wood tipped with sulphur. These were lighted by pressing the tip into glowing tinder. Later the sulphur tip was covered with a mixture of potassium chlorate and sugar, which ignited when dipped into a bottle containing asbestos saturated with strong sulphuric acid. The first true friction match was invented in 1827 by John Walker, an Englishman. It had a sulphur tip covered by a mixture of potassium chlorate and antimony sulphide. Fire was produced by drawing the head of the match between folded sandpaper which was supplied with each package.

Walker's matches were known as *congreves*, while imitations of these, called *lucifers*, were made by several competitors. White phosphorus was first used on the tips of friction matches by Walker and other manufacturers, in 1833. In the United States, improved friction matches were first made at Springfield, Massachusetts, in 1836.

For many years the tips of ordinary matches consisted of sulphur and white phosphorus, often with some chlorate or nitrate. Because of the unpleasant fumes of burning sulphur, these were largely displaced by *parlor matches*, having a more inflammable tip with much less sulphur. A machine for automatically preparing the sticks was invented in 1842.

In 1855, safety matches were introduced by a Swede named Lundstrom. He omitted white phosphorus from the tip and instead placed a friction surface of red phosphorus and sand on the side of the box. Safety matches ignite only when rubbed on this surface.

White phosphorus is an intense poison which was the cause, among match workers, of many cases of necrosis, or rotting of the jawbones. The dangers attendant on its use can be avoided by substituting in its place red phosphorus or phosphorus sesquisulphide. For this reason, the use of white phosphorus in matches has been forbidden in many countries.

Patents covering the use of phosphorus sesquisulphide in the United States were owned by the Diamond Match Company, which in 1911 surrendered these patents so that the process might be employed by anyone. The Esch-Hughes Non Poisonous Match act, passed in 1912, placed a tax of two cents per hundred on matches containing white phosphorus, thus making the use of this material commercially impossible. The exact composition now used for the tips of matches is a carefully guarded trade secret. Safety matches often have potassium chlorate and dichromate on the head, with red phosphorus, manganese dioxide, and glass powder on the rubbing surface. "Strike anywhere" matches generally contain phosphorus sesquisulphide together with such oxidizing materials as red lead, lead peroxide, manganese dioxide, and potassium chlorate. The mixture is often colored, and is held by a binder of glue or dextrin.

In North America, matches are usually made from white pine or California sugar pine which has been seasoned and dried for almost two years. The wood may be cut into planks about two inches thick, which are then sawed into blocks the length of a match. The blocks are fed into a machine which rapidly splits them into match sticks. A second important method of preparation consists in cutting the pine log into a long roll of veneer having the thickness of a match. The veneer is then reduced to splints by machinery.

The splints are automatically fixed in rows on an endless belt, which carries them until the free ends, having been heated and dipped in paraffin, receive the composition that forms the head. This is dried by a blast of warm air. They are then mechanically packed into boxes. Ordinarily, they are from 1⅞ to 2¼ inches long. Matches made of waxed taper, called *vestas*, as well as the small books of cardboard matches so much used for advertising are also made by machinery. Impregnated matches have been dipped in solutions of alum or magnesium sulphate to prevent smoldering of burnt stems. In France the manufacture of matches is a government monopoly. Prior to 1918 practically no safety matches were made in the United States, the entire supply being imported from Norway, Sweden, and Japan.

Mortar. A building material ordinarily made by mixing slaked lime, sand, and water. It becomes hard because of chemical action in which the lime absorbs carbon dioxide from the air and changes to calcium carbonate. Lime is prepared by roasting

limestone, or calcium carbonate, until the carbon dioxide which it contains is driven off. Thus the hardening of mortar is due to a change in which the lime again becomes limestone. Unlike cement, mortar does not harden until fairly dry. Consequently, it should not be used in very damp places.

Nails. Slender pieces of metal usually pointed at one end and flattened or enlarged at the other to form a head. Nails are classified, according to the method of manufacture, as wrought, cut, and wire. All nails were formerly made by hand, but, with the exception of some horseshoe nails, hand wrought products have been displaced by machine made nails.

The first machine for making cut nails was patented in 1786 by Ezekiel Reed, an American. Machines of this type cut the nails from sheets or narrow strips of heated metal, form the head by pressure or by hammering, and drop the flattened nail into a receiving trough. Wire-nail machines seem to have been a French invention, but the process received little recognition until 1876, when, at the Centennial exposition, American made machines were awarded medals over those of foreign manufacturers. These machines are fed from coils of wire, which they grasp, straighten, cut, and form into nails of any size or type, with great rapidity. At present the wire-nail industry produces the greatest proportion of all nails used.

The size of a standard common nail ranges from 2 d. or *two penny*, to 60 d. This odd method of describing nails, which originated in England, finds two explanations. One is that four penny and ten penny nails sold respectively for four pence and ten pence per hundred. According to the second explanation, 4 d. and 10 d. applied to nails, 1000 of which weighed four pounds and ten pounds respectively. The abbreviation "d.," which now means penny, was in earlier times used for pound. The standard size of the common wire nails is shown in the accompanying table.

A *spike* is three inches or more in length and is thicker than a corresponding nail. For example, a 40 d. spike has the same length as a 40 d. nail but is as thick as a 60 d. nail. *Common brads* have the same length and thickness as nails but have a small, thickened head instead of one that is large and flat. *Finishing nails*, made from 2 d. to 20 d., have the same shape and length as brads but are much thinner.

Wire nails are made into hundreds of special forms, such as roofing nails, plaster board nails, basket nails, wagon nails, hinge nails, and boat nails. Sterilized lath nails are marketed because lathers customarily carry nails in their mouths while working. Special nails may be smooth or may have rough, corrugated surfaces. Cement coated nails are extensively used because they have much greater holding power. Nails are generally sold in 100-pound kegs and in boxes of smaller weight. Those of 20 d. size and larger sell for the same price per pound; the cost of smaller nails increases as the size decreases.

Common Wire Nails

Size	Length Inches	Steel Wire Gauge	Diameter Inches	Number Per Pound
2 d.	1	15	.072	876
3 d.	1¼	14	.080	568
4 d.	1½	12½	.099	316
5 d.	1¾	12½	.099	271
6 d.	2	11½	.112	181
7 d.	2¼	11½	.112	161
8 d.	2½	10¼	.131	106
9 d.	2¾	10¼	.131	96
10 d.	3	9	.148	69
12 d.	3¼	9	.148	63
16 d.	3½	8	.162	49
20 d.	4	6	.192	31
30 d.	4½	5	.207	24
40 d.	5	4	.225	18
50 d.	5½	3	.244	14
60 d.	6	2	.263	11

Needle. A slender, pointed instrument of metal or other material, used to carry the thread in sewing, knitting, and similar operations. Most needles are pierced with a hole called the *eye*, through which the thread is passed. The earliest needles were really pins, for they had no eye but were used simply to make an opening through which a thong of leather or vegetable tissue could be passed. Stone needles having an eye at one end have been found among the relics of the Stone age. Delicate needlework was produced by the Egyptians and ancient Greeks, and both common and surgeons' needles were found in the ruins of Pompeii.

It is believed that the Chinese were the first to use steel needles and that knowledge of this practice was eventually carried into Europe by the Moors. By 1370 a needle making industry had become established at Nuremberg. The manufacture of needles in England developed during the reign of Queen Elizabeth. Not until 1885 were needles made and finished by machine.

Most modern needles are made from high grade steel wire cut into pieces two needles long. The pieces are straightened, both ends pointed against a grindstone, the eyes stamped out, and the double needle broken at the center. The rough needles thus formed have the heads ground to the proper shape and are tempered and polished. The eyes may be smoothed with fine emery and waxed thread, and, in the finest needles, are often gilded. Sewing machine needles are often pressed from short blanks of thick wire.

Knitting needles have no means for holding the thread. Crochet needles have a hook on the end. Surgeons' needles are generally curved, and the needles on many welting machines are curved in the arc of a circle. Sewing machine needles have the eye near the point, with grooves on the sides to prevent binding the thread.

Nitroglycerin. A powerful explosive made by treating pure glycerin with a mixture of concentrated nitric and sulphuric acids. The oily product has a yellowish color, is about 1.6 times as heavy as water, and is slightly volatile. It was discovered by Sobrero in 1846. Both the liquid and its fumes are poisonous and usually cause violent headaches, but persons working in the nitroglycerin factories often become immune to its effects. In medicine it is used as a heart stimulant. Pure nitroglycerin is not very sensitive to friction or to a moderate blow. When frozen it is less sensitive than when liquid. A small quantity, when freely exposed to a flame, burns brilliantly without explosion. Somewhat larger amounts, under the same conditions, usually explode, so that all experiments of this sort are uncertain and dangerous.

Liquid nitroglycerin is used in torpedoes for *shooting* wells, to start or hasten the flow of oil. Because of the danger attending its transportation, the liquid is usually absorbed in some very porous material, such as kieselguhr or sawdust, and pressed into sticks, which are carefully wrapped in paraffin paper. This product, which is known as *dynamite*, was invented by Alfred Nobel in 1866. Nitroglycerin is also an ingredient in other explosive compounds such as *gelatin dynamite* and the *smokeless powders*, which include *ballistite* and *cordite*. Dynamite, as well as nitroglycerin, is most effective when exploded by a *detonating cap* fired either by the ordinary fuse or by electricity. Such a detonator acts as a very quick, powerful blow. The safest way to destroy nitroglycerin is to treat it with a solution of ammonium sulphide.

Nylon. A synthetic textile having many properties similar to those of silk. The word is a coinage of E. I. duPont de Nemours & Co., which obtained the patent in 1937. Nylon is defined as the generic name for "synthetic fiber-forming amides having a protein-like chemical structure; derivable from coal, air, and water or other substances; and characterized by extreme toughness and strength and the peculiar property to be formed into fibers and into various

shapes, such as bristles and sheets."

Like rayon, nylon filaments are made by pressing a liquid through small holes. The filaments then become solid but may be cold-drawn to an extreme fineness.

Nylon differs from rayon in that it is not made from cellulose. It has greater strength and elasticity, but is less absorbent than cotton, wool, linen, rayon, or silk. Fabrics knitted from nylon hold their shapes better than those made from any other fabric and excel them in wearing qualities. Nylon takes dyes as well as wool, cotton, or silk. The dye may be incorporated in the yarn or added after it is spun. Among its chief uses are as hosiery and other knitted wear, tooth brush bristles, fish lines. Being relatively non-absorbent, fabrics made from nylon dry quickly and feel cool to the skin. A similar textile made by the Carbide Chemicals Corp. is known as *vinyon*.

Oleomargarine. A mixture of edible fats churned with milk, salted, and worked to a butter-like consistency. This product was invented in 1869 by a Frenchman, Hippolyte Mège-Mouries, in order to secure a prize offered by Napoleon III for a cheap and wholesome butter substitute.

Oleomargarine is made by churning carefully prepared fats with milk which has been pasteurized and then ripened or fermented until it has a strong butter flavor. Oleo oil and neutral lard, or simply *oleo* and *neutral*, are the most important ingredients used, although some vegetable oil, such as cottonseed or coconut, is often added. The term oleo oil is somewhat misleading, as the fat is not an oil at ordinary temperatures. Oleo is prepared from selected beef tallow by slowly cooling the melted fat until it begins to thicken. The pasty mass is wrapped in porous cloths and placed under pressure. This forces out the softer portion into tanks of cold water, where it is chilled to a granular, slightly yellowish solid. Neutral is made from choice lard by a similar process, which has for its purpose the removal of the crystalline portion of the fats so that the final product will be smooth instead of grainy. *Nut margarines* are prepared entirely from vegetable fats by substituting coconut and palm kernel oils for oleo and neutral.

The fats are first melted at low temperatures, weighed out in the exact amounts required by the formula, mixed, and thoroughly churned with the ripened milk. The contents of the churn are then sprayed into ice water, becoming solid so quickly that crystals do not have time to form. This chilled mass is allowed to stand for some time in order that the butter flavor may develop further. Its color is white. It is then salted, and worked by machinery until smooth and firm like butter. It may also be colored to resemble butter.

A household test which will usually distinguish between butter and margarine consists in heating a spoonful of the material over a small flame. Butter foams quietly, while margarine sputters noisily and produces very little foam. See *Butter*, *Cottonseed Oil*.

Paint. A suspension of finely ground pigment in a liquid or other medium, which is applied to objects for decoration or protection. Thus, calcimine and whitewash are paints in which the pigment is suspended in water. However, as generally used, paint refers to a suspension of pigment in a fatty oil. Paint was formerly used only as a means of decoration, but its value as a protection against corrosion and decay is now quite generally recognized.

A good house paint generally contains about 65 per cent by weight of pigment and about 35 per cent of a liquid vehicle, or pigment carrier. The vehicle consists of a mixture of an oil, a solvent or thinner, and a liquid drier. The oil is usually linseed oil, which has the property of absorbing oxygen from the air and of drying to a tough elastic film when spread out. China wood, perilla, soy bean, poppy, fish, and other oils are also used in paints. The solvent is added to make the product penetrate and spread more readily. Among the best solvents are turpentine and benzol. The principal driers are composed chiefly of lead and manganese soaps, which by their presence cause the oil to take up oxygen and to dry more rapidly.

The chief pigments are white lead, zinc oxide, and lithopone. Certain proportions of inert fillers such as barytes, asbestine, silica, and calcium carbonate are often added; but, as a rule, small amounts of these are found in good paint and large amounts in a cheap product. A single pigment in oil does not usually produce the best paint. White lead combined with zinc oxide, with or without a small amount of inert pigments, has been shown by many experiments to give the most satisfactory results. Any desired color may be produced by the addition of natural earth colors, such as sienna and iron oxide, or of artificial pigments, such as lead chromate, prussian blue, and carbon black.

In making prepared paints the pigments are thoroughly mixed by machinery with a small amount of oil. The mixture is then ground to a smooth paste between heavy revolving plates of stone or steel. One barrel of pigment, when ground with oil, yields only ⅓ barrel of paste. Paint is produced by mixing this paste with linseed oil together with the proper amounts of turpentine, liquid drier, and coloring pigments, which have also been ground in oil. The finished product is then sealed in containers and is packed for shipment.

Enamel paints generally consist of zinc oxide and lithopone in blown linseed oil and high grade varnish. Flat wall paints, often called sanitary flat wall paints, usually contain lithopone and zinc oxide ground in treated china wood oil and thinned with turpentine substitute made from petroleum. Floor paint contains a larger proportion of the inert pigments barytes and silica, which are highly resistant to abrasion, while good mixing varnish is added to the vehicle in order to produce a hard, glossy surface. Paints intended for the protection of iron and steel must prevent corrosion. Red lead containing about 15 per cent litharge, zinc oxide, zinc chromate, basic lead chromate, and basic lead sulphate are especially valuable as rust preventives. Steel hulls of ships usually receive a coat of anti-corrosive paint followed by a coat of antifouling paint, which, in order to prevent the growth of animal and vegetable organisms, contains a poison such as cyanide of copper or mercuric oxide. See *Linseed Oil*, *Turpentine*, *Varnish*.

Paper. A substance composed chiefly of cellulose fibers matted or felted into thin sheets. As cellulose is of vegetable origin, the raw materials used for making paper are numerous and include cotton or linen rags, wood pulp, cotton linters, esparto grass, straw, hemp, jute, and old papers. The word "paper" is derived from *papyrus*, a Latin word applied to writing material made from an aquatic plant of that name which was used by the Egyptians as early as 2400 B. C.

The manufacture of paper was known to the ancient Chinese, who during the second century B. C. prepared it from the pulp of the mulberry tree. Chinese prisoners taken by the Moslems introduced paper to the Arabs, who at first utilized ramie extensively in its manufacture. Ramie is a plant having tough fibers similar to linen or flax fibers but stronger. After the 14th century, linen fiber predominated. The Arabs passed the invention on to the Western nations, among whom the making of it has been developed into a highly mechanized process. Fine handmade papers are still produced in China, Japan, and Italy. But the same principle is used whether paper is made by machinery or by hand. A film of fibers suspended in water is spread over a flat surface and the water drained off. In making paper by hand, the mixture of pulp and water is dipped from a vat with a shallow tray or mold with a screen bottom. The vat man dips with a shaking motion to interlock the fibers, and most of the water drains out through the bottom of the mold. He then hands

it to the coucher who lays the wet sheet on the "couch" or piece of felt. The pile of alternate layers of felt and paper is pressed and re-pressed to remove more water, and, after sizing with animal glue, the sheets are hung up until thoroughly dry.

At least 250 kinds of paper have been made in the United States. Seventy-five per cent of the total volume is produced from wood pulp; about five per cent, consisting of the highest grades, from rags. The rags are carefully sorted and cut into small pieces, cleaned by boiling with lime, washed, ground in a machine called a *hollander*, bleached with some form of chlorine, and then beaten to a mass of fibers. These fibers are ready to be made into paper.

Wood pulp is classified, according to the method of preparation, as mechanical and chemical. *Mechanical pulp* is made by forcing logs of wood against a revolving grindstone, from which the torn fibers are carried away by a stream of water. *Chemical pulp* is prepared by cutting barked logs into chips, which are cooked with a liquid under pressure until most of the impurities have dissolved. The product is known as *soda*, *sulphite*, or *sulphate pulp*, according as the liquid contained caustic soda, lime and the gas from burning sulphur, or sodium sulphate. Soda pulp lacks strength, while sulphite pulp has good strength and color. Sulphate pulp gives a strong, brown product known as *kraft paper*. Spruce, poplar, pine, and hemlock are the chief pulp woods. Newspaper is usually made from mechanical pulp with which a certain amount of chemical pulp is mixed to impart strength.

The strained pulp, to which has been added any necessary coloring and filling materials, is made into paper on a complicated mechanism called a *Fourdrinier* machine. Wet pulp is first deposited on a long, endless, moving screen of fine wire, from which the water drains rapidly, leaving a soft sheet. A *water mark* is formed at this time by lightly pressing the moist layer with a roller having a raised design. From the moving wire the paper passes to felt rollers, where it is pressed; then to drying rollers; and from these to other rollers, which impart the desired finish to the surface. The edges of the sheet are trimmed and it is wound on a reel. Some Fourdrinier machines can make an endless sheet of paper 180 inches wide at 1000 feet per minute.

Papers to be used for printing and writing are filled with various materials and sized with glue so they will not absorb ink. *Tissue* and *blotting paper* are loosely made without sizing. *Manila paper* was originally made from hemp, jute, or old rope, but it is now produced from wood. The genuine product is called *rope manila*. *Paraffin paper* is made by passing the material through melted paraffin and then through rolls which remove the excess wax.

The skins of various animals when treated so as to afford a smooth surface for writing are known as *parchment*, and a soft, white variety made from calf- or kidskin is called vellum. *Vegetable parchment*, which resembles the animal product, is prepared by rinsing and drying an unsized paper that has been treated with dilute sulphuric acid.

Coated paper is a development of recent years to meet the exacting requirement of the printer so that half tones may be well printed. This paper is mechanically coated on both sides or on one side as may be desired, by either running it through a bath of coating liquid or flowing the liquid onto the paper. The materials used in the coating mixture are largely mineral in character. The mixture may have in it satin white (calcium sulphate and aluminum hydrate), English china clay, blanc fixe (barium sulphate), glue, casein, and starch.

Pins. The first pin was very probably a long thorn, pushed by some primitive man through the animal skins with which he covered himself. Pins made of bone and of bronze have been found among the remains of the ancient Lake Dwellers who inhabited central Europe in prehistoric times. Some of these relics are entirely similar to the present day safety pin. The Egyptians, the Greeks, and the Romans were all familiar with long pins of bronze, bone, and other hard materials.

Development of the process for making wire led to the production of modern pins, which were made first in France and Germany. The manufacture of brass wire pins was introduced into England in 1826. These early pins were cut and sharpened by hand, and the head was formed by wrapping fine wire around one end of the shank. Such handmade pins were expensive, but were considered so necessary an item of dress that the money received or set aside by a woman for her personal expenses came to be known as *pin money*.

The first machine for making solid-headed pins was the invention of an American, Lemuel W. Wright, in 1824. A more satisfactory machine was invented in 1831 by John Ireland Howe, a physician of New York City. A machine for sticking the pins into folded paper, invented by Samuel Slocum, was used in Howe's factory as early as 1841.

The great majority of common pins are made from brass wire; the best are made from fine steel. Coils of wire are placed in the machine, which cuts off and straightens a piece of proper length, holds it in viselike jaws until the head is formed by the blow of a die, and moves the lower end against grinding wheels, which sharpen the point. The pins are next cleaned, coated with tin, and polished. Other automatic machinery arranges them and sticks them into papers. Birmingham is the center of the industry in England; Connecticut, in the United States.

Plastics. A term applied to a group of synthetic chemical products. Their distinctive quality is their capacity to be molded into any shape by moderate heat and pressure and to retain it at ordinary temperatures. They may also be dissolved and used as lacquers, pressed into sheets and panels, or drawn out in threads. They are obtained by chemical treatment from such substances as cellulose (cotton), phenol, or carbolic acid (coal tar), and formaldehyde (wood alcohol). The caseins come from milk; the ureas from ammonia and carbon dioxide (coal, air, and water). The qualities which make these products desirable are their strength, hardness, and electric resistance, the variety of color and finish obtainable, and the possibility of reproducing with exact uniformity.

During World War II, when there were numerous shortages, the plastics industry came to the front by supplying many engineering materials. Considered then to be merely substitutes for older materials, plastics have since won recognition on their own merits, and production has soared from about a billion pounds a year to several times that figure. The development of plastics has had a marked effect on numerous industries. See *Bakelite*, *Cellophane*, *Celluloid*, *Lacquer*, *Nylon*, *Rayon*.

Porcelain. The most highly valued type of fine pottery, differing from inferior grades because of its glasslike, translucent body. It is usually very hard and white. Its common name of *china* indicates the place of its origin; the time is uncertain, perhaps because of the gradual development of the art. The Chinese may have made porcelain of a sort as early as the 7th century A.D. But it is generally acknowledged that not until the Ming dynasty (1368–1644) did their ceramic products develop the qualities for which they became famous.

Porcelain is generally classified, according to the materials of which it is composed, as hard paste, artificial soft paste, and natural soft paste. True hard paste porcelain is made from kaolin, or china clay, and feldspar, which imparts translucency; quartz and special sands are sometimes added. The feldspar is often called Cornish stone because Cornwall, England, has been an important source of this material. From the time that Chinese porcelain first appeared in Europe, great efforts were made to produce a similar product. Articles which resembled porcelain, but were chiefly glass, were made in Florence about 1580. In France, about 1670, artificial soft paste porcelain was first produced.

This contained no kaolin, but was a glasslike substance composed of sand, niter, gypsum, alum, soda, salt, and marl or chalk. It was usually covered with a rich, waxlike glaze. Very little porcelain of this type was produced after 1780. Natural soft paste porcelain, or *bone china*, was an English invention developed during the 18th century. The standard mixture, containing ball clay, kaolin, feldspar, and notable quantities of bone ash, was apparently fixed by Josiah Spode, about 1800. Since that time, it has been the principal product of the chief English potteries.

Hard paste porcelain was first produced in Europe, about 1709, by the alchemist Johann Friedrich Böttger. The factory which he established at Meissen became the source of the famous Dresden china. Manufacture of hard paste was begun at Plymouth, England, in 1768; at Sevres, France, in 1769; and at Philadelphia, U. S. A., in 1825.

Hard porcelain ware is usually baked at a rather low temperature. The resulting biscuit is decorated if desired, covered with glaze, dried, and then fired at temperatures so high that the body almost fuses. Kiln temperatures range from 2000° to 3200° F. The glaze is composed of the same ingredients as the body, although in different proportions. Care is necessary to prepare a glaze which will not crack and separate when the piece cools. When the cracking or crazing of the enamel is uniform and is produced intentionally, the product is known as *crackle ware*.

Parian is a fine grade of thin, unglazed porcelain which receives its name from a resemblance to an ivory tinted marble found on the island of Paros. *Belleek* is thin, light weight porcelain having a beautiful iridescent or pearly glaze. It takes its name from a town in Ireland where it has been made for many years.

The French factories at Sevres and Limoges, the German potteries at Meissen and Berlin, and the Royal Copenhagen factories are recognized as producers of much of the world's finest porcelain. Japan and Austria are also known for their porcelain. The production of high grade porcelain in the United States is constantly increasing, the output of certain potteries being considered by experts equal to the best made in the Continental factories. During the World War a very satisfactory porcelain for use in scientific laboratories was developed in America. See *Pottery*.

Pottery. Any article or product formed from soft, moist clay or claylike material and hardened by means of heat. The term thus includes products ranging in character from ordinary brick to finest porcelain. In common usage, however, *pottery* generally refers to the class of clay or ceramic products which comes between these extremes.

Production of pottery depends chiefly, first, on the fact that moist clay is so plastic that it may be worked or molded into almost any form; secondly, on the fact that, under the action of heat, the plasticity is destroyed, and soft clay becomes hard and durable.

After an article of pottery has been heated or *fired*, it has either a porous, open structure or a nonpermeable, vitrified, or glasslike, body. Porous ware includes terra cotta, fired refractories such as fire brick, and earthenware. *Terra cotta* includes all permeable, unglazed, clay products which fuse or lose shape if heated to 1650° C. The term is applied more narrowly to red-brown or yellowish red ceramic ware used for architectural or decorative purposes. Refractories are similar to terra cotta but must endure a temperature of 1650° C. without fusing or losing shape. Ceramic products having a permeable body covered with a glaze or enamel are classed generally as earthenware. Pottery having a *vitrified body* is divided into *stoneware* and *porcelain*. Stoneware is *opaque* and has usually more or less color; porcelain is *translucent* or partly transparent and is generally white.

The potter's art was known thousands of years before the Christian era. Wherever clay was to be found, man learned in prehistoric times to fashion it into useful articles and to harden these by heat. Thus, pottery was developed independently by the Egyptians, the Chinese, and the Aztecs or their ancestors.

Raw clay must be purified and tempered before satisfactory pottery can be made. For this purpose weathering or exposure to the elements for several months is often practiced. Stones and coarse material may be removed by screening and washing, and uniform plasticity obtained through grinding, kneading, and mixing, usually by machinery. Fine clays are often mixed with large amounts of water so that any coarse particles settle out. The thin mixture is then pumped through filter presses, which retain the clay and allow the water to escape. There are many kinds of clay; the finest—white burning china clay—is called *kaolin*. Iron is the most common impurity, imparting the red color characteristic of terra cotta and brick. Kaolin lacks plasticity; *ball clay* is highly plastic and, when burned, gives rise to white products; *slip clay* melts at low temperatures and is often used as a natural glaze.

When clay has been reduced to proper consistency, it is formed into pottery by *throwing* on a potter's wheel, or by means of molds. A potter's wheel is merely a horizontal, rotating table driven either by power or by the foot of the operator. A lump of clay is placed on the center of the table, and, as it turns under his hands, a skillful potter can produce almost any desired circular form, such as a flat plate or hollow vessel. The surface is smoothed with a wet sponge or a piece of leather and the piece is removed from the wheel. When dry, it may be made perfectly symmetrical by turning in a lathe. Rotating forms called *jiggers* are generally used when many pieces of the same size and shape are to be produced. Irregular shapes are molded, and large vessels may be made up from several molded pieces. Thin pieces are sometimes cast from a mixture of clay and water in a porous plaster of Paris mold, which absorbs much of the moisture. Small parts, such as spouts and handles, are cemented on by means of a thin suspension of clay in water.

When the pieces have dried, they are carefully packed in oven-like, clay containers called *saggers*, which are stacked up in the kiln. Firing requires from 24 to 60 hours, after which the pottery is allowed to cool very slowly. The ware is now in the stage known as *biscuit*. It may be decorated and is then glazed by being dipped into thin, watery mixtures of enamel, dried, and again fired for several hours. During the second firing, most enamels change to a transparent glass through which any decoration is plainly seen. Decoration may also be applied to the unfired enamel or to the fired glaze. Enamels containing tin are white and opaque, while lead enamels are softer and transparent. Very hard, transparent, lead glazes are produced by addition of feldspar, borax, and flint. Salt glaze is made by volatilizing salt in the furnace. The salt vapors combine with the surface of the biscuit ware, yielding a cheap, comparatively soft, but quite effective glaze.

Particular kinds of enamel and types of decoration often characterize the products of certain potteries. Thus Delft, a town in the Netherlands, has long been famous for its decorated, tin enameled pottery. *Majolica*, named from the island of Majorca, is another highly decorative, tin enameled ware. *Yellow ware* is earthenware made from clay which burns to a buff color, covered with transparent glaze. *Rockingham ware* is usually yellow ware covered with a dark brown glaze. It resembles pottery first made on the estate of the marquis of Rockingham. *White granite* or *ironstone* is a bluish white stoneware from which most of the ordinary American crockery is made.

Building bricks were made in Virginia as early as 1612, and white ware was first produced in America about 1684. White ware with underglaze decorations was first produced about 1770, and hard porcelain in 1825. Architectural terra cotta was made in the United States about 1870, and eggshell porcelain, in 1884. Possibly the most famous pottery in America is made at the Rookwood Pottery, of Cincinnati, Ohio. See *Porcelain.*

Pressure Cooker. One of the most popular devices for quick and convenient cooking in the modern American kitchen is the pressure cooker. It is usually made of aluminum or appropriate metal, which may be sealed for cooking or sterilizing under high-pressure superheated steam.

Raisin. A dried grape of special type. All grapes will not make raisins, one requirement being a high content of sugar which not only imparts the characteristic sweet taste but also acts as a preservative. Raisins are produced chiefly in the countries which border on the Mediterranean Sea and in California. The principal varieties of grapes used are the Muscat, Thompson seedless, and Sultana, which is also without seeds.

When the grapes are ripe, the bunches are usually cut from the vines and exposed to the sun on trays, with occasional turning so that drying will be uniform. About three weeks is the average time of curing, and, to hasten the process and avoid the danger of rain, some growers complete the process in artificial dryers.

Rayon. A manufactured textile fiber resembling silk in appearance and sometimes called artificial silk. The material from which it is made is either cotton linters or wood pulp. The raw material is treated with acids or other chemicals in order to make it soluble. It is then dissolved in alcohol and ether, or other suitable solvents, and, after purification, is forced through very small openings. It emerges as fine threads, which become solidified by evaporation of the volatile solvents or by passage through a setting bath.

There are four principal processes in use, of which the above is a generalized description. All are derived from the process devised by a French scientist, Chardonnet, about 1889.

The use of rayon has grown at an amazing rate. In 1922, the consumption of rayon in the United States was by weight about half that of silk. In 1926, the two were about equal. In 1931, 150 million pounds of rayon were used and 79 million pounds of silk. The United States leads the world in rayon production and is followed by Great Britain and Italy.

Rayon is smooth and lustrous, like silk, providing a beautiful fabric at a low cost. Most rayons, being pure cellulose, are very durable if not subject to wear in excess of their strength. Rayon yarn has comparatively low tensile strength, which is still further reduced when the fiber is wet. For this reason, it is frequently mixed with cotton or wool. The resulting fabric usually has better wearing qualities than rayon and is more decorative than cotton or wool.

Rifle. A firearm having spiral grooves cut on the surface of its bore. When a shot is fired, the bullet follows the path of the grooves until it leaves the barrel. It consequently receives a spinning motion, which greatly increases the accuracy of its flight.

A rifle usually means a small gun which is fired from the shoulder. But, with a few exceptions, all modern firearms, from the smallest pistol to the great guns of a battleship, are rifled. *Automatic rifles* and *pistols* are automatic only in the sense that they are self-loading; the trigger must be pulled before each shot. A loaded *machine gun,* however, continues to operate automatically as long as the trigger is depressed.

Rubber or **Caoutchouc.** An elastic gum obtained from the milky juice, or latex, of many tropical trees, vines, and shrubs. This latex contains the rubber as small suspended globules. In 1770, when it was learned that a piece of the material was useful for rubbing out pencil marks, it received the name rubber. The principal source of rubber has been the rubber tree, which is native to the valley of the Amazon.

Early experimenters tried to make shoes and clothing waterproof by covering the fabric with raw rubber. In 1823 Charles Macintosh produced rainproof garments by sewing a thin sheet of rubber between two of cloth. Such articles could not be generally useful because the gum became soft in hot weather and brittle in cold.

This difficulty was solved by Charles Goodyear in 1844, when he patented his process of *vulcanization,* in which rubber is mixed with powdered sulphur and heated. A low temperature and a small amount of sulphur produce a soft, elastic rubber; greater heat and much sulphur produce a completely vulcanized, hard rubber. *Vulcanite,* from which combs and thousands of other articles are made, contains about 32 per cent of sulphur.

Persistent experiments under British initiative in the East Indies resulted, during 1890–1900, in the successful cultivation of the Brazilian rubber tree in that region. As a result of scientific research, the quantity of the latex from each tree was increased and the quality was improved. The latex is coagulated on the plantation by the use of acetic acid or by other methods, thereby improving the texture of the rubber and shortening the time required for treatment in the factories. The coagulated rubber, washed, rolled into sheets, sun dried, and usually smoked to kill enzymes, is then shipped to the factories. Often, however, the latex itself is sent to the factory, where it is sprayed into heated chambers. The moisture evaporates from the latex in the process, and the rubber falls in flakes at the bottom of the chamber.

At the factory, the rubber is heated to make it plastic, and sulphur, fillers, accelerators, and pigments are added. When mixed to a homogeneous mass, it is then shaped into the required forms and heated with steam, which causes it to react with the sulphur and become vulcanized. Rubber spread on cloth, for producing rubberized fabrics, is vulcanized by the "cold" process, being hung in the vapor of sulphur monochloride.

Rugs and Carpets. Patterned fabrics generally employed as floor coverings. A floor rug differs from a carpet by being woven usually in one piece of a definite shape and design. A rug, also, unlike a carpet, is not intended to cover the whole floor. Both fabrics are usually woven with a pile, or raised surface of tufts, either cut or looped.

The weaving of rugs is one of the most ancient of industries. Rare specimens of decorative textiles in the Cairo museum dating from the 15th century B. C. indicate that the more ancient rugs made in Egypt did not have a pile, or nap, but were woven like tapestries. The earliest extant examples of rugs having a piled surface date from the 3rd or 4th century A. D. They were made in Egypt and are now in the Victoria and Albert museum, England.

From time immemorial, China and southwestern Asia have been noted for their beautiful rugs, and this industry remains today in almost the precise form under which it was carried on thousands of years ago. The rugs are laboriously woven by hand in the most primitive manner. By reason of the skill of the weavers, however, rugs of the Orient hold a unique place in the world's markets, being unsurpassed for coloring, artistic patterns, and durability.

Oriental rugs are woven on a simple frame consisting of two poles supporting two rollers. The poles are usually fixed upright in the ground with one roller attached to the top of the poles and the other below it at a distance about equal to the desired length of the rug. To the rollers is fastened a warp of strong threads, the number of which determines the width and fineness of the rug. To each

thread of the warp, short pieces of colored wool, silk, or hair of camels or goats are knotted in such a way that the two ends project toward the worker. The arrangement of these tufts by color produces the design in the finished product. A weft thread is then run in across the warp. A second row of knots are made on the warp threads, and a second weft thread is run in. The rows of tufts and the weft threads are pressed together by a comblike instrument, thus producing a compact textile with a pile. The projecting tufts are carefully clipped to make an even surface. The number of knots to the square inch varies ordinarily from about 50 to 400, although a few rugs are still more closely woven. The royal Ispahan prayer rug, made in the 18th century for the shah of Persia, has more than 1000 knots in each square inch of surface. The designation prayer rug has reference to the wide use of rugs among Mohammedans as a fabric upon which to kneel during prayer. Their designs generally have a religious significance.

Oriental rugs are usually classified according to the geographical divisions in which they are produced. Fabrics from each locality still have a distinctive character, although, in recent years, the sharpness of the distinctions have tended to be obscured because of the demand for rugs made to order. An account of the outstanding types is given in the following paragraphs.

Chinese rugs are readily distinguished by their looser texture and beautiful background of blue, gold, red, or tan. The designs are usually detached figures of dragons, kilins, lion-dogs, the animal signs of the Chinese zodiac, or emblems of Buddhism and are wrought predominantly in grayish blues, yellows, and creams, as well as in delicate pastel pinks and shades borrowed from Chinese silks and porcelains. The warp is always of cotton.

Bokhara rugs are woven by tribes, still largely nomadic, living in Bokhara, a district of Central Asia north of Afghanistan. They are made of fine durable wool with a liberal mixture of goats' hair. A Bokhara rug may be recognized by its wide selvages and long fringes at the ends and by its octagonal patterns on a field of rich maroon or dull crimson. *Afghan rugs* have a somewhat similar design on a deep red background. The choice of red as the dominant color is said to be determined by the religion of the weavers, who are worshippers of fire. *Beluchistan rugs* also are red and have simple floral or mosaic patterns. They come from western India.

Caucasian rugs are lighter in tone than those described in the preceding paragraph. They are made in the district lying between the Caspian Sea and the Black Sea. The finest of them are the *Daghestan rugs*, which are usually made of lambs' wool. The ground color is deep blue or ivory and is always well covered by geometrical designs, including octagons, hooks, crosses, and eight- or six-pointed stars. Daghestan rugs never exceed four by seven feet in size. Other Caucasian rugs are the *Shirvan rug*, very similar to the Daghestan; the *Kazak*, made by brigand Cossack tribes and distinguished by an unusually thick, heavy pile, which gives the fabric great durability; the *Cabistan*, which is long and narrow; the *Soumak*, or *Kashmir*, known by its straight lines and somewhat whitish effect; and the *Saruk* rug, which is richly ornamented with floral designs on a warm red or brown background.

Turkish rugs include the *Bergamo rug*, made near ancient Pergamum and distinguished by an open bold design with rosettes placed here and there and by a wide selvage at each end. The warp and woof are made of colored wool. *Smyrna rugs*, having a linen or hempen warp and filling and a pile on both sides, have been extensively imitated in America by machine processes, although the patterns in the American products are much simplified.

Persian rugs are the finest rugs made. Among the finest Persian rugs are those of *Kirmanshah*, a province on the Arabian Sea. These rugs are closely woven, often having more than 400 knots to the square inch. They usually have a central figure consisting of a floriated medallion on a rich background of old ivory, rose, or blue, and the borders are variegated with a maze of floral designs.

Other Persian rugs include *Mossoul rugs*, *Mahal rugs*, *Serebend rugs*, *Serape rugs*, *Meshed rugs*, *Saruk rugs*, and *Kurdistan rugs*. The last named are readily distinguished by their field color of deep blue or strong, rich red, on which is placed a large central figure. The design of this figure is matched by similar ornamentations at the corners of the rug. The Serebend rug also is easily recognized. On a field of rich blue or red is woven a small uniform loop pattern, which is said to have been intended originally to represent a bend in the sacred river Indus. Mahal rugs come from Sultanabad, in northwestern Persia. The name means "made to order," and, in America, many weaves properly designated by other names are sold as Mahal rugs because they are made at or near Sultanabad in fulfilment of orders. Persian rugs are noticeable in general for the profusion of their conventionalized floral figures.

The weaving of rugs and carpets was introduced into Europe by the Moors, but it was not practiced on a large scale before the 17th century. Ingrain carpet was manufactured at Kidderminster, England, as early as 1735. This carpet is woven with two or more colors of yarn, the design appearing in different colors on different sides of the fabric. It is known as *Kidderminster* or *Scotch carpet*.

Brussels carpet, made in imitation of floor tapestries then manufactured at Brussels, was first produced in England in the middle of the 18th century. It has a warp and a weft of cotton or jute, which serve as a body for extra warps of worsted. These warps are looped over wires and thus produce the characteristic ridges of Brussels carpet. The designs are made by the use of one layer of worsted thread in the warp for each color required in the design, all threads being concealed in each part of the fabric except the one having the desired color.

Wilton carpets and *rugs* are made like Brussels carpet, but the loops are cut so that a velvety appearance results. The materials used are generally better, and the weaving is finer. The designs are largely adaptations of Oriental models.

Tapestry and *Velvet rugs* have only one worsted warp instead of several. The designs may be printed on the warp before weaving, allowance being made for the distortions due to looping the worsted threads over the wires. A more recent process is to print the design on the rug after the weaving is completed.

Axminster rugs are distinguished by a loose, soft texture, and the colors in the patterns are not limited by the number of layers of threads in the warp. American Oriental rugs are modifications of Axminsters, the pattern being brought through to the back. They are distinguished from true Orientals by the fact that the tufts are looped about the warp threads instead of being knotted. *Smyrna rugs*, originally woven near Smyrna, Turkey, are made in America by weaving chenille, that is, tufted cords of wool, cotton, or worsted, as an extra weft into a body of cotton or jute warp and weft. They are made with Oriental patterns and are reversible. *Chenille Axminster rugs* are the richest and most costly of machine-made rugs. They are made like the Smyrna rugs, except that the chenille cord is steamed and flattened into a braid with fuzz on one side only. The pile of these rugs varies from three-eighths of an inch to one inch. Most of them have plain fields with two or three tone effects.

Other American rugs include those made by the *Navajo* Indians. These rugs are usually known as blankets, but, on account of their firm texture, they are often employed as floor coverings.

The first carpet factory to be established in America began operation in 1791 at Philadelphia, where now more carpets are produced than in any other city of the world. The best and most costly rugs, however, continue to come from Oriental countries.

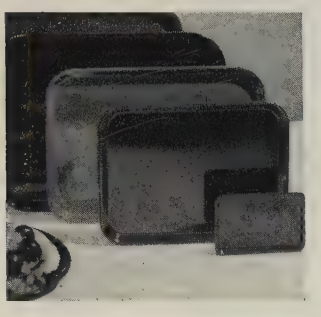
THE AGE OF PLASTICS

Phenolic plastics can be hard and tough. This telephone is made of Durez phenolic. Among other things, phenolics are molded into battery and electric switch boxes, radio and television cabinets, tool and appliance handles, camera and instrument cases.

Plastics are chemistry's contribution to modern living. These materials are widely useful, versatile, and economical. They can be crystal-clear, opaque or any color of the rainbow. They can be hard or soft, brittle or tough, flexible or rigid. They can be poured, cast, molded, machined, impregnated or extruded.

There are many different types of plastic materials, each having properties which suit it to special purposes. And so, today, plastics are used in the making of innumerable products and materials for the home and farm, for business and industry, for science and education. Only a few of the plastics and a few of their uses can be mentioned on this page. But here is proof that we do indeed live in *The Age of Plastics.*

This hat box is covered with Vinylite, a vinyl plastic. This type of plastic also will make floor coverings that outwear battleship linoleum, flexible tubing and lamp shades, drafting instruments and garden hose, gaskets and weather stripping.

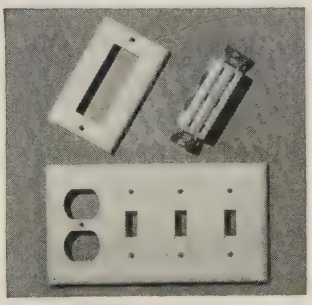


These trays are manufactured of wood fibres and Resinox, an industrial resin plastic. This class of plastic laminates wood for boat and airplane bodies, furniture and house panels. It is also a bonding agent in brake linings and grinding wheels, and an ingredient in special paints.

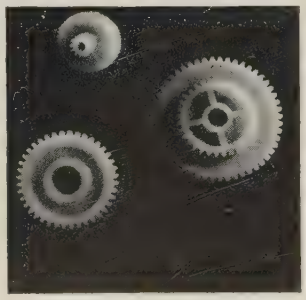
These colorful steering wheel medallions are made of Plexiglas, an acrylic plastic. This plastic is used for airplane windows and waterproof adhesives, display cases and hair brushes, wash basins and television lenses, gage glasses and dentures, educational models and safety goggles.

Plastic toys are economical and handsome. These are molded of Bakelite styrene plastic. Among the many products made of this plastic are dish covers and wall tiles, food containers and high-frequency wire insulation, fishing lures and lamp bases, bottle closures and medical goods.

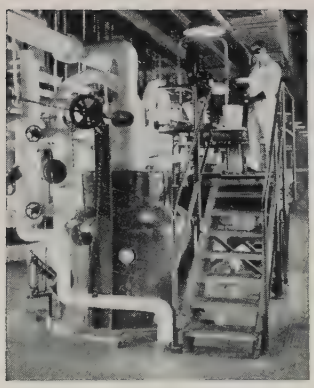
Koroseal is a brand of polyvinyl chloride plastic. It was used in making this chair covering. The same plastic is used in shower curtains and rain coats, silo caps and shoe soles, printing rollers and paper sizing, garment bags and aprons, suspenders and waterproof draperies.



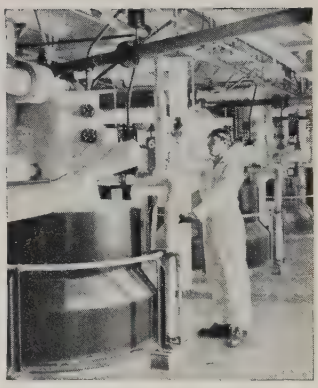
Most plastics are non-conductors and make ideal electrical parts. These are molded of Plaskon, an amino plastic. Buttons and compacts, clock cases and hearing aids, table ware and sterilizers, kitchen appliances and lighting fixtures, are a few of the things which may be made of amino plastics.



Although Nylon is widely known as a fabric and hosiery material, these gears are formed of the same polyamide plastic. It also is employed in landing wheels and luggage, fish line and paint brushes, hypodermic needles and hammers, lock nuts and automobile tires.



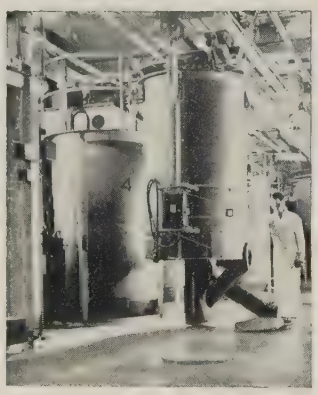
First step in the manufacture of Du Pont nylon yarn begins in evaporators where the moisture content of the nylon salt solution is reduced.



In these autoclaves the chemical process known as "polymerization" takes place and nylon polymer is created. Nylon is a polyamide plastic.

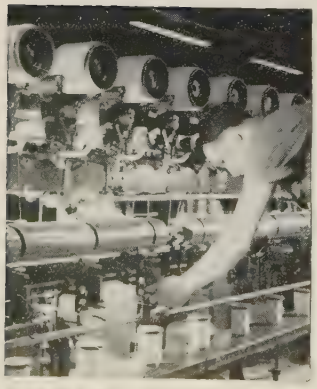
Molten nylon emerges from slot in lower end of autoclave is solidified on this casting wheel in form of plastic ribbon. It is broken into flake.

HOW NYLON YARN IS MADE



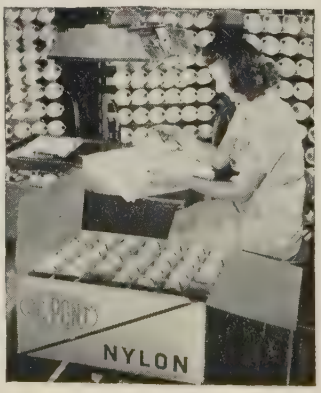
From portable blenders nylon flake is fed into stationary blenders where batches are mixed to insure a perfectly uniform product.

From tiny holes in this spinneret are extruded these fine filaments of nylon. All shown here will be wound together to form nylon yarn.



Here the yarn is wound from one spool to another, passing over a substance which gives it a protective coating during textile making.

The denier of nylon yarn is constantly checked. Samples of uniform length are taken from the spinning machine bobbins and weighed.



Careful inspection is given every bobbin of nylon yarn. It is then shipped to the many makers of nylon hosiery and fabrics.

Silk. A fine, strong fiber produced by certain insects, usually for the purpose of providing themselves with a protective covering, or cocoon. Most commercial silk is produced from the cocoon made by the larva of the mulberry-eating silk moth, which is cultivated chiefly in China, Japan, Syria, Persia, Italy, India, and France. According to Chinese history, the industry was begun by Si-ling-Chi, wife of the third emperor, about 2600 B. C. It developed to such a high state of perfection that Chinese silks were sold in Greece and Syria for their weight in gold. Death was the penalty for taking the eggs of the silkworm out of the country, and the secret was so well guarded that the true origin of the beautiful fabrics was unknown in Europe for many centuries. About 550 A. D., at the direction of the Roman emperor Justinian, two monks who had been missionaries in China brought to Constantinople a supply of the eggs concealed in their hollow bamboo staffs.

The silk moth is a small insect having broad, white wings marked with black lines parallel to the sides. In summer, the female, which cannot fly, lays about 500 sticky eggs and dies a few days later. The eggs hatch in the next spring, producing worms about ⅛ inch long, which feed almost continuously on fresh mulberry leaves, and grow so rapidly that they shed their skins 4 times within 6 weeks. At that time the green worms, which have reached a length of about 3 inches, begin to spin their cocoons. The thread is produced from a gluelike material secreted by two narrow glands which connect with an opening on the upper lip, called the spinneret. On exposure to air, the fluid hardens, forming a sticky thread which the worm winds about itself by a continuous, regular motion of the head.

Spinning is completed in about 3 days, and, if the cocoon is left for 2 or 3 weeks, a moth will force its way out through one end. The escape of the moth breaks so many threads that only enough cocoons are saved to provide another crop of eggs, and the remainder are heated so as to kill the pupa.

They are then assorted according to color and texture, the loose, irregular floss is removed from the outside, and the compact, creamy ovals placed in hot water in order to soften the gum which binds the threads together. Here they are stirred by means of a brush until the loose end of each coil is found. The threads from 4 or more cocoons are twisted together into one strand and then reeled into skeins of *raw silk*. A single thread is usually from 400 to 800 yards long. Only about 70 per cent of a cocoon can be reeled. The remainder, together with damaged cocoons, is combed and spun like wool into *spun silk*. There are about 35,000 silkworm eggs to the ounce. These will yield about 100 pounds of cocoons and 11 pounds of raw silk.

The skeins of raw silk are placed in linen bags and soaked in warm soapsuds to soften the gum; they are then dried and wound on spools. The next process, known as *throwing*, prepares the silk for weaving. That fiber called *organzine*, which will form the *warp* of cloth, is twisted, then doubled and twisted again so as to form a strong thread. *Tram*, or the material for filling the warp, is not twisted so tightly. The threads to be used for crêpes are very highly twisted. After throwing, the thread is stretched evenly on a special machine and then rewound into skeins to be dyed.

The dyer boils the skeins in soapy water until the gum is removed and the threads are soft and lustrous. They are then rinsed and passed to the dye vat. The boiling process causes a loss in weight of about 25 per cent. The desire to avoid this loss resulted in the process of *loading*, by which the fiber is made to unite with chemicals such as compounds of tin, which sometimes weigh several times as much as the silk. This process is generally injurious to the fabric and is not now practiced to such an extent as formerly.

Two of the chief requirements for commercial production of silk are a supply of cheap labor and of mulberry leaves. Lack of the former explains why silk growing has never been successful in the United States. However, silk weaving, performed by very complicated machinery, is a thriving industry. In modern factories two pieces of silk velvet or plush are woven face to face and then separated by a sharp knife, which cuts the pile threads. *Crêpe-de-chine* is produced by alternating right and left twisted threads in the warp and filling with a soft tram. *Georgette crêpe* has hard twisted threads in both warp and filling. Sewing silks are highly twisted threads, while floss and embroidery silks are loosely twisted.

A green tinted silk, used in China and Japan, is produced by the Japanese oak-feeding silk moth. The natives of India manufacture *tussah silk* from the hard grayish white cocoon of the undomesticated tussah moth. Several other varieties are also known.

Artificial silk is produced by several processes which usually depend on dissolving cotton or wood pulp to a thick liquid. This is forced through fine holes into some material that will cause the threads to harden. It is not usually so soft, nor has it the strength and elasticity of true silk, but improvement is taking place rapidly and the product is becoming more and more important. See *Rayon*.

Soap. A cleansing agent usually prepared by the action of caustic alkali on vegetable and animal fats. A fat is a chemical compound of glycerin with one or more fatty acids. In the presence of a caustic alkali, the fat breaks down; the acids combine with the alkali to form soap, while the glycerin remains in the solution. The alkalies used are caustic potash, which yields *soft soap*, and caustic soda, which gives the ordinary hard soap. The fats come from many sources and are usually of low grade, but some of the finest soaps are made from edible oils. Coconut, castor, corn, cottonseed, and soy bean oils are consumed in enormous quantities, together with various animal fats and tallows.

The lye and fat may be mixed in the proper proportions and allowed to react without being heated. This produces *cold process* soap. In the *Krebitz process*, the fats are saponified with milk of lime, and the resulting calcium soap is changed to soda soap by boiling with sodium carbonate. But 90 per cent of the soap used in the United States is made by boiling the fat with a solution of caustic soda. When the action is complete, salt is added until the soap is thrown out of solution and floats at the top of the kettle. The spent lye is drawn off and concentrated in vacuum pans in order to recover the glycerin. The soap is then given a second boiling with a small amount of fresh caustic, again salted out, and settled for some time before it is drawn off into *crutchers*, where it is very thoroughly mixed. *Filling*, such as water glass, washing soda, borax, or naphtha, is often added during this so-called *crutching process*. *Floating soaps* are produced by operating the crutcher in such a manner as to incorporate a large amount of air in the soap and thus make it slightly lighter than water. From the crutchers the pasty liquid is drawn into narrow iron boxes called *frames*, where it stands until cool and hard. The iron shell is then removed and the huge slab is cut into cakes by pressing against a series of tightly drawn wires.

Toilet soaps are usually produced by milling. This consists in passing the soap between heavy rollers which reduce it to narrow ribbons. The ribbons may be dried and perfumed and are then forced by a powerful screw press through an opening about the size of the cake into which the pieces are pressed. Transparent soaps are made in various ways; for example, by adding sugar to a soap made with much castor oil, or by dissolving ordinary soap in alcohol and then evaporating the solvent.

Marine soap and *hard water soaps* usually contain a large amount of coconut oil. Cold process soap contains all the glycerin of the original fat. Pure *castile soap*, named from the province of Castile in Spain, is made from olive oil. The best soaps usually result from a mixture of tallow with some

coconut and other vegetable oils. Many soaps contain rosin, but with one or two exceptions rosin is seldom used in a product intended for toilet purposes. *Shaving soap* is prepared chiefly from coconut and palm kernel oils, which impart its lathering qualities. Great care is taken to avoid retaining any free alkali, which is irritating to the skin. Small amounts of gum or other substances are often added so the lather will dry more slowly.

Just how soap washes and cleans is a problem which science has not yet answered completely. The process was formerly believed to be chemical; but, according to more recent views, soap removes the greasy particles of dirt by *emulsifying* the oil which holds them in place. That is, soap causes the oils to separate into minute globules which mix with the water and are carried off by it.

Other *detergents* besides soap are now produced in quantity in the United States. Often called "soapless soap," these synthetic detergents, which are generally sold in powder form under various trade names, are extremely popular for household uses, especially laundering and dishwashing.

Soda Water. A slightly acid beverage having a peculiar pungent taste due to carbon dioxide gas which has been forced into the water under pressure. When the liquid is drawn into a glass and the pressure released, the gas forms characteristic bubbles as it escapes from solution.

Starch. A white, granular substance, insoluble in cold water, that is found in all green plants, where it serves as a reserve food supply. Large amounts are found in many seeds and in certain roots and tubers, especially corn, wheat, rice, beans, potatoes, sweet potatoes, and cassava, or manioc. Food starches also include *arrowroot*, obtained from a West Indian plant; *sago*, from the pith of various palm trees; and *tous-les-mois*, from certain varieties of canna. Pure starch alone will not sustain life, but, in its natural forms or as products made from them, it constitutes the greater proportion of human food.

The grains of starch from different sources generally have a characteristic shape and size by which they can be readily identified when seen under the microscope. Starch turns blue when treated with tincture of iodine, as may be shown by placing a drop of this solution upon a piece of potato or bread. Hot water causes the grains to swell until they burst, and, on cooling, the paste sets to a stiff gelatinous mass.

In Europe, much starch is produced from potatoes, but, in the United States, over 90 per cent is made from corn, usually by the sulphur dioxide process. The grain is soaked from two to four days in water containing one per cent of the gas from burning sulphur. When sufficiently soft, it is ground, and carried by a stream of pure water over sieves, which permit the starch to pass but retain the germs and husks. As the germs float, they are skimmed off and pressed to recover the valuable oil which they contain. The residue is sold for cattle food. The water with its suspended starch is passed over a series of gently sloping surfaces, on which the heavier particles are left. The remainder flows to settling tanks, from which the starchy sediment is collected to be further refined by washing and straining until sufficiently pure. The separated starch is dried by artificial heat until the mass breaks into lumps.

Besides its chief uses for food and laundry purposes, starch is employed in the preparation of glucose and dextrin, in printing and finishing calico and other cloths, and in making special kinds of paste. See *Bread*, *Flour*, *Glucose*, *Sugar*.

Sugar. A sweet crystallizable substance found in the juices of many plants. The term includes a group of chemically related compounds such as *grape sugar*, *fruit sugar*, *milk sugar*, and *malt sugar*; but, except in a technical sense, sugar means the very valuable food called *cane sugar* or *sucrose*. Any substance having a sweet taste was formerly called sugar, hence the name *sugar of lead* for poisonous lead acetate. A sugar of some sort appears to be the first carbohydrate formed in green plants, where it serves as a food for the growing parts or is changed into starch and stored as a reserve. The principal sources of sugar are the *sugar cane* and *sugar beet*.

The use of sugar and of sugar cane seems to have originated in India at a very early period. During the middle ages it was carried by Arabs to Egypt and southern Europe, whence it was introduced into Louisiana in 1751. The first refined sugar was made about 1791, and the first commercial crop was harvested in 1795.

Sugar cane is a giant grass, raised chiefly in Cuba, Puerto Rico, Louisiana, Hawaii, the Philippines, Java, and India. It is usually from 6 to 15 feet high, with narrow cornlike leaves at the top. The stalk is from 1 to 2 inches thick and is composed of short jointed sections which may be yellow, green, purple, or striped, depending on the variety. The plant may be raised from seed, but usually pieces of stalk are planted in shallow furrows running the length of the field. At each joint there is an eye, or bud, from which a new stalk springs up.

In Louisiana the harvesting occurs between October and January; in tropical countries, from January to June. The cane is cut close to the ground with a broad knife about 18 inches long which has a sharp hook on the back. The leaves are stripped off with the hook, the top cut away at the last mature joint, and the cane stacked until it can be taken to the factory. New crops will grow from the stubble for several seasons, but the general practice is to replant a part of the field each year.

At the factory the canes are shredded and then passed through a series of heavy rolls, which squeeze out the juice. Water is usually sprinkled upon the cane before the second pressing in order that the extraction may be as complete as possible. The crushed cane, called *bagasse*, is used for fuel. The juice is a gray or green liquid which contains, in addition to sugar, many impurities, such as glucose, gum, albumin, acids, and ash. These are removed by treatment with lime, other chemicals, and heat.

Sugar is obtained by evaporating the purified juice, usually under vacuum, to a heavy sirup. This is run to another vacuum kettle called the *strike pan*, where boiling is continued until crystals of sugar form and grow to the proper size. The mixture of sugar and sirup, called *massecuite*, is stirred and fed to centrifugal machines lined with fine screen, which retains the crystals and allows the molasses to escape. A second and a third yield of soft sugar are often obtained from the molasses, of which the uncrystallizable residue is ultimately sold to distilleries or for cattle food. A certain amount of the best grade is used in cooking. If the molasses is separated from the massecuite by draining rather than by centrifugal force, the sugar is not so pure and is called *muscovado*.

Brown, or *raw*, *sugar*, so prepared, is usually shipped in bags to a refinery, where it is dissolved, filtered, treated with chemicals, decolorized by means of bone black, and again boiled under vacuum until the small white crystals of granulated sugar are formed. These are dried and sifted into the standard sizes. *Loaf sugar* may be made by molding the sticky grains under centrifugal pressure, then drying and sawing the resulting blocks to the proper size. By a more recent process, however, the individual blocks are molded in presses, from a specially prepared soft, white grain. *Powdered* and *confectioners' sugars* are prepared by passing the crystalline variety through a disintegrator that reduces it to very fine particles, which are graded by sifting.

The sugar beet, which is extensively cultivated in Europe and the United States, grows best in a temperate climate where the soil is suitable and where the average summer temperature is about 70° F. It is white and usually contains 12 to 18 per cent sugar, compared with 10 to 16 per cent in

Louisiana cane. The seeds are usually planted in April and May. At harvest time, which begins in August or September, the beets are pulled up, and the leaves cut off just below the top or neck. The beets are then carried to the factory to be carefully washed and weighed. The clean beets are cut into very thin slices, packed into a series of tanks, and treated with warm water, which dissolves the sugar together with many impurities. The exhausted chips are pressed, dried, and sold for stock food or fertilizer.

The solution is purified with lime, bleached with sulphur fumes, crystallized, and the sugar is refined in much the same way as that from cane. Special efforts are made to obtain as much sugar as possible from the molasses. Neither the raw beet sugar nor the molasses are fit to eat, but, when the raw product has been properly refined, it is impossible to tell whether it came from beet or cane.

Jaggery, the sugar obtained from several varieties of the palm, has been used in India since very ancient times. It is obtained by tapping a hole in the tree and collecting the sap which runs out. This is boiled with a little lime, until a sirup forms which will harden on cooling. A large tree will yield 30 to 40 pounds of sugar per year. The sirup has long been an article of commerce under the name *date honey*.

Maple sugar is made in North America wherever the sugar maple is found, but Quebec, Ontario, New York, Vermont, Ohio, and Pennsylvania are the most important producing centers. Sap begins to flow in the trees at the end of winter and is collected by drilling into the base of the trunk one or more small holes about 1½ inches deep. A spile or trough is driven into each hole to conduct the sap into a bucket. The juice, which is unusually free from impurities, contains an average of 3½ per cent of sugar. It is boiled down over an open fire or in a modern evaporator to a heavy sirup, or, if sugar is wanted, until the liquid will become solid on cooling. The average amount of sugar from each tree varies from 2 to 3 pounds. Maple sugar is highly valued because of its characteristic flavor, and is sold as raw sugar and as sirup. If it were refined, it would be exactly the same as the product of cane or beet.

Thermos Bottle. The trade name for a practical device invented by Sir James Dewar about 1892 for the purpose of containing intensely cold, liquefied gases. It is also called a *vacuum bottle*, as it consists essentially of a double walled bottle or flask in which there is a high vacuum between the walls. Radiation is prevented by silvering the walls, and there is of course nothing to conduct heat across the vacuum. The small opening to the flask is usually stoppered with a thick cork, this material being a very poor conductor of heat.

Hot substances stay hot for long periods in a vacuum bottle because the heat cannot get out, and cold substances remain cold because heat from the outside cannot get in. Such containers have generally been made of glass, which requires careful handling. An improved type is constructed of metal, thus avoiding the fragility of the glass product.

Time-pieces. Modern time-pieces are known chiefly as watches or clocks. Watches, being for personal use, are smaller and are driven by a spring. Clocks are driven either mechanically, by spring or gravity (by means of weights), or by electricity.

Mechanically driven time-pieces consist essentially of a system of wheels controlling indicators, or "hands", on a dial, the wheels being actuated by a force and their revolutions made uniform in speed by a governing device, known as an *escapement*.

The escapement is ordinarily a rod curved in the arc of a circle, each end being provided with a specially shaped cog, or detent. The rod is pivoted at the center. The escapement, being driven usually by the actuating force of the clock, oscillates on its pivot. The ends of the escapement alternately engage and release cogs of a wheel, which is also driven by the actuating force of the clock. The result is to cause the wheel to revolve in equally timed jumps. In gravity clocks, a pendulum governs the movement of the escapement.

With the revolutions of a master wheel thus made uniform in time, a system of cog gears is used to make the axis on which the hands are set revolve at the requisite speed to indicate hours and minutes marked on a dial.

The invention of the first mechanical clock is ascribed to Pope Silvester II in 996 A.D. Watches were first made about the time of the discovery of America in 1492. The chief contribution of America to the development of time-pieces has been the devising of mass production methods of manufacture.

The electric clock in common use in America is driven by a small motor so constructed that it revolves once for each "beat" of an alternating current or in some other fixed relation to the beat. Its uniformity of speed is thus dependent on the accuracy of the dynamo which produces the current. The desired speed of rotation of the hands is secured by gearing from the motor to the axis of the hands.

Turpentine. The resinous exudate of several species of pine trees. In America it is obtained during the spring by cutting and scarring the trunk of the long-leaf pine, which grows abundantly in the Southern states. The sap which runs from the cuts is collected, placed in copper stills, and heated until the volatile products are driven off as vapors. These are condensed by means of cold water to *spirits of turpentine*, which, when pure, is a colorless liquid having a penetrating, aromatic odor, and a bitter, burning taste. After distilling off the "turps," the residue, while still hot, is run into barrels, where it hardens to a brittle, transparent mass of *rosin*.

Turpentine is much used in varnishes to hasten drying and in paints for thinning and for producing a dull surface. It is also used in medicine, internally, as an antispasmodic, as a stimulant, and to stop hemorrhages; externally, as a remedy for ringworm and to relieve inflammation. Rosin is used in the manufacture of varnish, soap, sealing wax, cement, sizing, and for many other purposes.

Varnish. A solution of gums or resins which dries to a hard, smooth, transparent film. Varnishes give a pleasing appearance to most surfaces, protect them against the weather, and bring out the beauty of wood even better than polishing. The many kinds of varnish are classified according to the solvent used. Shellac dissolved in alcohol forms the best-known example of a *spirit varnish*. It dries rapidly to a hard, brittle surface. *Turpentine varnishes* also dry rapidly and, being more brilliant and less brittle, are sometimes used in oil paintings.

Oil varnishes, the most important for general use, are made by adding the proper amount of boiling oil to melted gums and boiling the mixture until it becomes clear. It is then thinned with turpentine, cooled, filtered, and pumped to storage-tanks to age for at least six months.

Linseed oil and *copal*, a hard resin found as a fossil and on living trees chiefly in Zanzibar and New Zealand, are the principal ingredients of a good oil varnish. Poppy and tung oils are of increasing importance, while available gums include lac, mastic, sandarac, amber, asphalt, and various synthetic resins. Coloring matter, such as dragon's blood, cochineal, or artificial dye, is often added. *Japanese lacquer* is a natural varnish prepared from the sap of a plant. See *Lacquer*, *Tung Tree*.

Veneer. A thin layer of valuable wood, or occasionally other material, glued to furniture or cabinetwork in order to produce a surface more attractive than that which it covers.

Veneers that are sawed from the solid wood are known as *saw cut*; those that are pared, as *knife cut*. Both are made by machinery. Saw cut veneer varies from 1/32 to 1/16 inch thick, while knife cut

veneer is usually much thinner. The use of veneer does not imply cheapness or poor quality. It is the only method by which some rare and beautiful woods such as curly mahogany and burled walnut can be applied to surfaces.

Vinegar. A sour liquid varying in color from light yellow to brownish red, much used as a condiment and for pickling. It is made from weak alcoholic liquors such as hard cider, wine, beer, beetroot juice, or fermented molasses. When liquids of this sort stand exposed to the air at a temperature of about 76° F., a slimy scum usually forms on the surface. This scum, commonly known as *mother of vinegar*, is a bacterial growth, in the presence of which the dilute *alcohol* combines with *oxygen* of the air to form *acetic acid*. The sourness of vinegar is due to this organic acid, but the characteristic odor and taste are due to the materials out of which it is made.

In the *new* or *quick* process, now generally used, vinegar is produced by draining the alcoholic liquor over some substance such as beech-wood shavings, or clean charcoal which has been previously soaked in strong vinegar. Such a material provides a very large surface on which thin films of liquid are exposed to the action of the "mother" and to the air. By this method vinegar is produced in from 24 to 36 hours as compared with several weeks required by the old process. Vinegar and foods containing it should be kept in glass or other nonmetallic containers, because acetic acid slowly attacks such metals as tin, copper, and brass, forming soluble compounds highly injurious to health.

The strength of commercial vinegar is usually expressed in *grains*. Each grain represents $\frac{1}{10}$ per cent of acid, so that a bottle of vinegar marked 45 grain contains 4.5 per cent acetic acid.

Water Glass. A heavy, colorless solution of sodium or potassium silicate, which becomes hard and glossy when exposed to the air. It is usually prepared by heating fine sand together with washing soda and charcoal, and extracting the fused mass with boiling water. Uses for the alkaline liquid include painting on glass, protecting wall decorations, glazing, and fireproofing. It is an important ingredient in fireproof cement, and is valuable as a coating material for the inside of barrels because it fills any small holes and leaves a smooth, watertight coating. Large quantities are used for filling cheap soaps. When mixed with sand, it hardens to a useful artificial stone. Eggs are often preserved by keeping them covered with a dilute solution of water glass.

Wool. A soft, wavy, modified form of hair, which grows on domestic sheep. No wild wool-bearing animals are known, and, when sheep are raised without care or protection from the elements, the wool rapidly becomes coarse and hairlike. Wool differs from other textile fibers and from hair chiefly in being covered with scales which can interlock and thus cause the fibers to mat together. Wool is elastic, it does not readily absorb water, and the scales hold air in the spaces of a woolen garment, making it very warm for its weight. These characteristics make wool so valuable that the quantity used each year is second only to cotton. Longer fibers very similar to wool are found on the llama and the alpaca of South America; on the Kashmir goats of India; and on the Angora goat, which yields the wool used in weaving *mohair*.

Sheep are not native to America, but were imported by the earliest settlers, who were accustomed to weave their own clothes from homespun yarn. Practically all standard breeds are now raised in this country, wool from the merino sheep being the finest but not the longest.

The wool is generally clipped from the sheep in the spring, and, when there are large flocks, the clippers are power driven, so that an experienced operator can trim 150 to 200 animals each day. All the clippings from one sheep are called a *fleece* and usually weigh from 5 to 8 pounds. Wool taken from the shoulders and back is the best in quality. Lambs' wool is softer and more wavy than sheep's wool. *Pulled wool* is that removed from pelts of dead animals. It is usually of inferior quality because of the treatment given the skins in order to loosen the fibers. Consequently it is necessary to sort the fleeces into various grades. A certain amount is sorted at the clipping sheds, but most of this work is done at the warehouses and factories.

There are many grades and qualities, and several systems of classification, but in general the fibers may be grouped as *combing wool* when over $2\frac{1}{2}$ inches long and rather straight; as *carding wool* when short, fine, and wavy; and as *carpet*, or *blanket*, *wool* when coarse and stiff. *Woolen* goods are made from carding wool, while *worsteds* are woven from combing wool. The chief difference is that woolen thread is soft and composed of crisscross fibers, while worsted thread is twisted hard after the fibers have been combed until they are parallel. Worsted is firm and shows a definite pattern, while woolens are soft, having the pattern almost concealed by the nap.

When the wool reaches the factory, the fleeces are pulled apart, graded, and beaten to remove dust and dirt. The reason wool does not form a mass of felt on a healthy sheep's back is that each fiber is coated with a mixture of greasy materials called *yolk* and *suint*, secreted by the animal. This is removed from the clipped wool by careful *scouring* with soap and soft water. From the wash water *potash* and *lanolin* are obtained. Lanolin serves as a basis for salves and ointments. Most wool is white, but some is black, gray, fawn, or brown. The fiber can be dyed in the form of wool, yarn, or cloth. After scouring is complete, the material may be "dyed in the wool," and dried.

The matted wool is loosened by revolving, toothed drums, and any seeds or burs are removed either mechanically or by a chemical process, which chars the impurities. Oil is added to restore the natural softness; then all the material is uniformly mixed and passed to a series of *carding machines*. These are cylinders covered with projecting teeth, which arrange the fiber in a continuous flat band. This is divided by a *condensing* machine into narrow strips, or *slivers*, somewhat larger than heavy yarn. The sliver is usually spun into twisted thread on a *mule-jenny* and is then ready for the loom.

After weaving, various processes are used to give a cloth the desired surface and finish. In the first step, *fulling*, the fabric is wet with soap and water and pressed or worked between rolls until the shrinkage and degree of felting are satisfactory. It is then rinsed and supported on hooks until dry. The nap of woolens is raised by means of a conelike spike head covered with sharp hooks, which grows on the teasel plant. Artificial *teasels* are frequently used for this purpose.

The fibers for making worsted, unless very long, are also carded and are then put through *combing* and *gilling* machines, which leave them parallel and free from the short, curly pieces called *noil*. They are then spun to a hard, wiry thread, and are woven. *Felt* is a warm, dense fabric made by pressing and beating together unwoven wool fibers. It is much used for making hats. *Shoddy* might be called secondhand wool, for it is obtained by tearing refuse woolen fabrics into fibers which can be rewoven. It is of great value, and is objectionable only when used to adulterate new wool.

Broadcloths and *beavers* have the nap raised and spread in one direction over the face of the cloth. On *overcoatings* the nap is often formed in little curls. In some goods it is left standing as in velvet, and, in the bare-face finish, it is entirely sheared off. *Tweed* is a soft, rough-finished material, originally made in the villages along the Tweed river, Scotland. It is usually woven from two or more different colored yarns. The cloth is finally brushed, stretched on drums under hot water, and steamed while in a hydraulic press in order to develop the luster.

TEST QUESTIONS

Point out several reasons for the widespread interest in economics. Define the term economics. Discuss some industrial effects of *division of labor* 1197

Illustrate commercial co-operation among states and countries 1197–1198

From what circumstances does the conflict between capital and labor arise? 1198

Discuss the function of money as a medium of exchange 1198

What is "wealth" said to mean today? . . . 1198

Point out some characteristics of the "age of industry" 1198

COMMERCE

In what does commerce consist? What does the term commerce generally imply? Distinguish between *foreign* and *domestic* commerce. Explain the phrase "interstate commerce" 1199

State some of the conditions upon which commerce depends. Explain the interrelation between transportation and commerce . . 1199

Describe the commercial system of the ancient Phœnicians. What were the economic conditions that gave rise to the extensive commerce of the Greeks? 1199

What service to commerce did Rome render for five centuries? 1199

What people controlled commerce during the period immediately after the fall of Rome? Summarize the conditions that prevented commerce in Europe in this period 1200

Explain the rise of markets and guilds in the towns of medieval Europe. Indicate the use and importance of the medieval fairs . . . 1200

Indicate the purpose and the power of the Hanseatic league. Point out some events to which Venice owed her commercial supremacy in the Mediterranean 1200

What states became strong commercial powers in the 14th and 15th centuries? 1200

What new sea routes were opened about the end of the 15th century? To what city did commercial supremacy fall at this period? . 1200

By what influences was the commercial power of Spain destroyed? How did Portugal lose her greatness in trade? 1201

Outline the growth and decline of Dutch commerce in the 17th and 18th centuries . . . 1201

Point out the commercial advantages possessed by France between 1500 and 1800. Explain her failure in world commerce 1201–1202

To what two chief factors is the commercial success of England in the 17th and 18th centuries ascribed? Name the most important English trading companies of this period. What were the staple articles of English commerce? 1202–1203

Summarize the chief features of the growth of Canadian commerce. What are the chief articles of Canadian export? 1203

Outline the leading facts about American commerce down to 1812 1203

Describe the important economic development of the United States in the period from 1812 to 1860. Compare the list of chief exports in 1800 with that of 1860 1203–1204

Explain the phrase "triangular exchange" . 1204

What were the most notable effects of the Civil War upon the economic development of the United States? 1204

Show by statistics the growth of United States export trade from 1870 to 1892. Account for the decline of the American merchant marine. Give figures which show the growth of the foreign commerce of the United States after 1860 1204

Point out the amount, and the distribution by countries, of United States foreign commerce in 1913. Show the proportions of United States foreign trade taken by leading countries in 1935 1205

How does the internal commerce of the United States compare in importance with the foreign trade of the United States and of the world? 1205

State the changes in the ranking of leading nations in foreign commerce since World War II. How was the foreign trade of the United States affected? 1205–1206

COMMUNICATION

What emperor first opened the postal system to private use? 1208

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Give the date of the introduction of the following in England: penny rate of postage; perforated stamps; mail boxes 1208

Outline the history and some of the regulations of the Universal Postal Union . . . 1208

Outline the history of the colonial postal system in America before the Revolution. Summarize the important reforms and extensions of the United States postal system, giving the date of each 1208–1209

Mention some of the chief conveniences afforded by the parcel post service in the United States 1209

Indicate the rapid development of the air mail service 1209

State examples of the extensive practical development of radio communication 1210

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Name two Frenchmen and two Scotchmen who are famous in the history of modern road building 1211

Summarize important facts about the history of canal building 1211

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By whom was the Suez canal constructed? State its dimensions and original cost. Name the largest stockholder in the canal company 1216
Name the two men to whom the chief credit for the Panama canal construction is due. Describe the course of the canal. What is its height above sea level in Gatun lake? What was the total cost of the canal? . . 1217
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Point out the remarkable growth of railroad building in the United States between 1868 and 1910. What was the track mileage of railroads in the United States in 1920? in 1930? 1218-1219
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GOVERNMENT · POLITICS
OF THE PEOPLE · BY THE PEOPLE · FOR THE PEOPLE

GOVERNMENT AND POLITICS

INTRODUCTORY

It may be useful to distinguish between the art of politics and the science of politics. The art, ideally, is the practice of government so that it accords with justice, so that the dignity and the effectiveness of institutions are maintained and good and able men are kept in control of public affairs. The science of politics analyzes and elaborates the theory of the state and examines the various types of public administration, past, present, and proposed. The two things flow into each other. The fields of "morals and legislation" tend to become closely united. It has been a common conception, from the time of Hobbes to the period of the World War, that the state itself creates morals or standards of conduct; that what the state decides and commends is ethically right. But there is a different view; namely, that there is a Moral Order higher than any human laws, higher than the state itself, by which all acts of authority are to be judged. This, in the final analysis, was the ethical issue in the World War.

Need for Government. There is a widespread disposition, by no means of recent origin, to question the usefulness of the state. To the anarchist, laws are a stumbling block and a stone of offense, and, to radical reformers generally, governments are institutions for the exploitation of the many by the few. But a scientific canvass of society in its various stages, from savagery to civilization, reveals the certain fact that, however much governments have been and still are associated with acts of oppression, there is no escape from human ills in anarchy. Mankind, without a common authority, is predatory. Society released, as occasionally happens, from the respect and dread of government, promptly exhibits the most violent and terrible tendencies. Imperfect as governments are, discriminating in their bestowal of advantages as they too frequently are, nevertheless they are the safeguard and security for the advantages of life. The sentimental philosophers of the 18th century imagined a natural state enjoyed by savage peoples, in which the blessings of simplicity and freedom were attained. Modern study of primitive society reveals no such happy "state of nature," but everywhere a cramped and cruel savage existence in which life is never free from danger and the human mind seldom released from terror.

History of Political Philosophy. The science or philosophy of politics is one of the richest fields of human inquiry. It possesses a great and classical literature. Its scope and its form of reasoning were first clearly developed by the Greek philosopher, Aristotle, whose *Politics* lies at the base of subsequent discussion. Aristotle's studies were limited to the Greek "city-state," which, to his mind, represented the highest attainment of human freedom and law. His method was concrete and inductive. He collected hundreds of city-state constitutions, compared their provisions, and deduced general principles. The state, to Aristotle, was not a Utopia such as that imagined by Plato, but it was an actual institution realized in hundreds of examples throughout the Ægean and Mediterranean seas. No writer has stated better, or in fewer words, the purpose of civilized society. "The state," says Aristotle, "comes into existence, that man may live. It continues, that man may live well." "Good life," in all its rich and noble expressions, is the aim and object of the state.

Centuries after Aristotle, another political philosopher, the Italian statesman Machiavelli, examined the city-states of his own day, with results that offer startling contrasts. Machiavelli's political studies are embraced in two works. The first, called *The Prince*, is a discussion of the sinister principles whereby the Italian despot of that day maintained himself in power. The other, *The Discourses*, which is a far nobler and more suggestive work, examines the principles whereby a republic may endure.

A century later comes the period where national governments rise above feudal conditions. The king attains an absolute power and destroys the independence of the nobles. This monarchical movement met with opposition. In England it was overthrown by revolution. Out of the struggles of the period came several notable works—*The Republic*, of Bodin, in which is first essayed a definition of the difficult conception of "sovereignty"; *The Leviathan*, of Thomas Hobbes, who attempted to justify monarchical absolutism by the theory of a "social contract" between subjects and king; *The Patriarcha*, of Sir Robert Filmer, an attempt to found monarchy upon patriarchal authority conferred by God upon Adam.

A little later, in the 18th century, John Locke, in *Two Treatises on Civil Government*, turns the doctrine of the social contract against the monarchists, laying the basis for the "right of revolution" in the abusive exercise of a power which monarchs have contracted to use with justice and discretion. "Men are," said Locke, "by nature all free, equal, and independent." Only by free consent does man enter into the obligations of society, resigning his natural rights to a public authority in return for benefits which, if not satisfactorily conferred, he is at liberty to end. Misrule by a monarch, in Locke's view, not only justifies rebellion but makes it inevitable. Locke powerfully affected the minds of the English colonists in America, and some of his actual language appears in the Declaration of Independence. The revolutionary ideas of Locke were put into a winged form by Rousseau, whose *Social Contract* contributed incalculably to the French Revolution and has remained to the present day an inspiration to political revolt.

Modern Revolutionary Movements. The world is now so closely united that political and social movements pass from the country of their origin over the entire earth. The revolutionary movement began in America with the revolt of the English colonies; it passed thence to France and from that country to other parts of Europe. From that continent it was carried back to the New World where it resulted in the independence of Spanish America and in the rise of numerous republics through the break-up of the empire of Spain. This revolutionary movement still goes on. It has affected Asia and promises to invade Africa. The present century, particularly, is remarkable for political changes in all continents.

Politics and the World Wars. World War I brought to the surface much that had been germinating in secret. The empires of Central Europe and Russia disappeared. Through the disintegration of monarchical states, the number of nations

increased. In July 1914, the number of European governments was 22; in 1936, it appeared to be 35. But monarchical governments have greatly diminished in number, and the world is now predominantly republican. See *Monarchy* and *Republic*.

Among other effects produced in these European states by World War I was a widening of democracy. The war had given an illustration of the possible power of governments over economic systems, which was reflected by the drift toward socialism in many constitutions. The New World felt these influences of the war much less than did Europe.

Authoritarianism. But this trend toward democracy was followed in many European countries by a reaction. Now, however, it was not a reaction toward the old monarchical absolutism of dictators, raised to power by aggressive minorities, but accepted by the majority: Mussolini in Italy, Hitler in Germany, Lenin in Russia, Salazar in Portugal, Franco in Spain, and others. In some cases the democratic forms were more or less preserved, but the result was the same. To the rise of these dictators the economic depression of the '30s contributed heavily. And, with the new Führers and Duces, came an appropriate theory of the state. The state, acting through the government, must control the activities of the people. The individual was only significant as a fraction of the omnipotent state, with no rights against it.

World War II destroyed three outstanding examples of this authoritarian state, but it left others. It left also a condition of political and economic demoralization in which many were willing to sacrifice "merely political freedoms" for security.

Latin America. The influence of the Constitution of the United States upon the plan of governments formed throughout Latin America has been large. In greater or less degree, American ideas of republican government,—federalism, bicameral legislatures, the legal "separation of powers" between legislative, executive, and judicial departments, the commitment of executive office to a president popularly elected for a fixed term, and the constitutional guarantees of civil and political rights,—found their way into the constitutions of republics to the south.

Unfortunately, at the time of attaining their independence, these peoples lacked experience with representative legislatures. Spain, during the entire period of her empire, never established or permitted a representative legislature in any of her American kingdoms. On the other hand, the tradition of strong executive authority and of centralized initiative and direction exercised undue influence. Within these states, local government proceeds on conceptions entirely different from the local autonomy or home rule found in American county or local administration. Everywhere the Spanish conceptions of central administrative control prevail.

These forces combined with civil struggle to give rise to the Latin American "dictators," *caudillos*, who dominated many of these republics during the 19th century. The large illiterate native element in the population of many of these states, together with the practice of intimidation at the polls, made difficult the realization of the democratic franchise demanded by the political ideals which Latin America received with her independence.

Recent decades have witnessed progress in the realization of constitutional government. While the office of president is retained, the principle of "no re-election" has appeared in Spanish American public law, and in other ways the extreme power of the executive is reduced.

Asiatic Revolutions. In Asia, the constitutional movement preceded the war. Revolution triumphed in Turkey in 1908, in Persia in 1909, in China in 1911, and resulted either in the overthrow of absolute monarchy or in its limitation by constitutional enactment and by the introduction of representative institutions. New Asian states also have arisen. After the Japanese invasions, the Asiatic movement took the form of demands for self-government, if not independence. "Asia for the Asiatics."

Social Ideals in Politics. Side by side with the liberalizing of political institutions has progressed a vast social movement designed to increase the well-being of the masses of people and to secure a more general distribution of the proceeds of industry.

The free play of individual initiative is no longer permitted in modern governments. It is limited by a vast mass of "social legislation," by organizations of workmen, and by various forms of co-operation. A new social theory has permeated politics. In its more extreme form, it looks toward the complete restraint of competition and toward the distribution of goods upon an equal basis to all members of the community. These tendencies find expression in the theory called "socialism."

Political Problems. The present age, while productive of innumerable political writings, is less occupied with theories of the state and with definition than it is with the choice and the operation of political institutions. The problem is to democratize government and at the same time to keep it vigorous and stable. Growing attention is paid to the problems of the relations between states, to expedients for solving international difficulties, preventing war, and organizing international co-operation.

A closely related problem of infinite magnitude is the government of peoples who are politically backward. In the course of recent years, the entire habitable world has been explored and vast areas heretofore politically unorganized have been brought under the jurisdiction of European powers. Perhaps it is not too much to say that the greatest political task of the immediate future includes the creation of satisfactory relations between the races, the instruction and progress of backward peoples in the practice of government, and the commitment to their hands of the shaping of their political destiny.

Politics and History. In thought, politics is often associated with history. But while history is, largely, the record of political activities, the two subjects differ widely in scope and in method. History surveys the past. The historian has the advantage of adequate accumulations of materials. He studies episodes and movements that are completed. He may separate himself from the partisanship and emotions of the time he describes. The student of politics does not have these advantages. He is dealing, primarily, not with the past, but with the present and with the future. His mind must be incessantly occupied with the morrow. Political sense comprises not only good judgment of actual events, but prescience for the future. Politics is not static, but dynamic; political forces are constantly altering, finding new directions, and attaining new balances. Institutions tend to constant change. The activity of the lawmaker is incessant. The materials for the study of politics thus constantly become obsolete and remain incomplete and unsatisfactory. Practical considerations of the highest importance, none the less, demand constant fresh examination of governments and policies and require the training of special faculties of the mind.

The Department of Politics of this work is divided into three parts. The first deals with the government of the United States, Federal, state, and local. The fundamental institutions which the American republic has developed and found serviceable are briefly described. Some attempt has been made to indicate the direction which progress is taking. In the second part are described the governments of foreign states as they exist today, while the third part is composed of a dictionary of political terms and institutions. In many cases the topic upon which the reader may desire information will be found embraced under a more comprehensive heading. For this reason, consultation of the index to the entire volume is indispensable.

THE UNITED STATES OF AMERICA

THE United States arose through the union of thirteen of the colonies of Great Britain in North America into a new nation under a federal form of government. This union was brought about by successive stages of development, after experiences with several forms of concerted action, and by a common protest and resistance to acts of the British king and Parliament.

Intercolonial Assemblies. This common resistance found expression in several intercolonial assemblies, first in the Stamp Act Congress (1765), which met at New York, was attended by delegates of nine colonies, and adopted a declaration of "rights and grievances," a petition to the king and a memorial and a petition to the House of Lords; second, by the First Continental Congress (1774), called by Massachusetts and Virginia and attended by delegates from all the colonies except Georgia. This Congress passed resolutions called the "Association" binding the colonies in a far-reaching boycott of British trade.

Independence of Colonies. The Second Continental Congress assembled after warfare had actually begun. It recruited a Continental army to resist the British forces, and appointed George Washington commander in chief. On July 4, 1776, it declared the independence of the colonies from Great Britain, and, in the absence of any more effectual organization, united the efforts of the colonies for the prosecution of the war until the adoption of the Articles of Confederation in 1781. The original Declaration of Independence is on permanent exhibit in the Congressional Library, Washington, D. C.

DECLARATION OF INDEPENDENCE

THE UNANIMOUS DECLARATION OF THE THIRTEEN UNITED STATES OF AMERICA, IN CONGRESS, JULY 4, 1776.

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume, among the powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident—that all men are created equal; that they are endowed by their Creator with certain inalienable rights; that among these are life, liberty, and the pursuit of happiness. That, to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that, whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute a new government, laying its foundation on such principles, and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established should not be changed for light and transient causes; and, accordingly, all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security. Such has been the patient sufferance of these colonies; and such is now the necessity which constrains them to alter their former systems of government. The history of the present king of Great Britain is a history of repeated injuries and usurpations, all having in direct object the establishment of an absolute tyranny over these states. To prove this, let facts be submitted to a candid world.

He has refused his assent to laws the most wholesome and necessary for the public good.

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operations till his assent should be obtained; and, when so suspended, he has utterly neglected to attend them.

He has refused to pass other laws for the accommodation of large districts of people, unless these people would relinquish the right of representation in the legislature—a right inestimable to them, and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable and distant from the repository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses repeatedly, for opposing with manly firmness, his invasions on the rights of the people.

He has refused, for a long time after such dissolutions, to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise; the state remaining in the meantime, exposed to all the dangers of invasion from without and convulsions within.

He has endeavored to prevent the population of these states; for that purpose obstructing the laws for the naturalization of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands.

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers.

He has made judges dependent on his will alone for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of new offices, and sent hither swarms of officers, to harass our people and eat out their substance.

He has kept among us, in times of peace, standing armies, without the consent of our legislatures.

He has affected to render the military independent of, and superior to, the civil power.

He has combined with others to subject us to a jurisdiction foreign to our constitutions and unacknowledged by our laws; giving his assent to their acts of pretended legislation:

For quartering large bodies of armed troops among us;

For protecting them, by a mock trial, from punishment for any murders which they should commit on the inhabitants of these states;

For cutting off our trade with all parts of the world;

For imposing taxes on us without our consent;

For depriving us, in many cases, of the benefits of trial by jury;

For transporting us beyond seas, to be tried for pretended offenses;

For abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries, so as to render it at once an example and fit instrument for introducing the same absolute rule into these colonies;

For taking away our charters, abolishing our most valuable laws, and altering, fundamentally, the forms of our governments;

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection, and waging war against us.

He has plundered our seas, ravaged our coasts, burned our towns, and destroyed the lives of our people.

He is at this time transporting large armies of foreign mercenaries, to complete the works of death, desolation, and tyranny, already begun with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation.

He has constrained our fellow citizens, taken captive on the high seas, to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

He has excited domestic insurrection among us, and has endeavored to bring on the inhabitants of our frontiers the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions.

In every stage of these oppressions we have petitioned for redress in the most humble terms: our repeated petitions have been answered only by repeated injury. A prince whose character is thus marked by every act which may define a tyrant is unfit to be the ruler of a free people.

Nor have we been wanting in our attentions to our British brethren. We have warned them, from time to time, of attempts by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity and we have conjured them by the ties of our common kindred, to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They, too, have been deaf to the voice of justice and of consanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them as we hold the rest of mankind—enemies in war—in peace, friends.

We, therefore, the representatives of the United States of America, in general Congress assembled, appealing to

the Supreme Judge of the world for the rectitude of our intentions, do, in the name, and by the authority of the good people of these colonies, solemnly publish and declare that these united colonies are, and of right ought to be, free and independent states; that they are absolved from all allegiance to the British crown, and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved; and that, as free and independent states, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent states may of right do. And for the support of this declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other our lives, our fortunes and our sacred honor.

The foregoing declaration was, by order of Congress, engrossed, and signed by the following members:

JOHN HANCOCK.

New Hampshire

JOSIAH BARTLETT, MATTHEW THORNTON.
WM. WHIPPLE,

Massachusetts Bay

SAML. ADAMS, ROBT. TREAT PAINE,
JOHN ADAMS, ELBRIDGE GERRY.

Rhode Island, etc.

STEP. HOPKINS, WILLIAM ELLERY.

Connecticut

ROGER SHERMAN, WM. WILLIAMS,
SAM'EL HUNTINGTON, OLIVER WOLCOTT.

New York

WM. FLOYD, FRANS. LEWIS,
PHIL. LIVINGSTON, LEWIS MORRIS.

New Jersey

RICHD. STOCKTON, JOHN HART,
JNO. WITHERSPOON, ABRA. CLARK.
FRAS. HOPKINSON,

Pennsylvania

ROBT. MORRIS, JAS. SMITH,
BENJAMIN RUSH, GEO. TAYLOR,
BENJA. FRANKLIN, JAMES WILSON,
JOHN MORTON, GEO. ROSS.
GEO. CLYMER,

Delaware

CÆSAR RODNEY, THO. M'KEAN.
GEO. READ,

Maryland

SAMUEL CHASE, THOS. STONE,
WM. PACA, CHARLES CARROLL OF CARROLLTON.

Virginia

GEORGE WYTHE, THOS. NELSON, JR.,
RICHARD HENRY LEE, FRANCIS LIGHTFOOT LEE,
TH. JEFFERSON, CARTER BRAXTON.
BENJA. HARRISON,

North Carolina

WM. HOOPER, JOHN PENN.
JOSEPH HEWES,

South Carolina

EDWARD RUTLEDGE, THOMAS LYNCH, JR.,
THOS. HEYWARD, JR., ARTHUR MIDDLETON.

Georgia

BUTTON GWINNETT, GEO. WALTON.
LYMAN HALL,

The Continental Congress. The defects of the Continental Congress as an agency for united effort were serious and were early apprehended. It rested on no constitution and commanded no support except as a revolutionary body. Its members represented the colonies from which they came, and voted under instructions, each state having one vote. The states regarded themselves as independent and able to disregard Congress when it appeared to their interest to do so.

The same session that produced the Declaration of Independence provided also a committee to draw up a plan for a better union. A committee was appointed which produced the Articles of Confederation, the first constitution of a united America. Nearly five years passed, however, before, on March 1, 1781, these articles became effective. The Congress did not adopt the committee's report until November 15, 1777. Eleven states ratified within a year following, but Delaware withheld ratification until 1779, and Maryland until 1781.

Articles of Confederation. As the precursor of the Constitution of the United States, the Articles of Confederation is a political document of first interest. As its name indicates, it provided for a "confederation," not for a "federal" government. It left the independence and the "sovereignty" of the thirteen states unimpaired (Article II). The states delegated certain powers to the national government; but, in spite of the use of the word "perpetual" in the document, they undoubtedly regarded themselves as possessing the right to withdraw if they desired.

The government created dealt only with the states. It could not act upon the individual. As in the Continental Congress, each state possessed one vote, and could send a number of "delegates," not less than two nor more than seven. These delegates the state chose and compensated in any desired manner (Article V). Action under the really important powers granted to the Congress required the assent of nine states to be effective (Article IX, 6th paragraph). The government created consisted only of the Congress, a single chamber body. A "president" was authorized (Article IX, 5th paragraph) to serve not "more than one year in any term of three," but he was simply a presiding officer. Executive functions were intrusted to "committees" of which a great number were eventually created. During recess a "Committee of the States," with one representative from each state, was authorized. To it was delegated a limited control.

The Congress had no independent power to enforce its measures. It was dependent upon the states for all resources and for troops; it had no courts nor officers to enforce its laws. Nevertheless, the government here created was an advance toward actual national union, and it furnished an experience essential to the final production of the constitution. The document in its entirety follows:

ARTICLES OF CONFEDERATION OF THE UNITED STATES OF AMERICA.

TO ALL TO WHOM THESE PRESENTS SHALL COME, WE THE UNDERSIGNED DELEGATES OF THE STATES AFFIXED TO OUR NAMES, SEND GREETING.

Whereas the delegates of the United States of America in Congress assembled did on the 15th day of November in the year of our Lord 1777, and in the second year of the independence of America agree to certain Articles of Confederation and perpetual union between the States of New Hampshire, Massachusetts Bay, Rhode Island and Providence Plantations, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina and Georgia, in the words following, viz.

ARTICLES OF CONFEDERATION AND PERPETUAL UNION BETWEEN THE STATES OF NEW HAMPSHIRE, MASSACHUSETTS BAY, RHODE ISLAND AND PROVIDENCE PLANTATIONS, CONNECTICUT, NEW YORK, NEW JERSEY, PENNSYLVANIA, DELAWARE, MARYLAND, VIRGINIA, NORTH CAROLINA, SOUTH CAROLINA, AND GEORGIA.

ARTICLE I. The style of this confederacy shall be "The United States of America."

ARTICLE II. Each state retains its sovereignty, freedom and independence, and every power, jurisdiction and right, which is not by this confederation expressly delegated to the united states, in Congress assembled.

ARTICLE III. The said states hereby severally enter into a firm league of friendship with each other, for their common defense, the security of their liberties, and their mutual and general welfare, binding themselves to assist each other, against all force offered to, or attacks made upon them, or any of them, on account of religion, sovereignty, trade, or any other pretense whatever.

ARTICLE IV. The better to secure and perpetuate mutual friendship and intercourse among the people of the different states in this union, the free inhabitants of each of these states, paupers, vagabonds, and fugitives from justice excepted, shall be entitled to all privileges and immunities of free citizens in the several states; and the people of each state shall have free ingress and regress to and from any other state, and shall enjoy therein all the privileges of trade and commerce, subject to the same duties, impositions and restrictions as the inhabitants thereof respectively, provided that such restriction shall not extend so far as to prevent the removal of property imported into

any state, to any other state of which the owner is an inhabitant; provided also that no imposition, duties or restriction shall be laid by any state, on the property of the United States, or either of them.

If any person guilty of, or charged with treason, felony, or other high misdemeanor in any state, shall flee from justice, and be found in any of the united states, he shall upon demand of the Governor or executive power, of the state from which he fled, be delivered up and removed to the state having jurisdiction of his offense.

Full faith and credit shall be given in each of these states to the records, acts and judicial proceedings of the courts and magistrates of every other state.

ARTICLE V. For the more convenient management of the general interest of the united states, delegates shall be annually appointed in such manner as the legislature of each state shall direct, to meet in Congress on the first Monday in November, in every year, with a power reserved to each state, to recall its delegates, or any of them, at any time within the year, and to send others in their stead, for the remainder of the year.

No state shall be represented in Congress by less than two, nor by more than seven members; and no person shall be capable of being a delegate for more than three years in any term of six years; nor shall any person, being a delegate, be capable of holding any office under the united states, for which he, or another for his benefit receives any salary, fees or emolument of any kind.

Each state shall maintain its own delegates in any meeting of the states, and while they act as members of the committee of the states.

In determining questions in the united states, in Congress assembled, each state shall have one vote.

Freedom of speech and debate in Congress shall not be impeached or questioned in any court, or place out of Congress, and the members of Congress shall be protected in their persons from arrests and imprisonments, during the time of their going to and from, and attendance on Congress, except for treason, felony, or breach of the peace.

ARTICLE VI. No state without the consent of the united states in Congress assembled, shall send any embassy to, or receive any embassy from, or enter into any conference, agreement, alliance or treaty with any king, prince or state; nor shall any person holding any office of profit or trust under the united states, or any of them, accept of any present, emolument, office or title of any kind whatever from any king, prince or foreign state; nor shall the united states in Congress assembled, or any of them, grant any title of nobility.

No two or more states shall enter into any treaty, confederation or alliance whatever between them, without the consent of the united states in Congress assembled, specifying accurately the purposes for which the same is to be entered into, and how long it shall continue.

No state shall lay any imposts or duties, which may interfere with any stipulation in treaties, entered into by the united states in Congress assembled, with any king, prince or state, in pursuance of any treaties already proposed by Congress, to the courts of France and Spain.

No vessels of war shall be kept up in time of peace by any state, except such number only, as shall be deemed necessary by the united states in Congress assembled, for the defense of such state, or its trade; nor shall any body of forces be kept up by any state, in time of peace, except such number only, as in the judgment of the united states, in Congress assembled, shall be deemed requisite to garrison the forts necessary for the defense of such state; but every state shall always keep up a well regulated and disciplined militia, sufficiently armed and accoutred, and shall provide and have constantly ready for use, in public stores, a due number of field pieces and tents, and a proper quantity of arms, ammunition and camp equipage.

No state shall engage in any war without the consent of the united states in Congress assembled, unless such state be actually invaded by enemies, or shall have received certain advice of a resolution being formed by some nation of Indians to invade such state, and the danger is so imminent as not to admit of a delay, till the united states in Congress assembled can be consulted: nor shall any state grant commissions to any ships or vessels of war, nor letters of marque or reprisal, except it be after a declaration of war by the united states in Congress assembled, and then only against the kingdom or state and the subjects thereof, against which war has been so declared, and under such regulations as shall be established by the united states in Congress assembled, unless such state be infested by pirates, in which case vessels of war may be fitted out for that occasion, and kept so long as the danger shall continue, or until the united states in Congress assembled shall determine otherwise.

ARTICLE VII. When land forces are raised by any state for the common defense, all officers of or under the rank of colonel, shall be appointed by the legislature of each state respectively by whom such forces shall be raised, or in such manner as such state shall direct, and all vacancies shall be filled up by the state which first made the appointment.

ARTICLE VIII. All charges of war, and all other expenses that shall be incurred for the common defense or general welfare, and allowed by the united states in Congress assembled, shall be defrayed out of a common treasury, which shall be supplied by the several states, in proportion to the value of all land within each state, granted to or surveyed for any person, as such land and the buildings and improvements thereon shall be estimated according to such mode as the united states in Congress assembled, shall from time to time, direct and appoint.

The taxes for paying that proportion shall be laid and levied by the authority and direction of the legislatures of the several states within the time agreed upon by the united states in Congress assembled.

ARTICLE IX. The united states in Congress assembled, shall have the sole and exclusive right and power of determining on peace and war, except in the cases mentioned in the sixth article—of sending and receiving ambassadors—entering into treaties and alliances, provided that no treaty of commerce shall be made whereby the legislative power of the respective states shall be restrained from imposing such imposts and duties on foreigners, as their own people are subjected to, or from prohibiting the exportation or importation of any species of goods or commodities whatsoever—of establishing rules for deciding in all cases, what captures on land or water shall be legal, and in what manner prizes taken by land or naval forces in the service of the united states shall be divided or appropriated—of granting letters of marque and reprisal in times of peace—appointing courts for the trial of piracies and felonies committed on the high seas and establishing courts for receiving and determining finally appeals in all cases of captures, provided that no member of Congress shall be appointed a judge of any of the said courts.

The united states in Congress assembled shall also be the last resort on appeal in all disputes and differences now subsisting or that hereafter may arise between two or more states concerning boundary, jurisdiction or any other cause whatever; which authority shall always be exercised in the manner following. Whenever the legislative or executive authority or lawful agent of any state in controversy with another shall present a petition to Congress, stating the matter in question and praying for a hearing, notice thereof shall be given by order of Congress to the legislative or executive authority of the other state in controversy, and a day assigned for the appearance of the parties by their lawful agents, who shall then be directed to appoint by joint consent, commissioners or judges to constitute a court for hearing and determining the matter in question: but if they cannot agree, Congress shall name three persons out of each of the united states, and from the list of such persons each party shall alternately strike out one, the petitioners beginning, until the number shall be reduced to thirteen; and from that number not less than seven, nor more than nine names as Congress shall direct, shall in the presence of Congress be drawn out by lot, and the persons whose names shall be so drawn or any five of them, shall be commissioners or judges, to hear and finally determine the controversy, so always as a major part of the judges who shall hear the cause shall agree in the determination: and if either party shall neglect to attend at the day appointed, without showing reasons, which Congress shall judge sufficient, or being present shall refuse to strike, the Congress shall proceed to nominate three persons out of each state, and the secretary of Congress shall strike in behalf of such party absent or refusing; and the judgment and sentence of the court to be appointed, in the manner before prescribed, shall be final and conclusive; and if any of the parties shall refuse to submit to the authority of such court, or to appear or defend their claim or cause, the court shall nevertheless proceed to pronounce sentence, or judgment, which shall in like manner be final and decisive, the judgment or sentence and other proceedings being in either case transmitted to Congress, and lodged among the acts of Congress for the security of the parties concerned: provided that every commissioner, before he sits in judgment, shall take an oath to be administered by one of the judges of the supreme or superior court of the state, where the cause shall be tried, "well and truly to hear and determine the matter in question, according to the best of his judgment, without favor, affection or hope of reward": provided also that no state shall be deprived of territory for the benefit of the united states.

All controversies concerning the private right of soil claimed under different grants of two or more states, whose jurisdictions as they may respect such lands, and the states which passed such grants are adjusted, the said grants or either of them being at the same time claimed to have originated antecedent to such settlement of jurisdiction, shall on the petition of either party to the Congress of the united states, be finally determined as near as may be in the same manner as is before prescribed for deciding disputes respecting territorial jurisdiction between different states.

The united states in Congress assembled shall also have the sole and exclusive right and power of regulating the alloy and value of coin struck by their own authority, or by

that of the respective states—fixing the standard of weights and measures throughout the United States—regulating the trade and managing all affairs with the Indians, not members of any of the states, provided that the legislative right of any state within its own limits be not infringed or violated—establishing and regulating post offices from one state to another, throughout all the united states, and exacting such postage on the papers passing through the same as may be requisite to defray the expenses of the said office—appointing all officers of the land forces, in the service of the united states, excepting regimental officers—appointing all the officers of the naval forces, and commissioning all officers whatever in the service of the united states—making rules for the government and regulation of the said land and naval forces, and directing their operations.

The united states in Congress assembled shall have authority to appoint a committee, to sit in the recess of Congress, to be denominated "A Committee of the States," and to consist of one delegate from each state; and to appoint such other committees and civil officers as may be necessary for managing the general affairs of the united states under their direction—to appoint one of their number to preside, provided that no person be allowed to serve in the office of president more than one year in any term of three years; to ascertain the necessary sums of money to be raised for the service of the united states, and to appropriate and apply the same for defraying the public expenses—to borrow money, or emit bills on the credit of the united states, transmitting every half year to the respective states an account of the sums of money so borrowed or emitted—to build and equip a navy—to agree upon the number of land forces, and to make requisitions from each state for its quota, in proportion to the number of white inhabitants in such state; which requisition shall be binding, and thereupon the legislature of each state shall appoint the regimental officers, raise the men and clothe, arm and equip them in a soldierlike manner, at the expense of the united states; and the officers and men so clothed, armed and equipped shall march to the place appointed, and within the time agreed on by the united states in Congress assembled: But if the united states in Congress assembled shall, on consideration of circumstances judge proper that any state should not raise men, or should raise a smaller number than its quota, and that any other state should raise a greater number of men than the quota thereof, such extra number shall be raised, officered, clothed, armed and equipped in the same manner as the quota of such state, unless the legislature of such state shall judge that such extra number cannot be safely spared out of the same, in which case they shall raise, officer, clothe, arm and equip as many of such extra number as they judge can be safely spared. And the officers and men so clothed, armed and equipped, shall march to the place appointed, and within the time agreed on by the united states in Congress assembled.

The united states in Congress assembled shall never engage in a war, nor grant letters of marque and reprisal in time of peace, nor enter into any treaties or alliances, nor coin money, nor regulate the value thereof, nor ascertain the sums and expenses necessary for the defense and welfare of the united states, or any of them, nor emit bills, nor borrow money on the credit of the united states, nor appropriate money, nor agree upon the number of vessels of war, to be built or purchased, or the number of land or sea forces to be raised, nor appoint a commander in chief of the army or navy, unless nine states assent to the same: nor shall a question on any other point, except for adjourning from day to day be determined, unless by the votes of a majority of the united states in Congress assembled.

The Congress of the united states shall have power to adjourn to any time within the year, and to any place within the united states, so that no period of adjournment be for a longer duration than the space of six months, and shall publish the journal of their proceedings monthly, except such parts thereof relating to treaties, alliances or military operations, as in their judgment require secrecy; and the yeas and nays of the delegates of each state on any question shall be entered on the journal, when it is desired by any delegate; and the delegates of a state, or any of them, at his or their request shall be furnished with a transcript of the said journal, except such parts as are above excepted, to lay before the legislatures of the several states.

Article X. The committee of the states, or any nine of them, shall be authorized to execute, in the recess of Congress, such of the powers of Congress as the united states in Congress assembled, by the consent of nine states, shall from time to time think expedient to vest them with; provided that no power be delegated to said committee, for the exercise of which, by the Articles of Confederation, the voice of nine states in the Congress of the united states assembled is requisite.

Article XI. Canada acceding to this Confederation, and joining in the measures of the united states shall be admitted into, and entitled to all the advantages of this union: but no other colony shall be admitted into the same, unless such admission be agreed to by nine states.

Article XII. All bills of credit emitted, moneys borrowed and debts contracted by, or under the authority of Congress, before the assembling of the united states, in pursuance of the present Confederation, shall be deemed and considered as a charge against the united states, for payment and satisfaction whereof the said united states, and the public faith are hereby solemnly pledged.

Article XIII. Every state shall abide by the determinations of the united states in Congress assembled, on all questions which by this Confederation is submitted to them. And the articles of this Confederation shall be inviolably observed by every state, and the union shall be perpetual; nor shall any alteration at any time hereafter be made in any of them; unless such alteration be agreed to in a Congress of the united states, and be afterwards confirmed by the legislatures of every state.

And whereas it hath pleased the Great Governor of the World to incline the hearts of the legislatures we respectively represent in Congress, to approve of, and to authorize us to ratify the said Articles of Confederation and perpetual union. Know ye that we the undersigned delegates, by virtue of the power and authority to us given for that purpose, do by these presents, in the name and in behalf of our respective constituents, fully and entirely ratify and confirm each and every of the said Articles of Confederation and perpetual union, and all and singular the matters and things therein contained: And we do further solemnly plight and engage the faith of our respective constituents, that they shall abide by the determinations of the united states in Congress assembled, on all questions which by the said Confederation are submitted to them. And that the articles thereof shall be inviolably observed by the states we respectively represent, and that the union shall be perpetual.

In witness whereof we have hereunto set our hands in Congress. Done at Philadelphia in the State of Pennsylvania the ninth day of July in the year of our Lord, 1778, and in the third year of the independence of America.

On the part and behalf of the State of New Hampshire.

Josiah Bartlett, John Wentworth, Jun., August 8, 1778.

On the part and behalf of the State of Massachusetts Bay.

John Hancock, Francis Dana,
Samuel Adams, James Lovell,
Elbridge Gerry, Samuel Holten.

On the part and behalf of the State of Rhode Island and Providence Plantations.

William Ellery, John Collins.
Henry Marchant,

On the part and behalf of the State of Connecticut.

Roger Sherman, Titus Hosmer,
Samuel Huntington, Andrew Adams.
Oliver Wolcott,

On the part and behalf of the State of New York.

Jas. Duane, William Duer,
Fras. Lewis, Gou'r Morris.

On the part and behalf of the State of New Jersey.

Jno. Witherspoon, Nath'l Scudder, November 26, 1778.

On the part and behalf of the State of Pennsylvania.

Robt. Morris, William Clingan,
Daniel Roberdeau, Joseph Reed,
Jona Bayard Smith, July 22, 1778.

On the part and behalf of the State of Delaware.

John Dickinson, Thos. M'Kean,
May 5, 1779, February 12, 1779.
Nicholas Van Dyke,

On the part and behalf of the State of Maryland.

John Hanson, Daniel Carroll,
March 1, 1781, March 1, 1781.

On the part and behalf of the State of Virginia.

Richard Henry Lee, Jno. Harvie,
John Banister, Francis Lightfoot Lee.
Thomas Adams,

On the part and behalf of the State of North Carolina.

John Penn, Jno. Williams.
July 21, 1778,
Corns. Harnett,

On the part and behalf of the State of South Carolina.

Henry Laurens, Richard Hutson,
William Henry Drayton, Thos. Heyward, Jun.
Jno. Matthews,

On the part and behalf of the State of Georgia.

Jno. Walton, Edw'd Langworthy.
24th July, 1778,
Edw'd Telfair,

CONSTITUTION OF THE UNITED STATES

The unsatisfactory character of the union effected by the Articles of Confederation became increasingly apparent during the period of its existence. The Congress had no power to raise money by taxation. It could borrow, issue paper money, and make requisitions on the states; but the use of these ineffective powers only added to the financial difficulties and lowered the public credit. Congress sought the right to levy tariff duties, but the opposition of one or more states defeated this amendment.

The power was lacking also of developing a national commercial policy and of controlling commerce between states. Freedom of trade within the union was essential to commercial and to industrial development; but local jealousy led the states to erect trade barriers and to set up discriminations. Above all, the Congress lacked power to compel the states to live up to their obligations under the union. Washington indicated the fundamental failure of Congress as its "absence of coercive power."

The Constitutional Convention. The increasing gravity of American affairs, the growing probability of disruption, gradually convinced the people of the states of the need of a "more perfect union." A group of talented statesmen, led by Washington, Madison, Hamilton, and Franklin, worked unceasingly to this end, and in 1787 their labors were rewarded by the convention which met at Philadelphia in May and framed the Constitution of the United States.

Seventy-three delegates in all were appointed by the states, but only fifty-five ever attended. The average number present was from thirty to thirty-five, nearly all thoroughly experienced in public affairs and representative of the varying views of the states, while among them were a group of men distinguished for greatness of character and for political sagacity. Moreover, all were practical men, interested in effective forms of government, rather than in theoretical expedients. They were interested also in the protection of those ancient civil rights for which their race had contended for centuries, rather than in vague conceptions of political felicity.

Organization of Convention. The convention organized on May 25, and George Washington was unanimously chosen president. It adjourned on September 17. The convention met behind closed doors. It imposed a bond of secrecy on its members as to the differences and disputes which divided them, and this obligation of protecting the reputation of all concerned was never violated.

The journal of the convention was not published until 1818, when Congress so ordered. Nearly all that is known of the debates and adjustments of this meeting is derived from a private journal kept by Madison and first published in 1840. But it is apparent that no body of men intrusted with a comparable responsibility ever labored with greater disinterestedness and patriotism or strove in greater loyalty to bring the different views which separated them into a common agreement and workable plan. The result justifies the high talents and the profound patriotism of these collaborators.

The First Constitution. The Constitution, which is the first of modern constitutions in point of time, is easily the first also in the praise it has evoked and in the confidence of those who live under it. It may also be said that no political instrument ever framed embodies a more remarkable series of contributions to government or has exerted a wider influence on the subsequent history of states.

Among the institutions given original form in the Constitution are (1) Federal government, subsequently initiated in such widely different states as the Dominion of Canada, the Swiss Confederation, the German Empire, the Mexican and Argentine republics, and the Commonwealth of Australia; (2) the Senate, with its principle of equality of representation of member states as contrasted with a House of Representatives based on population; (3) the office of president, a plan of government which contrasts with ministerial or parliamentary executive as one of the two predominant types of national administration; (4) the supreme court, with its august and remarkable power of judicially interpreting the provisions of the Constitution itself, and of declaring void national or state legislation in conflict with the Constitution; (5) the creation of a sphere of constitutional liberty inviolable by government and protected by judicial power; (6) the creation of complete freedom of movement and of commerce within the union of states, subject only to Federal control.

Character of the Constitution. The Constitution is remarkable for the brevity and for the exactness of its language. While it is an instrument based on experience in government, extending over a long period of colonial and revolutionary statesmanship, its original character justifies the eulogy of Gladstone, that it is "the most wonderful work ever struck off at a given time by the brain and purpose of man."

The Constitution is, finally, the oldest frame of government in the world today. All other modern states rest upon constitutions that are relatively recent and which embody revolutionary changes.

In spite of the expansion of the United States since 1787 and the growth of the American people, the amendments to the Constitution have been relatively few and have little altered its original character as the first plan of the government. These amendments are 22 in number: their character and dates of adoption are as given below.

Ratification of Constitution. The Constitution was signed on September 17, 1787, by all members present except Mr. Gerry of Massachusetts and Mr. Mason and Mr. Randolph of Virginia. The president of the convention transmitted it to Congress and Congress on September 28 directed it to be "transmitted to the several legislatures in order to be submitted to a convention of delegates chosen in each state by the people thereof, in conformity to the resolves of the convention."

The Constitution was ratified by the thirteen original states in the following order:

Delaware, December 7, 1787, unanimously.
Pennsylvania, December 12, 1787, vote 46 to 23.
New Jersey, December 18, 1787, unanimously.
Georgia, January 2, 1788, unanimously.
Connecticut, January 9, 1788, vote 128 to 40.
Massachusetts, February 6, 1788, vote 187 to 168.
Maryland, April 28, 1788, vote 63 to 12.
South Carolina, May 23, 1788, vote 149 to 73.
New Hampshire, June 21, 1788, vote 57 to 46.
Virginia, June 25, 1788, vote 89 to 79.
New York, July 26, 1788, vote 30 to 28.
North Carolina, November 21, 1789, vote 193 to 75.
Rhode Island, May 29, 1790, vote 34 to 32.

The original document is on display in a specially constructed shrine at the Library of Congress, Washington, D. C.

Amendment of the Constitution. The Constitution (Article V) provides the method of its amendment. The initiative may come either from Congress by a two-thirds vote of both Houses, or by the applications of the legislatures of two-thirds of the states. An amendment thus legally proposed becomes a part of the Constitution when three-fourths of the states have ratified it. This ratification may be given either by the legislatures of the states or by conventions called for this purpose. Actually, however, all amendments have been proposed by Congress and ratified by state legislatures or conventions. The alternative methods of initiative and ratification have never been employed. The dates and circumstances occasioning the amendments are as follows:

Articles I–X were declared in force December 15, 1791.

The Constitution, as originally submitted, contained no code of fundamental civil rights. To remedy what was considered a defect, as well as to make unequivocal the retention by the people or by the states of powers not expressly conferred upon the national government, these ten amendments were enacted by the first Congress and submitted to the states.

Article XI was declared in force January 8, 1798.

Article XII altered in some particulars the method of choosing the president and the vice president. It was ratified by all the states except Connecticut, Delaware, Massachusetts, and New Hampshire, which rejected it. It was declared in force September 25, 1804.

Article XIII, the emancipation amendment, was ratified by 31 of the 36 states; rejected by Delaware and Kentucky; not acted on by Texas; conditionally ratified by Alabama and Mississippi. Proclaimed December 18, 1865.

Article XIV, the reconstruction amendment, was ratified by 23 northern states; rejected by Kentucky, Delaware, Maryland, and 5 southern states; and not acted on by California. New Jersey, Ohio, and Oregon withdrew ratification. The 5 southern states subsequently ratified under pressure. Proclaimed July 28, 1868.

Article XV, Negro citizenship amendment, was not acted on by Tennessee; rejected by California, Delaware, Kentucky, Maryland, New Jersey, and Oregon. It was ratified by the remaining 30 states; New York rescinded its ratification January 5, 1870. Proclaimed March 30, 1870.

Article XVI was proposed after the supreme court of the United States had rendered a decision that the Constitution did not confer upon the United States government the right to levy an income tax. This income tax amendment was ratified by 39 states, but failed of ratification in Connecticut, Florida, Massachusetts, New Hampshire, Pennsylvania, Rhode Island, Utah, Vermont, and Virginia. It was proclaimed February 25, 1913.

Article XVII, providing for the direct election of senators, became *de facto* a part of the Constitution on its ratification by the last of the required number of states on April 8, 1913.

Article XVIII, the prohibition amendment, had on January 16, 1919, been ratified by 36 states, and on January 29, 1919, was formally proclaimed to take effect on January 16, 1920. Connecticut and Rhode Island alone failed to ratify.

Article XIX, the equal suffrage amendment, was adopted between June 10, 1919, and August 19, 1920, by three-fourths of the states, and proclaimed in effect August 26, 1920.

Article XX, the "lame duck" amendment, had been ratified by 39 states by February 6, 1933, when it was proclaimed valid.

Article XXI, repealing the prohibition amendment, article *XVIII*, was ratified by the 36th state, Utah, on December 5, 1933, and was immediately proclaimed valid.

Article XXII, limiting presidential terms of office to two. Went into effect February 26, 1951.

CONSTITUTION OF THE UNITED STATES

PREAMBLE.—We the people of the United States, in order to form a more perfect Union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

ARTICLE I

SECTION I. All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

SECTION II. 1. The House of Representatives shall be composed of members chosen every second year by the people of the several states, and the electors in each state shall have the qualifications requisite for electors of the most numerous branch of the state legislature.

2. No person shall be a representative who shall not have attained to the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that state in which he shall be chosen.

3. Representatives and direct taxes shall be apportioned among the several states which may be included within this Union, according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of representatives shall not exceed one for every thirty thousand, but each state shall have at least one representative; and until such enumeration shall be made, the state of New Hampshire shall be entitled to choose 3; Massachusetts, 8; Rhode Island and Providence Plantations, 1; Connecticut, 5; New York, 6; New Jersey, 4; Pennsylvania, 8; Delaware, 1; Maryland, 6; Virginia, 10; North Carolina, 5; South Carolina, 5; and Georgia, 3. See *Article XIV., Amendment.*

4. When vacancies happen in the representation from any state, the executive authority thereof shall issue writs of election to fill such vacancies.

5. The House of Representatives shall choose their speaker and other officers; and shall have the sole power of impeachment.

SECTION III. 1. The Senate of the United States shall be composed of two senators from each state, chosen by the legislature thereof, for six years; and each senator shall have one vote (Superseded by the 17th Amendment).

2. Immediately after they shall be assembled in consequence of the first election, they shall be divided as equally as may be into three classes. The seats of the senators of the first class shall be vacated at the expiration of the second year, of the second class at the expiration of the fourth year, and of the third class at the expiration of the sixth year, so that one-third may be chosen every second year; and if vacancies happen by resignation, or otherwise, during the recess of the legislature of any state, the executive thereof may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies.

3. No person shall be a senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that state for which he shall be chosen.

4. The vice president of the United States shall be president of the Senate, but shall have no vote, unless they be equally divided.

5. The Senate shall choose their other officers, and also a president pro tempore, in the absence of the vice president, or when he shall exercise the office of president of the United States.

6. The Senate shall have the sole power to try all impeachments. When sitting for that purpose, they shall be on oath or affirmation. When the president of the United States is tried, the chief justice shall preside: and no person shall be convicted without the concurrence of two-thirds of the members present.

7. Judgment in cases of impeachment shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted shall nevertheless be liable and subject to indictment, trial, judgment, and punishment, according to law.

SECTION IV. 1. The times, places, and manner of holding elections for senators and representatives shall be prescribed in each state by the legislature thereof; but the Congress may at any time by law make or alter such regulations, except as to the places of choosing senators.

2. The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day.

SECTION V. 1. Each House shall be the judge of the elections, returns, and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner, and under such penalties as each House may provide.

2. Each House may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two-thirds, expel a member.

3. Each House shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may in their judgment require secrecy; and the yeas and nays of the members of either House on any question shall, at the desire of one-fifth of those present, be entered on the journal.

4. Neither House, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the

two Houses shall be sitting.

SECTION VI. 1. The senators and representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the treasury of the United States. They shall in all cases, except treason, felony, and breach of the peace, be privileged from arrest during their attendance at the session of their respective Houses, and in going to and returning from the same; and for any speech or debate in either House, they shall not be questioned in any other place.

2. No senator or representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased, during such time; and no person holding any office under the United States, shall be a member of either House during his continuance in office.

SECTION VII. 1. All bills for raising revenue shall originate in the House of Representatives; but the Senate may propose or concur with amendments as on other bills.

2. Every bill which shall have passed the House of Representatives and the Senate, shall, before it become a law, be presented to the president of the United States; if he approve he shall sign it, but if not he shall return it, with his objections, to that House in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration two-thirds of that House shall agree to pass the bill, it shall be sent, together with the objections, to the other House, by which it shall likewise be reconsidered, and, if approved by two-thirds of that House, it shall become a law. But in all such cases the votes of both Houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each House respectively. If any bill shall not be returned by the president within ten days (Sundays excepted) after it shall have been presented to him, the same shall be a law, in like manner as if he had signed it, unless the Congress by their adjournment prevent its return, in which case it shall not be a law.

3. Every order, resolution, or vote to which the concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the president of the United States; and before the same shall take effect, shall be approved by him, or being disapproved by him, shall be repassed by two-thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

SECTION VIII. The Congress shall have power:

1. To lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defense and general welfare of the United States; but all duties, imposts, and excises shall be uniform throughout the United States.

2. To borrow money on the credit of the United States.

3. To regulate commerce with foreign nations, and among the several states, and with the Indian tribes.

4. To establish an uniform rule of naturalization, and uniform laws on the subject of bankruptcies throughout the United States.

5. To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures.

6. To provide for the punishment of counterfeiting the securities and current coin of the United States.

7. To establish post offices and post roads.

8. To promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.

9. To constitute tribunals inferior to the supreme court.

10. To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations.

11. To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water.

12. To raise and support armies, but no appropriation of money to that use shall be for a longer term than two years.

13. To provide and maintain a navy.

14. To make rules for the government and regulation of the land and naval forces.

15. To provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions.

16. To provide for organizing, arming, and disciplining, the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the states respectively, the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress.

17. To exercise exclusive legislation in all cases whatsoever, over such district (not exceeding ten miles square) as may, by cession of particular states, and the acceptance of Congress, become the seat of the government of the United States, and to exercise like authority over all places purchased by the consent of the legislature of the state in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings.

18. To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the government of the United States, or in any department or officer thereof.

SECTION IX. 1. The migration or importation of such persons as any of the states now existing shall think proper to admit, shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight, but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.

2. The privilege of the writ of habeas corpus shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.

3. No bill of attainder or ex post facto law shall be passed.

4. No capitation, or other direct, tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken (Changed by the 16th Amendment).

5. No tax or duty shall be laid on articles exported from any state.

6. No preference shall be given by any regulation of commerce or revenue to the ports of one state over those of another: nor shall vessels bound to, or from, one state be obliged to enter, clear, or pay duties in another.

7. No money shall be drawn from the treasury, but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

8. No title of nobility shall be granted by the United States: And no person holding any office of profit or trust under them, shall, without the consent of the Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state.

SECTION X. 1. No state shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, ex post facto law, or law impairing the obligation of contracts, or grant any title of nobility.

2. No state shall, without the consent of the Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws: and the net produce of all duties and imposts, laid by any state on imports or exports, shall be for the use of the treasury of the United States; and all such laws shall be subject to the revision and control of the Congress.

3. No state shall, without the consent of Congress, lay any duty of tonnage, keep troops, or ships of war in time of peace, enter into any agreement or compact with another state, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II

SECTION I. 1. The executive power shall be vested in a president of the United States of America. He shall hold his office during the term of four years, and, together with the vice president, chosen for the same term, be elected as follows.

2. Each state shall appoint, in such manner as the legislature thereof may direct, a number of electors, equal to the whole number of senators and representatives to which the state may be entitled in the Congress: but no senator or representative, or person holding an office of trust or profit under the United States, shall be appointed an elector.

3. The electors shall meet in their respective states, and vote by ballot for two persons, of whom one at least shall not be an inhabitant of the same state with themselves. And they shall make a list of all the persons voted for, and of the number of votes for each; which list they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the president of the Senate. The president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted. The person having the greatest number of votes shall be the president, if such number be a majority of the whole number of electors appointed; and if there be more than one who have such majority, and have an equal number of votes, then the House of Representatives shall immediately choose by ballot one of them for president; and if no person have a majority, then from the five highest on the list the said House shall in like manner choose the president. But in choosing the president, the vote shall be taken by states, the representation for each state having one vote; A quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice. In every case, after the choice of the president, the person having the greatest number of votes of the electors shall be the vice president. But if there should remain two or more who have equal votes, the Senate shall choose from them by ballot the vice president (Superseded by the 12th Amendment).

4. The Congress may determine the time of choosing the electors, and the day on which they shall give their votes;

which day shall be the same throughout the United States.

5. No person except a natural born citizen, or a citizen of the United States, at the time of the adoption of this Constitution, shall be eligible to the office of president; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and have been fourteen years a resident within the United States.

6. In case of the removal of the president from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the vice president, and the Congress may by law provide for the case of removal, death, resignation, or inability, both of the president and vice president, declaring what officer shall then act as president, and such officer shall act accordingly, until the disability be removed, or a president shall be elected.

7. The president shall, at stated times, receive for his services, a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected, and he shall not receive within that period any other emolument from the United States, or any of them.

8. Before he enter on the execution of his office, he shall take the following oath or affirmation:—

"I do solemnly swear (affirm) that I will faithfully execute the office of President of United States, and will, to the best of my ability, preserve, protect, and defend the Constitution of the United States."

SECTION II. 1. The president shall be commander in chief of the army and navy of the United States, and of the militia of the several states, when called into the actual service of the United States; he may require the opinion, in writing, of the principal officer in each of the executive departments, upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment.

2. He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the senators present concur; and he shall nominate, and by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and consuls, judges of the supreme court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law: but the Congress may by law vest the appointment of such inferior officers, as they think proper, in the president alone, in the courts of law, or in the heads of departments.

3. The president shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which shall expire at the end of their next session.

SECTION III. He shall from time to time give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may, on extraordinary occasions, convene both Houses, or either of them, and in case of disagreement between them, with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed, and shall commission all the officers of the United States.

SECTION IV. The president, vice president, and all civil officers of the United States shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors.

ARTICLE III

SECTION I. The judicial power of the United States, shall be vested in one supreme court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services, a compensation, which shall not be diminished during their continuance in office.

SECTION II. 1. The judicial power shall extend to all cases, in law and equity, arising under this Constitution, the laws of the United States, and treaties made, or which shall be made, under their authority;—to all cases affecting ambassadors, other public ministers and consuls;—to all cases of admiralty and maritime jurisdiction;—to controversies to which the United States shall be a party;—to controversies between two or more states;—between a state and citizens of another state;—between citizens of different states;—between citizens of the same state claiming lands under grants of different states,—and between a state, or the citizens thereof, and foreign states, citizens, or subjects.

2. In all cases affecting ambassadors, other public ministers and consuls, and those in which a state shall be party, the supreme court shall have original jurisdiction. In all the other cases before mentioned, the supreme court shall have appellate jurisdiction, both as to law and fact, with such exceptions, and under such regulations as the Congress shall make.

3. The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the state where the said crimes shall have been committed; but when not committed within any state, the trial shall be at such place or places as the Congress may by law have directed

SECTION III. 1. Treason against the United States, shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

2. The Congress shall have power to declare the punishment of treason, but no attainder of treason shall work corruption of blood, or forfeiture except during the life of the person attainted.

ARTICLE IV

SECTION I. Full faith and credit shall be given in each state to the public acts, records, and judicial proceedings of every other state. And the Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

SECTION II. 1. The citizens of each state shall be entitled to all privileges and immunities of citizens in the several states.

2. A person charged in any state with treason, felony, or other crime, who shall flee from justice, and be found in another state, shall on demand of the executive authority of the state from which he fled, be delivered up, to be removed to the state having jurisdiction of the crime.

3. No person held to service or labor in one state, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

SECTION III. 1. New states may be admitted by the Congress into this Union; but no new state shall be formed or erected within the jurisdiction of any other state; nor any state be formed by the junction of two or more states, or parts of states, without the consent of the legislatures of the states concerned as well as of the Congress.

2. The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this Constitution shall be so construed as to prejudice any claims of the United States, or of any particular state.

SECTION IV. The United States shall guarantee to every state in this Union a republican form of government, and shall protect each of them against invasion; and on application of the legislature, or of the executive (when the legislature cannot be convened) against domestic violence.

ARTICLE V

The Congress, whenever two-thirds of both Houses shall deem it necessary, shall propose amendments to this Constitution, or, on the application of the legislatures of two-thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes, as part of this Constitution, when ratified by the legislatures of three-fourths of the several states, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided that no amendment which may be made prior to the year one thousand eight hundred and eight shall in any manner affect the first and fourth clauses in the Ninth Section of the First Article; and that no state, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI

1. All debts contracted and engagements entered into before the adoption of this Constitution, shall be as valid against the United States under this Constitution, as under the Confederation.

2. This Constitution, and the laws of the United States which shall be made in pursuance thereof; and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every state shall be bound thereby, anything in the Constitution or laws of any state to the contrary notwithstanding.

3. The senators and representatives before mentioned, and the members of the several state legislatures, and all executive and judicial officers, both of the United States and of the several states, shall be bound by oath or affirmation, to support this Constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII

The ratification of the conventions of nine states, shall be sufficient for the establishment of this Constitution between the states so ratifying the same.

Done in convention by the unanimous consent of the states present the seventeenth day of September in the year of our Lord one thousand seven hundred and eighty-

seven, and of the independence of the United States of America the twelfth. In witness whereof we have hereunto subscribed our names,

GO: WASHINGTON—
Presidt. and Deputy from Virginia

New Hampshire
JOHN LANGDON
NICHOLAS GILMAN

Massachusetts
NATHANIEL GORHAM
RUFUS KING

Connecticut
WM. SAML. JOHNSON
ROGER SHERMAN

New York
ALEXANDER HAMILTON

New Jersey
WIL: LIVINGSTON
DAVID BREARLEY
WM. PATERSON
JONA: DAYTON

Pennsylvania
B. FRANKLIN
THOMAS MIFFLIN
ROBT. MORRIS
GEO. CLYMER
THOS. FITZSIMONS
JARED INGERSOLL
JAMES WILSON
GOUV. MORRIS

Delaware
GEO: READ
GUNNING BEDFORD JUN
JOHN DICKINSON
RICHARD BASSETT
JACO; BROOM

Maryland
JAMES MCHENRY
DAN OF ST. THOS. JENIFER
DANL. CARROLL

Virginia
JOHN BLAIR—
JAMES MADISON JR.

North Carolina
WM. BLOUNT
RICHD. DOBBS SPAIGHT
HU WILLIAMSON

South Carolina
J. RUTLEDGE
CHARLES COTESWORTH PINCKNEY
CHARLES PINCKNEY
PIERCE BUTLER

Georgia
WILLIAM FEW
ABR. BALDWIN

Attest WILLIAM JACKSON,
Secretary

AMENDMENTS TO THE CONSTITUTION

ARTICLE I

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the government for a redress of grievances.

ARTICLE II

A well regulated militia, being necessary to the security of a free state, the right of the people to keep and bear arms, shall not be infringed.

ARTICLE III

No soldier shall, in time of peace, be quartered in any house, without the consent of the owner, nor in time of war, but in a manner to be prescribed by law.

ARTICLE IV

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures shall not be violated, and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

ARTICLE V

No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service in time of war or public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

ARTICLE VI

In all criminal prosecutions the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the state and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the assistance of counsel for his defense.

ARTICLE VII

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any court of the United States, than according to the rules of the common law.

ARTICLE VIII

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

ARTICLE IX

The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.

ARTICLE X

The powers not delegated to the United States by the Constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people.

ARTICLE XI

The judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States, by citizens of another state, or by citizens or subjects of any foreign state.

ARTICLE XII

The electors shall meet in their respective states, and vote by ballot for president and vice president, one of whom, at least, shall not be an inhabitant of the same state with themselves; they shall name in their ballots the person voted for as president, and in distinct ballots the person voted for as vice president, and they shall make distinct lists of all persons voted for as president, and of all persons voted for as vice president, and of the number of votes for each, which list they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the president of the Senate;—the president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates and the votes shall then be counted; —the person having the greatest number of votes for president, shall be the president, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers not exceeding three on the list of those voted for as president, the House of Representatives shall choose immediately, by ballot, the president. But in choosing the president, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a president whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the vice president shall act as president, as in the case of the death or other constitutional disability of the president. The person having the greatest number of votes as vice president, shall be the vice president, if such number be a majority of the whole number of electors appointed, and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the vice president; a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of president shall be eligible to that of vice president of the United States.

ARTICLE XIII

1. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

2. Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV

1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the state wherein they reside. No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any state deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.

2. Representatives shall be apportioned among the several states according to their respective numbers, counting the whole number of persons in each state, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for president and vice president of the United States, representatives in Congress, the executive and judicial officers of a state, or the members of the legislature thereof, is denied to any of the male inhabitants of such state, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion, or other crime, the basis of representation therein shall be reduced in the proportion

which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such state.

3. No person shall be a senator or representative in Congress, or elector of president and vice president, or hold any office, civil or military, under the United States, or under any state, who, having previously taken an oath, as a member of Congress, or as an officer of the United States, or as a member of any state legislature, or as an executive or judicial officer of any state, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may by a vote of two-thirds of each House, remove such disability.

4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any state shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

ARTICLE XV

1. The right of the citizens of the United States to vote shall not be denied or abridged by the United States or by any state on account of race, color, or previous condition of servitude.

2. The Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XVI

The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several states, and without regard to any census or enumeration.

ARTICLE XVII

The Senate of the United States shall be composed of two senators from each state, elected by the people thereof, for six years, and each senator shall have one vote. The electors in each state shall have the qualifications requisite for electors of the most numerous branch of the state legislatures.

When vacancies happen in the representation of any state in the Senate, the executive authority of such state shall issue writs of election to fill such vacancies: Provided, that the legislature of any state may empower the executive thereof to make temporary appointments until the people fill the vacancies by election as the legislature may direct.

This amendment shall not be so construed as to affect the election or term of any senator chosen before it becomes valid as part of the Constitution.

ARTICLE XVIII

1. After one year from the ratification of this article the manufacture, sale, or transportation of intoxicating liquors within, the importation thereof into, or the exportation thereof from the United States and all territory subject to the jurisdiction thereof, for beverage purposes, is hereby prohibited.

2. The Congress and the several states shall have concurrent power to enforce this article by appropriate legislation.

3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of the several states, as provided in the Constitution, within seven years from the date of submission hereof to the states by the Congress.

ARTICLE XIX

1. The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any state on account of sex.

2. Congress shall have power, by appropriate legislation, to enforce the provisions of this article.

ARTICLE XX

1. The terms of the president and vice president shall end at noon on the 20th day of January, and the terms of senators and representatives at noon on the 3d day of January, of the years in which such terms would have ended if this article had not been ratified; and the terms of their successors shall then begin.

2. The Congress shall assemble at least once in every year, and such meeting shall begin at noon on the 3d day of January, unless they shall by law appoint a different day.

3. If, at the time fixed for the beginning of the term of the president, the president elect shall have died, the vice president elect shall become president. If a president shall not have been chosen before the time fixed for the beginning of his term, or if the president elect shall have failed to qualify, then the vice president elect shall act as president until a president shall have qualified; and the Congress may by law provide for the case wherein neither a president elect nor a vice president elect shall have qualified, declaring who shall then act as president, or the manner in which one who is to act shall be selected, and such person shall act accordingly until a president or vice president shall have qualified.

4. The Congress may by law provide for the case of the death of any of the persons from whom the House of Representatives may choose a president whenever the right of choice shall have devolved upon them, and for the case of the death of any of the persons from whom the Senate may choose a vice president whenever the right of choice shall have devolved upon them.

ARTICLE XXI

1. The 18th article of amendment to the Constitution of the United States is hereby repealed.

2. The transportation or importation into any state, territory, or possession of the United States for delivery or use therein of intoxicating liquors, in violation of the laws thereof, is hereby prohibited.

3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by conventions in the several states, as provided in the Constitution, within seven years from the date of the submission thereof, to the states by the Congress.

ARTICLE XXII

1. No person shall be elected to the office of the President more than twice, and no person who has held the office of President, or acted as President, for more than two years of a term to which some other person was elected President shall be elected to the office of the President more than once. But this article shall not apply to any person holding the office of President when this article was proposed by the Congress, and shall not prevent any person who may be holding the office of President, or acting as President, during the term within which this article becomes operative from holding the office of President or acting as President during the remainder of such term.

2. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislators of three fourths of the several states within seven years from the date of its submission to the states by the Congress.

THE FEDERAL GOVERNMENT

In framing the national government, the makers of the Constitution, as has been said above, built on American experience. But two theories of their time strongly influenced their minds and their work: one was the theory of the threefold "distribution of powers" into legislative, executive, and judicial; the other, the theory of useful "checks and balances," inserted as safeguards against undue power and encroachment on civil liberties.

THE LEGISLATIVE DEPARTMENT

THE CONGRESS

Consisting of both the Senate and the House of Representatives as co-ordinate bodies.

DURATION.—The term of each Congress is for two years, beginning January 3d of the odd years.

REGULAR SESSIONS—Annual, beginning at noon on January 3d.

SPECIAL SESSIONS.—At the call of the president.

MEMBERSHIP.—Each House is the judge of the elections and qualifications of its own members.

The Senate

NUMBER.—Two senators from each state.

ELECTED.—By direct vote of the people.

TERM.—Six years; one-third of the Senate being elected every two years.

ELIGIBILITY.—Citizen of the United States nine years; resident of state; minimum age, 30 years.

SALARY.—Fixed by law at $22,500 per year.

PRESIDENT OF THE SENATE.—The vice president of the United States.

POWERS OF THE SENATE:—

Confirms or rejects nominations of the president.
Ratifies or rejects treaties with foreign powers.
Elects president *pro tempore* of the Senate, and its other officers.

Elects vice president of the United States if regular election fails.
Acts as a court for the trial of impeachments.

The House of Representatives

NUMBER.—Four hundred thirty-five members.*
ELECTED.—By voters of congressional districts.
TERM.—Two years,—the entire House being elected every two years.
ELIGIBILITY.—Citizen of the United States seven years; resident of the state; minimum age 25 years.
SALARY.—Fixed by law at $22,500 per year; the speaker, $45,000 per year.
POWERS OF THE HOUSE OF REPRESENTATIVES:—
Elects its speaker (presiding officer) and its other officers.
Elects president of the United States if the regular election fails.
Prosecutes impeachments before the Senate.
Originates all bills for raising revenue.

*There are, besides, one territorial delegate each from Hawaii and Alaska, and a resident commissioner from Puerto Rico, who have the right to speak and to make motions, but not to vote.

THE EXECUTIVE DEPARTMENT

THE PRESIDENT

HOW ELECTED.—In several steps as follows:
State electors are chosen at a general election held on the Tuesday following the first Monday of November of every fourth year, the number of electors of each state being equal to the number of senators and representatives to which the state is entitled in Congress. The date of the election was fixed by act of Congress in 1845.
The electors meet in their respective states on December 15 and vote by ballot for president and vice president; at the same time they make certificates of their vote and transmit the same to the president of the Senate.
The Senate and the House of Representatives meet jointly and count the votes of the state electors, when, if there is an election, the president of the Senate declares who are elected president and vice president.
In case there is no choice by the state electors, the president is elected by the House of Representatives from the three candidates who received the most electoral votes for president, in which election the vote is taken by states, each state having but one vote, and a majority of all the states being necessary to a choice.
TERM OF OFFICE.—Four years, from January 20.
ELIGIBILITY.—A natural born citizen; resident of the United States 14 years; minimum age, 35.
SALARY.—$100,000 a year; also $50,000 (tax-free) for expenses.
POWERS AND DUTIES OF THE PRESIDENT:—
Commander in chief of the army and navy.
Receives representatives of foreign governments.
Communicates with Congress by message.
Approves or disapproves acts of Congress.
Calls and adjourns special sessions of Congress.
Makes treaties with advice and consent of the Senate.
Appoints public officers with the advice and consent of the Senate.
Commissions public officers of the United States.
Grants reprieves and pardons for offenses against the United States.

The Vice President

HOW ELECTED.—Elected by state electors the same as the president; or by the Senate, in case there is no choice by the state electors.
TERM AND ELIGIBILITY.—Same as for president.
SALARY.—$45,000 a year, which includes $10,000 for expenses.
THE PRESIDENTIAL SUCCESSION:—In case of the removal, death, resignation, or inability:
Of the president, the vice president takes the president's place.
Of both president and vice president, under the Presidential Succession act of July 18, 1947, the Speaker of the House of Representatives, if constitutionally eligible, shall resign his position and act as president. If there is no speaker, the president pro tempore of the Senate may resign and serve. If both these offices are vacant, then the heads of the departments in the order given below, if constitutionally eligible. The individual so succeeding shall serve out the current term, except that in case both president-elect and vice president-elect fail to qualify, or in case both are temporarily disabled, he shall serve only until one of them qualifies, or the disability is removed.

The Executive Departments

DEPARTMENT OF STATE.—Has charge of foreign affairs.
TREASURY DEPARTMENT.—Has charge of fiscal affairs.
DEPARTMENT OF DEFENSE.—Has charge of the national defense forces: army, navy, and air force.
DEPARTMENT OF JUSTICE.—Has charge of the legal affairs of the government.
POST-OFFICE DEPARTMENT.—Has charge of postal affairs.
DEPARTMENT OF THE INTERIOR.—Has charge of domestic affairs, including public lands, pensions.
DEPARTMENT OF AGRICULTURE.—Has charge of agricultural affairs, including weather bureau, etc.
DEPARTMENT OF COMMERCE.—Has charge of domestic and foreign affairs, relating to commerce, transportation, etc.
DEPARTMENT OF LABOR.—Has charge of labor affairs and naturalization.
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE.—Has charge of public health service, office of education, and the social security administration.

The Cabinet

MEMBERS.—Heads of the executive departments.
APPOINTMENT.—By the president with the advice and consent of the Senate.
SALARY.—All cabinet members, $22,500 annually.

The President and Legislation

Acts of Congress become laws:
When signed (approved) by the president; or by his failure to make objections in writing (veto) within ten days after any act is submitted to him, unless Congress by adjournment within that time prevents its return; but Congress has power to pass a law over the president's veto by a vote of two-thirds of each House.

THE JUDICIAL DEPARTMENT

JUDGES OF THE UNITED STATES COURTS

APPOINTMENT.—By the president with the advice and consent of the Senate.
TENURE OF OFFICE.—During life or good behavior; but may retire on full salary after reaching the age of seventy years, and after ten years' service on the bench.

THE SUPREME COURT OF THE UNITED STATES

MEMBERS.—A chief justice and eight associate justices.
SALARIES.—Chief justice, $35,500; associate justices, each, $35,000. Retirement at full pay optional after 70½ years of age.
TERMS OF COURT.—One each year, beginning on the second Monday in October.
ORIGINAL JURISDICTION.—In all cases affecting ambassadors, ministers, and consuls, and in all cases in which a state is a party.
APPELLATE JURISDICTION.—In cases of law and equity where the inferior courts have original jurisdiction, with such exceptions and regulations as Congress has made.
THE CHIEF JUSTICE.—Presides over the Senate when it sits as a court of impeachment for the trial of the president.

INFERIOR COURTS

JURISDICTION:—
In cases between citizens of different states.
In cases in which the United States is a party.
In cases of admiralty and maritime jurisdiction.
In trials for crimes against the United States; but the trial of crimes must be by jury, and must be held in the state where the crime was committed.
Appeals to the supreme court may be had in all cases of law and equity, with such exceptions and regulations as Congress has made.

United States Circuit Courts of Appeals:—

Organized in 1891 to relieve the United States supreme court in appellate cases.

NUMBER.—One in each of the nine judicial circuits.

SALARY OF CIRCUIT JUDGE.—$25,500 per year.

MEMBERS.—Three judges: the chief justice, or the associate justice assigned to the circuit, or any circuit or district judge within the circuit, is competent to sit.

United States District Courts:—

NUMBER OF DISTRICTS.—One or more in each state and territory. At present there are eighty-one judicial districts within the United States and the District of Columbia, one each for Hawaii, Puerto Rico, and the Canal Zone, and one for Alaska with four judges sitting in four divisions.

SALARY OF DISTRICT JUDGE.—Fixed by law at $22,500 per year.

United States Court of Claims:—

JURISDICTION.—Claims against the United States, including those referred to it by Congress.

MEMBERS.—One chief justice and four associate justices.

SALARIES.—All justices, $22,500 annually.

United States Court of Customs and Patent Appeals:—

JURISDICTION.—Cases involving appeals from customs duties and from the patent office.

MEMBERS.—One chief justice and four associate justices.

SALARIES.—Fixed by law at $22,500 per year.

CONGRESS

All legislative power granted by the Constitution is intrusted to the "Congress of the United States," which consists of a Senate and a House of Representatives. The number of members of each of these bodies, method of election, term, salary, conditions of eligibility, are given above in tabulated form. Each house of the Congress has some special powers.

The Senate. To the Senate is given the power of ratifying nominations of the president to public office. The Constitution specifically mentions judges of the supreme court and "ambassadors, other public ministers and consuls" for appointment "with the advice and consent of the Senate." The Senate, however, is never formally consulted. It has no right of nomination, but it does at times reject the president's appointments, though rarely in the case of heads of executive departments or "cabinet positions."

Foreign treaties are made "by and with the consent of the Senate, provided two-thirds of the Senators present concur." These two special powers associate the Senate with the president in the determining of foreign policy and in the guidance of foreign relations. Other facts indicate the same intention: the Senate's title, derived from the Roman Senate, which was largely occupied with foreign relations; its constitutional privilege to deliberate behind closed doors or in "executive session"; its relatively small membership; the more mature age of its members and the fact that as a body it "never dies" but is reconstituted gradually. Yet this responsibility for foreign policy has been sparingly and rather negatively exercised by the Senate.

The president is considered to have the sole right of negotiating with representatives of other nations and the Senate has never received either foreign delegates or communications. The president does not formally consult the Senate upon foreign relations, though he generally seeks to maintain touch with Senate opinion through its committee on foreign affairs. The president retains complete control of a treaty until he delivers it to the Senate, and he may even then withdraw it. He is not bound to disclose to the Senate correspondence with foreign states, or even to give information within his possession. For these reasons the president, rather than the Senate, generally determines foreign policy, though subject to the severe limitation of having his treaties rejected. The president also has repeatedly conducted foreign negotiations through "personal representatives," unconfirmed by the Senate, or he may himself negotiate personally and directly, as did President Wilson at Paris.

It may also be noticed that, through the treaty ratifying power, the Senate, with the president, may end war and conclude peace, though only Congress can declare war. For the trial of impeachments, the Senate sits as a judicial body, a concurrence of two-thirds of the members present being necessary for conviction. (Article I, sec. 3, par. 6). The chief justice presides at the impeachment trial of a president.

The vice president of the United States is the constitutional presiding officer of the Senate, but a president *pro tempore* is chosen from among the senators. In presidential elections, in case no person should receive a majority of votes of the electors, the vice president would be chosen by the Senate.

The House of Representatives. The House of Representatives, likewise, has special powers. It alone can vote impeachment and prosecute the trial of an impeached officer. It alone can initiate bills for raising revenue, though such measures are frequently totally altered by the Senate. In case of a failure of a presidential election to give a majority of electors for one person, the House of Representatives is empowered to select the president by ballot, each state casting one ballot.

During the early history of Congress, the House of Representatives appeared to be the more important body and membership in it was preferred to the Senate. Gradually the Senate became the more important body, and the position of senator far exceeded in influence that of representative. This lesser rôle played by the House of Representatives is in striking contrast to the predominant position held by the chambers of deputies in France and Belgium, as contrasted with the senates of those countries.

Powers of Congress. Other than as above stated, the two houses possess equality in legislation. The Constitution limits this legislative faculty, however, to expressly defined fields.

To provide for the raising and disbursement of revenue.
To borrow money; to coin money and to regulate its value; and to fix the standard of weights and measures.
To regulate foreign and interstate commerce.
To declare war, and to maintain an army and a navy.
To establish post offices and post roads.
To enact patent and copyright laws.
To enact uniform naturalization and bankruptcy laws.
To provide for the punishment of crimes against the United States.
To establish courts inferior to the supreme court.
To provide for organizing and calling out the militia.
To admit new states into the Union.
To provide for the government of the territories.
To exercise exclusive jurisdiction over the District of Columbia, public lands, public buildings, forts, and navy yards.
To enact all laws necessary and proper for carrying into execution all the powers vested by the Constitution in the government of the United States.

SPEAKERS OF THE HOUSE

Name	State	Born	Died	Congress	Years
F. A. Muhlenberg	Pa.	1750	1801	1	1789–91
Jonathan Trumbull	Conn.	1740	1809	2	1791–93
F. A. Muhlenberg	Pa.	1750	1801	3	1793–95
Jonathan Dayton	N. J.	1760	1824	4, 5	1795–99
Theo. Sedgwick	Mass.	1746	1813	6	1799–01
Nathaniel Macon	N. C.	1758	1837	7–9	1801–07
Joseph B. Varnum	Mass.	1750	1821	10, 11	1807–11
Henry Clay	Ky.	1777	1852	12, 13	1811–14
Langdon Cheves	S. C.	1776	1857	13	1814–15
Henry Clay	Ky.	1777	1852	14–16	1815–20
John W. Taylor	N. Y.	1784	1854	16	1820–21
Philip P. Barbour	Va.	1783	1841	17	1821–23
Henry Clay	Ky.	1777	1852	18	1823–25
John W. Taylor	N. Y.	1784	1854	19	1825–27
Andrew Stevenson	Va.	1784	1857	20–23	1827–34
John Bell	Tenn.	1797	1869	23	1834–35
James K. Polk	Tenn.	1795	1849	24, 25	1835–39
R. M. T. Hunter	Va.	1809	1887	26	1839–41
John White	Ky.	1805	1845	27	1841–43
John W. Jones	Va.	1791	1848	28	1843–45
John W. Davis	Ind.	1799	1859	29	1845–47
Robert C. Winthrop	Mass.	1809	1894	30	1847–49
Howell Cobb	Ga.	1815	1868	31	1849–51
Linn Boyd	Ky.	1800	1859	32, 33	1851–55
Nathaniel P. Banks	Mass.	1816	1894	34	1855–57
James L. Orr	S. C.	1822	1873	35	1857–59
Wm. Pennington	N. J.	1796	1862	36	1859–61
Galusha A. Grow	Pa.	1823	1907	37	1861–63
Schuyler Colfax	Ind.	1823	1885	38–40	1863–69
James G. Blaine	Me.	1830	1893	41–43	1869–75
Michael C. Kerr	Ind.	1827	1876	44	1875–76
Samuel J. Randall	Pa.	1828	1890	44–46	1876–81
Joseph W. Keifer	Ohio	1836	1932	47	1881–83
John G. Carlisle	Ky.	1835	1910	48–50	1883–89
Thomas B. Reed	Me.	1839	1902	51	1889–91
Charles F. Crisp	Ga.	1845	1896	52, 53	1891–95
Thomas B. Reed	Me.	1839	1902	54, 55	1895–99
David B. Henderson	Iowa	1840	1906	56, 57	1899–03
Joseph G. Cannon	Ill.	1836	1926	58–61	1903–11
Champ Clark	Mo.	1850	1921	62–65	1911–19
Fred. H. Gillett	Mass.	1851	1935	66–68	1919–25
Nicholas Longworth	Ohio	1869	1931	69–71	1925–31
John N. Garner	Tex.	1869	....	72	1931–33
Henry T. Rainey	Ill.	1860	1934	73	1933–34
Joseph W. Byrnes	Tenn.	1869	1936	74	1935–36
Wm. B. Bankhead	Ala.	1874	1940	74–76	1936–40
Sam Rayburn	Tex.	1882	....	76–79	1940–46
Joseph W. Martin, Jr.	Mass.	1884	....	80	1947–48
Sam Rayburn	Tex.	1882	....	81–82	1949–53
Joseph W. Martin, Jr.	Mass.	1884	....	83	1953–55
Sam Rayburn	Tex.	1882	....	84	1955–

Interpreted Powers. The practice of legislation has grown and taken on new aspects through the felt necessity of extending the scope of the national government. The supreme court has usually given a liberal interpretation to these powers, especially to the power to regulate interstate commerce and to enact needed laws to carry into execution the powers vested by the constitution in the national government. The court having decided, however, that the Constitution did not give the power to levy a direct tax on incomes, the 16th amendment was adopted in 1913, giving Congress this right.

Limitations on Powers of Congress. The Constitution limits Congress to powers expressly conferred. It also forbids Congress to:

Suspend the writ of habeas corpus unless, in case of rebellion or invasion, the public safety so requires.
Pass any bill of attainder or ex post facto law.
Lay any direct per capita tax, other than an income tax, without apportionment among the states according to population.
Lay any tax or duty on articles exported from any state.
Give any preference to the ports of one state over those of another.
Grant any title of nobility.
Create a new state within the jurisdiction of another state or out of its territory, without the consent of the state.
Make any law respecting the establishment of religion or prohibiting its free exercise.
Abridge the freedom of speech or of the press.
Forbid the right of peaceable assembly.
Forbid the right of petition.
Pass any law for the quartering of soldiers in private houses, without the consent of the owners, in time of peace.
Pass any law providing for unreasonable searches and seizures, or for the issue of warrants without the usual judicial process
Infringe the right to keep and bear arms.
Pass any law providing for the holding of a person for a capital or otherwise infamous crime, unless on presentment and indictment of a grand jury, except in cases arising in the land or naval forces or in the militia when in actual service in time of war or public danger.
Pass any law that would subject a person to being twice put in jeopardy of life or limb or deprive him of life, liberty, or property, without due process of law.
Pass any law taking private property for public use without just compensation.
Pass any law denying or abridging the right of citizens of the United States to vote, by reason of race, color, sex, or previous condition of servitude.
Assume or pay any debt or obligation incurred in aid of rebellion or insurrection against the United States, or to pay any claim for the loss of slaves.
Pass any law denying the rights of an accused person to a speedy and public trial by a jury of the locality where the crime is committed, to be informed of the nature and cause of the accusation against him, to be confronted with the witnesses against him, and to compel witnesses to testify in his favor, and to have the assistance of a counsel.
Pass any law forbidding jury trial for suits at common law, where the value in controversy exceeds twenty dollars.
Pass any law requiring excessive bail or imposing excessive fines or cruel and unusual punishments.

These prohibitions apply to the power of Congress in legislating for the Union. The supreme court has ruled that they do not generally limit the Congress in legislating for dependencies. They are, furthermore, prohibitions on the powers of Congress, not of the states, but the 14th Amendment places certain restrictions on the states.

Enactment of a Law. The process of making laws is long and complex. An understanding of the essential steps in it, however, is necessary for an intelligent grasp of newspaper accounts of the progress of legislation.

Of the numerous steps which a measure may have to pass through before becoming a law, the 16 listed below are the most important. For the sake of simplicity, it will be assumed that the typical bill here traced through Congress originates in the House of Representatives, although all bills except those relating to appropriations may originate also in the Senate. If the Senate acts first on a measure, the rôles of the houses as described here will be reversed. Here are the principal steps:

1. A bill is introduced by an individual Congressman. This step may be preceded by a message from the president recommending action. The message is ordinarily referred to a committee, the chairman of which introduces a bill embodying the proposals. (See *Congressional Committees.*)

2. The bill is referred for study to a standing committee of the House, designated by the speaker.

3. The committee, if it so decides, may take testimony regarding the measure from spokesmen for interested groups, these hearings usually including executive officers of the government.

4. The committee may then report the bill back to the House, with or without amendments and with or without recommendation for enactment. If the committee takes no action, the bill is said to die in committee. The House may, however, discharge the committee from further consideration of the bill and so place the bill on the legislative calendar.

5. If passed, the bill is sent to the Senate.

6. There it is referred to a committee, as in the House.

7. The Senate committee may, at its discretion, report the bill for favorable action, with or without changes, or it may substitute another bill already before it or an entirely new bill on the subject.

8. If the Senate approves the bill as it came from the House, it goes to the president for his signature. If defeated in the Senate, the bill is dead, barring a reconsideration. The third possible action is approval in amended form.

9. In this last case, the bill goes back to the House, which may accept the amendments, thus making it ready for the president's signature.

10. If the House refuses to accept the Senate amendments or makes others which the Senate refuses to accept, the bill "goes to conference." This means that the measure is submitted to a group consisting of 3 or 5 members of the House and the same number of members of the Senate, each panel appointed by the presiding officer of the house represented. The duty of conferees is to reconcile differences in the bill as approved by the two houses.

11. If no agreement is reached, the bill is said to "die in conference." Otherwise the conferees report their agreement to both houses, and the conference report is either sent back for further efforts or is accepted.

12. When the conference report is accepted by both houses, the bill goes to the president.

13. The president may sign the bill, usually after consultation with his advisers. It then becomes a law, and is classified by the secretary of state as public or private, and is given a number.

14. The president may fail to sign the bill after he has had it for ten days, exclusive of Sundays. In that case, it becomes law without his signature, except in one circumstance, which is described below under *Pocket Veto*.

15. The president may return the bill to Congress with a veto.

16. Congress may then repass the bill by two-thirds majorities in both houses. If this is done, the bill becomes law without the president's signature. If either house fails to override the veto by this majority, the bill is dead.

Pocket Veto. This term is popularly applied when the president withholds for ten days his approval of a bill and Congress adjourns before the end of the ten days. Under these circumstances, the bill dies without having been specifically vetoed.

Congressional Committees. These bodies form bottle-necks, as it were, by which the vast majority of bills are kept from consideration by Congress, only those regarded as the most important being allowed to pass through. It is by these committees also that the only genuine study in Congress is made of the need and probable effect of the prospective laws. Partly for this reason, the recommendations of the committees carry great weight with the members of Congress, none of whom ordinarily has had an opportunity to consider the merits of the bills advocated.

Representation of the political parties on committees is in approximate proportion to their strength in the legislative body. The chairman of each committee is always a member of the majority party. It is for this reason that few laws are ever enacted which have not the support of the party in power.

The most powerful committees include the appropriations committee, which handles measures for spending money, and the ways and means committee, which deals with tax bills. Measures from these committees have the right of way at all times. The power to give preferential places on the calendar to other bills rests with the committee on rules. The so-called steering committee is made up of leaders of the majority party only. Its purpose is to hasten legislation favored by the party in power.

Kinds of Congressional Action. Bills are measures which, on approval, become acts. Resolutions represent Congressional action of a "non-legislative" character. Senate resolutions and House resolutions require action by one house only. Concurrent resolutions require approval by both houses but not by the president. Joint, or public, resolutions require the same procedure as bills. They are frequently indistinguishable from bills except in form and name.

THE PRESIDENT

The president of the United States is the highest representative of the nation. Elected by the suffrage of the voters of all the states for a fixed term of years, he is independent of Congress, the courts, and sectional demands. In spite of the theory of separation of powers, in accordance with which the constitution-makers created the office, the president has immense influence over legislation and is held responsible by the people for the work of Congress.

The president's influence springs from his power of veto; from his constitutional practice of submitting recommendations to Congress, which he may do either orally, in the presence of both houses, or by written message; and from his vast influence with the nation as the molder of public opinion. His power of appointment, with his ability to distribute "patronage" among members of Congress, serves to keep the members who are of his party in accord with his policies.

The National Leader. While dependent on his party for nomination and support, he is the recognized national leader of his party and frequently dominates its views and controls its organization. He is, moreover, the head of the entire national administration. Members of Congress, the president, and the vice president are the only elected officers of the United States. All others are appointed by the president or by heads of departments under his control. The president's removal power extends to nearly all offices, except the judicial or quasi judicial. In 1926, the Supreme Court in the case of *Myers v. U. S.* upheld the president's removal power over an office given fixed tenure by Congress.

Powers of President. The president is the commander in chief of the army and of the navy, with the right to determine their employment and to dispatch armed forces upon foreign missions. While Congress alone can legally declare war, the president has repeatedly, of his own authority, used the army or navy in acts of warfare and for hostile invasion. On his will and judgment, more even than on the attitude of Congress, seems to rest the momentous decision of peace and of war. By his direction the attorney-general undertakes judicial investigations and prosecutions. These may be suspended or abandoned by the president's direction. He may grant pardon to convicted persons, and amnesty to political prisoners or to those in rebellion. He may commute or suspend sentences after conviction or during the trial itself.

The Cabinet. The cabinet, or conference of heads of departments, meets solely to advise with the president and may not with propriety assemble without his presence. Its views are purely consultative and in no manner bind his freedom of decision. He may at any time direct the action of the head of a department, and in the field of foreign relations frequently does so, and may alter or reverse a department's decision.

Disability of President. The president remains in office, irrespective of the attitude of Congress or of the support of the nation, until the end of his term, or until his death in office. The Constitution provides that, in case of the disability of the president, the vice president may act; but no procedure is laid down for determining the president's disability, and, while more than one president has suffered long and prostrating illness, no vice president has ever assumed office during the president's lifetime.

Place of Power. The official actions of the president need not be taken at the national capital. He may exercise any power at any place within the country or even while abroad. For more than a century no president left the national territory during his term of office, but this tradition has been broken by presidents in recent years without legally impairing their position or their actions.

Impeachment of President. There is no way of disciplining the president except by impeachment; and, while this method was once attempted (1868, Andrew Johnson), it was unsuccessful, more than one-third of the members of the Senate present at

the trial having refused to vote for conviction. Furthermore, while Federal courts have in certain instances directed writs against heads of departments, such writs apparently cannot be issued against the president himself nor can his actions thus be judicially reviewed.

Authority in Crises. During war time, the president becomes virtually a national dictator, concentrating in his office the strength and the will of the nation. It may be observed, however, that, while Congress and the nation have given unreserved support and authority to the president during war, they have jealously limited him in the arrangement of peace. In the economic crisis in 1933, the president was granted powers in many respects even greater than those given in time of war.

Magnitude of Power. Reviewing the office of president in the light of other national executives, it is probably correct to say that it exceeds all other modern offices in the breadth of its powers and in the respect which it commands. Since the term of Washington, it has steadily grown in independence and in influence. It has gained many functions and has surrendered none. It appears to reflect the American preference for strong, responsible, unified, executive authority. The extension of the powers of Congress has been repeatedly resisted. For many years there has been opposition to the review power of the supreme court and advocacy of its reconstitution. But no movement has succeeded in diminishing the office of the president.

Furthermore, it may be added that no president has been tempted to the gross abuse of his power; no financial scandal has ever besmirched the chief executive, nor has any president carried into private life the ambition illegally to prolong or unconstitutionally to regain his vast authority. The keen and unrelaxing public interest which surrounds the office, the light of publicity which beats upon it, the force of the great traditions which attach to it, and the sobering effect of its occupancy have sufficed to keep the American president responsible to the Constitution and to the will of the nation.

THE EXECUTIVE DEPARTMENTS

These are now ten in number. All have been established by acts of Congress. The heads of the departments constitute the president's cabinet. The departments with the dates of their establishment are as follows: State (1789), Treasury (1789); Post Office (head admitted to the cabinet 1829), Interior (1849); Justice (1870); Agriculture (1889); Commerce (1903); Labor (1913); Defense (1947); Health, Education and Welfare (1953). With the exception of the attorney-general and the postmaster-general, department heads are usually called "secretary."

Heads of Departments. The departments have from one to several assistant secretaries and a chief clerk. They are divided into bureaus and divisions, each with a single head known as "director" or "commissioner," "chief," etc. Subject always to his subordination to the president, who appoints and may at any time remove him, and who is politically responsible for his official acts, a department head directs the entire service under him; appoints and removes many subordinate officials; issues "regulations" governing the administrative work; and decides a variety of disputes or controversies arising from the actions of his subordinates.

In many cases the decision of the department head is final, though in others there is appeal to the president. The list of bureaus and of other divisions as fixed by statute is given in a tabulated form below, together with the list of department heads and the years of their service. In spite of the possession of a number of important dependencies, there is no department corresponding to the ministry of colonies in other governments. The department of the interior supervises the Virgin Islands, Guam, and Tutuila (Samoa). Alaska and Hawaii are partly supervised by the Department of the Interior, though other departments are represented. The Panama Canal Zone is under army direction.

In 1949, a commission, headed by ex-president Hoover, made a series of reports on the reorganization of the whole executive department, with recommendations for its administrative improvement.

THE DEPARTMENT OF STATE

The secretary of state, in event of the death of the president, is fourth in the line of presidential succession. Thus far, no secretary of state has been called to fill this place. All treaties are negotiated by the secretary of state, who often conducts the discussions in person, through interviews with foreign representatives. The secretary, under the direction of the president, is charged with the duties of correspondence with ministers and consuls of the United States, and with representatives of foreign powers accredited to the United States. He is charged also with negotiations of whatever character relating to foreign affairs.

The secretary of state is also the regular medium of communication between the president and the governors of the several states of the United States. He has certain functions relating to presidential elections, such as receiving from the governors of the states the certification of appointment of presidential electors, and the receipt and the transmission to Congress of any challenge of the ballot as reported. He has the custody of the Great Seal of the United States, and countersigns and affixes the seal to all executive proclamations.

He is also custodian of the treaties made with foreign states, and of the laws of the United States. He grants and issues passports. Exequaturs (formal recognitions of power to act) to foreign consuls in the United States are issued through his office. He publishes the laws and resolutions of Congress, amendments to the constitution, and proclamations declaring admission of new states.

SECRETARIES OF STATE

Presidents	Cabinet Officers	Residences	Appointed
Washington	Thomas Jefferson	Va.	1789
Washington	Edmund Randolph	Va.	1794
Washington	Timothy Pickering	Mass.	1795
Adams	Timothy Pickering	Mass.	1797
Adams	John Marshall	Va.	1800
Jefferson	James Madison	Va.	1801
Madison	Robert Smith	Md.	1809
Madison	James Monroe	Va.	1811
Monroe	John Quincy Adams	Mass.	1817
J. Q. Adams	Henry Clay	Ky.	1825
Jackson	Martin Van Buren	N. Y.	1829
Jackson	Edward Livingston	La.	1831
Jackson	Louis McLane	Del.	1833
Jackson	John Forsyth	Ga.	1834
Van Buren	John Forsyth	Ga.	1837
Harrison	Daniel Webster	Mass.	1841
Tyler	Daniel Webster	Mass.	1841
Tyler	Hugh S. Legaré	S. C.	1843
Tyler	Abel P. Upshur	Va.	1843
Tyler	John C. Calhoun	S. C.	1844
Polk	James Buchanan	Pa.	1845
Taylor	John M. Clayton	Del.	1849
Fillmore	Daniel Webster	Mass.	1850
Fillmore	Edward Everett	Mass.	1852
Pierce	William L. Marcy	N. Y.	1853
Buchanan	Lewis Cass	Mich.	1857
Buchanan	Jeremiah S. Black	Pa.	1860
Lincoln	William H. Seward	N. Y.	1861
Johnson	William H. Seward	N. Y.	1865
Grant	Elihu B. Washburn	Ill.	1869
Grant	Hamilton Fish	N. Y.	1869
Hayes	William M. Evarts	N. Y.	1877
Garfield	James G. Blaine	Me.	1881
Arthur	F. T. Frelinghuysen	N. J.	1881
Cleveland	Thomas F. Bayard	Del.	1885
B. Harrison	James G. Blaine	Me.	1889
B. Harrison	John W. Foster	Ind.	1892
Cleveland	Walter Q. Gresham	Ill.	1893
Cleveland	Richard Olney	Mass.	1895
McKinley	John Sherman	Ohio	1897
McKinley	William R. Day	Ohio	1898
McKinley	John Hay	Ohio	1898
T. Roosevelt	John Hay	Ohio	1901
T. Roosevelt	Elihu Root	N. Y.	1905

SECRETARIES OF STATE—Con.

PRESIDENTS	Cabinet Officers	Residences	Appointed
T. Roosevelt	Robert Bacon	N. Y.	1909
Taft	Philander C. Knox	Pa.	1909
Wilson	William J. Bryan	Nebr.	1913
Wilson	Robert Lansing	N. Y.	1915
Wilson	Bainbridge Colby	N. Y.	1920
Harding	Charles E. Hughes	N. Y.	1921
Coolidge	Charles E. Hughes	N. Y.	1923
Coolidge	Frank B. Kellogg	Minn.	1925
Hoover	Frank B. Kellogg	Minn.	1929
Hoover	Henry L. Stimson	N. Y.	1929
F. D. Roosevelt	Cordell Hull	Tenn.	1933
F. D. Roosevelt	Edward R. Stettinius	N. Y.	1944
Truman	Edward R. Stettinius	N. Y.	1945
Truman	James F. Byrnes	S. C.	1945
Truman	George C. Marshall	Pa.	1947
Truman	Dean G. Acheson	Md.	1949
Eisenhower	John Foster Dulles	N. Y.	1953

THE DEPARTMENT OF DEFENSE

This department was established by the act of July 26, 1947, creating the National Military Establishment, with the object of unifying our armed forces. At its head is the Secretary of Defense. Subordinate to him are the Secretaries of the Army, the Navy, and the Air Force, who are not of cabinet rank, but have direct access to the president. The department takes over the duties of the war and navy departments, and the air force.

SECRETARIES OF DEFENSE

PRESIDENTS	Cabinet Officers	Residences	Appointed
Truman	James Forrestal	N. Y.	1947
Truman	Louis A. Johnson	W. Va.	1949
Truman	George C. Marshall	Pa.	1950
Truman	Robert A. Lovett	N. Y.	1951
Eisenhower	Charles E. Wilson	Mich.	1953

The following are the Secretaries of the Army, the Navy, and the Air Force appointed since these departments were consolidated into the Department of Defense under a single cabinet member.

Secretaries of the Army. Kenneth C. Royall, 1947; Gordon Gray, 1949; Frank Pace, Jr., 1950; Earl D. Johnson (acting), 1953; Robert T. Stevens, 1953; Wilbur M. Brucker, 1955.

Secretaries of the Navy. John L. Sullivan, 1947; Francis P. Matthews, 1949; Dan A. Kimball, 1951; Robert B. Anderson, 1953; Charles S. Thomas, 1954; Thomas S. Gates, Jr., 1957.

Secretaries of the Air Force. W. Stuart Symington, 1947; Thomas K. Finletter, 1950; Harold E. Talbot, 1953; Donald A. Quarles, 1955.

The War Department. Before 1947, the Secretary of War, a civilian, had charge of estimates, purchases, and expenditures for the army; and supervised military education, fortifications, and the Panama Canal Zone. He had charge also of river and harbor improvements, and of military posts. The department was created in 1789.

SECRETARIES OF WAR

PRESIDENTS	Cabinet Officers	Residences	Appointed
Washington	Henry Knox	Mass.	1789
Washington	Timothy Pickering	Mass.	1795
Washington	James McHenry	Md.	1796
Adams	James McHenry	Md.	1797
Adams	Samuel Dexter	Mass.	1800
Adams	Roger Griswold	Conn.	1801
Jefferson	Henry Dearborn	Mass.	1801
Madison	William Eustis	Mass.	1809
Madison	John Armstrong	N. Y.	1813
Madison	James Monroe	Va.	1814
Madison	William H. Crawford	Ga.	1815
Monroe	John C. Calhoun	S. C.	1817
J. Q. Adams	James Barbour	Va.	1825
J. Q. Adams	Peter B. Porter	N. Y.	1828
Jackson	John H. Eaton	Tenn.	1829
Jackson	Lewis Cass	Ohio	1831
Jackson	Benjamin F. Butler	N. Y.	1836
Van Buren	Joel R. Poinsett	S. C.	1837
Harrison	John Bell	Tenn.	1841
Tyler	John Bell	Tenn.	1841

SECRETARIES OF WAR—Con.

PRESIDENTS	Cabinet Officers	Residences	Appointed
Tyler	John C. Spencer	N. Y.	1841
Tyler	James M. Porter	Pa.	1843
Tyler	William Wilkins	Pa.	1844
Polk	William L. Marcy	N. Y.	1845
Taylor	George W. Crawford	Ga.	1849
Fillmore	Charles M. Conrad	La.	1850
Pierce	Jefferson Davis	Miss.	1853
Buchanan	John B. Floyd	Va.	1857
Buchanan	Joseph Holt	Ky.	1861
Lincoln	Simon Cameron	Pa.	1861
Lincoln	Edwin M. Stanton	Ohio	1862
Johnson	Edwin M. Stanton	Ohio	1865
Johnson	U. S. Grant (*ad in.*)	Ill.	1867
Johnson	Lor. Thomas (*ad in*)	Del.	1868
Johnson	John M. Schofield	N. Y.	1868
Grant	John A. Rawlins	Ill.	1869
Grant	William W. Belknap	Ia.	1869
Grant	Alphonso Taft	Ohio	1876
Grant	James Don. Cameron	Pa.	1876
Hayes	George W. McCrary	Ia.	1877
Hayes	Alexander Ramsey	Minn.	1879
Garfield	Robert T. Lincoln	Ill.	1881
Arthur	Robert T. Lincoln	Ill.	1881
Cleveland	William C. Endicott	Mass.	1885
B. Harrison	Redfield Proctor	Vt.	1889
B. Harrison	Stephen B. Elkins	W. Va.	1891
Cleveland	Daniel S. Lamont	N. Y.	1893
McKinley	Russell A. Alger	Mich.	1897
McKinley	Elihu Root	N. Y.	1899
T. Roosevelt	Elihu Root	N. Y.	1901
T. Roosevelt	William H. Taft	Ohio	1904
T. Roosevelt	Luke E. Wright	Tenn.	1908
Taft	J. M. Dickinson	Tenn.	1909
Taft	Henry L. Stimson	N. Y.	1911
Wilson	Lindley M. Garrison	N. J.	1913
Wilson	Newton D. Baker	Ohio	1916
Harding	John W. Weeks	Mass.	1921
Coolidge	John W. Weeks	Mass.	1923
Coolidge	Dwight F. Davis	Mo.	1925
Hoover	James W. Good	Ill.	1929
Hoover	Patrick J. Hurley	Okla.	1929
F. D. Roosevelt	George H. Dern	Utah	1933
F. D. Roosevelt	Harry W. Woodring	Kansas	1936
F. D. Roosevelt	Henry L. Stimson	N. Y.	1940
Truman	Henry L. Stimson	N. Y.	1945
Truman	Robert P. Patterson	N. Y.	1945
Truman	Kenneth C. Royall	N. C.	1947

DEPARTMENT OF THE NAVY

By the act of July 26, 1947, the navy department, which was originally established in 1798, was merged in the department of defense. It is headed by a civilian secretary, not of cabinet rank. The secretary has general superintendence of the construction, manning, armament, equipment, and employment of vessels of war and of the operation of the naval bases, shipyards, and training stations.

Among other duties of the department of the navy are the preparation of hydrographic maps covering foreign waters and the high seas; operation of the naval observatory and broadcasting of time signals 20 times daily; and supervision of naval aeronautics.

SECRETARIES OF THE NAVY

PRESIDENTS	Cabinet Officers	Residences	Appointed
Adams	Benjamin Stoddert	Md.	1798
Jefferson	Benjamin Stoddert	Md.	1801
Jefferson	Robert Smith	Md.	1801
Jefferson	Jacob Crowninshield	Mass.	1805
Madison	Paul Hamilton	S. C.	1809
Madison	William Jones	Pa.	1813
Madison	B. W. Crowninshield	Mass.	1814
Monroe	B. W. Crowninshield	Mass.	1817
Monroe	Smith Thompson	N. Y.	1818
Monroe	Samuel L. Southard	N. J.	1823
J. Q. Adams	Samuel L. Southard	N. J.	1825
Jackson	John Branch	N. C.	1829
Jackson	Levi Woodbury	N. H.	1831
Jackson	Mahlon Dickerson	N. J.	1834
Van Buren	Mahlon Dickerson	N. J.	1837
Van Buren	James K. Paulding	N. Y.	1838
Harrison	George E. Badger	N. C.	1841
Tyler	George E. Badger	N. C.	1841
Tyler	Abel P. Upshur	Va.	1841
Tyler	David Henshaw	Mass.	1843
Tyler	Thomas W. Gilmer	Va.	1844

SECRETARIES OF THE NAVY—Con.

Presidents	Cabinet Officers	Residences	Appointed
Tyler	John Y. Mason	Va.	1844
Polk	George Bancroft	Mass.	1845
Polk	John Y. Mason	Va.	1846
Taylor	William B. Preston	Va.	1849
Fillmore	William A. Graham	N. C.	1850
Fillmore	John P. Kennedy	Md.	1852
Pierce	James C. Dobbin	N. C.	1853
Buchanan	Isaac Toucey	Conn.	1857
Lincoln	Gideon Welles	Conn.	1861
Johnson	Gideon Welles	Conn.	1865
Grant	Adolph E. Borie	Pa.	1869
Grant	George M. Robeson	N. J.	1869
Hayes	Richard W. Thompson	Ind.	1877
Hayes	Nathan Goff, Jr.	W. Va.	1881
Garfield	William H. Hunt	La.	1881
Arthur	William E. Chandler	N. H.	1882
Cleveland	William C. Whitney	N. Y.	1885
B. Harrison	Benjamin F. Tracy	N. Y.	1889
Cleveland	Hilary A. Herbert	Ala.	1893
McKinley	John D. Long	Mass.	1897
T. Roosevelt	John D. Long	Mass.	1901
T. Roosevelt	William H. Moody	Mass.	1902
T. Roosevelt	Paul Morton	N. Y.	1904
T. Roosevelt	Charles J. Bonaparte	Md.	1905
T. Roosevelt	Victor H. Metcalf	Cal.	1906
T. Roosevelt	Truman H. Newberry	Mich.	1908
Taft	George von L. Meyer	Mass.	1909
Wilson	Josephus Daniels	N. C.	1913
Harding	Edwin Denby	Mich.	1921
Coolidge	Edwin Denby	Mich.	1923
Coolidge	Curtis D. Wilbur	Cal.	1924
Hoover	Charles F. Adams	Mass.	1929
F. D. Roosevelt	Claude A. Swanson	Va.	1933
F. D. Roosevelt	Charles Edison	N. J.	1940
F. D. Roosevelt	Frank Knox	Ill.	1940
F. D. Roosevelt	James Forrestal	N. Y.	1944
Truman	James Forrestal	N. Y.	1945

THE DEPARTMENT OF THE TREASURY

The secretary of the treasury is charged by law with the management of the national finances. He prepares plans for the improvement of the revenues and for the support of the public credit, including the issuing of government bonds and treasury certificates; superintends the collection of customs and the internal revenue, including income taxes and taxes on tobacco and other commodities or articles; directs the forms of keeping and rendering public accounts and of making returns; grants warrants for all moneys drawn from the treasury.

This department also handles the planning, construction, and maintenance of public buildings. It coins metallic money and engraves and prints the paper currency; directs the coast guard service, and the suppression of illicit traffic in narcotics.

An annual estimate of revenues and expenses of the government is prepared by the treasury department for presentation to Congress by the president. The secretary is, *ex officio*, the presiding officer of the Federal Reserve Board. He reports annually to Congress.

SECRETARIES OF THE TREASURY

Presidents	Cabinet Officers	Residences	Appointed
Washington	Alexander Hamilton	N. Y.	1789
Washington	Oliver Wolcott	Conn.	1795
Adams	Oliver Wolcott	Conn.	1797
Adams	Samuel Dexter	Mass.	1801
Jefferson	Samuel Dexter	Mass.	1801
Jefferson	Albert Gallatin	Pa.	1801
Madison	Albert Gallatin	Pa.	1809
Madison	George W. Campbell	Tenn.	1814
Madison	Alexander J. Dallas	Pa.	1814
Madison	William H. Crawford	Ga.	1816
Monroe	William H. Crawford	Ga.	1817
J. Q. Adams	Richard Rush	Pa.	1825
Jackson	Samuel D. Ingham	Pa.	1829
Jackson	Louis McLane	Del.	1831
Jackson	William J. Duane	Pa.	1833
Jackson	Roger B. Taney	Md.	1833
Jackson	Levi Woodbury	N. H.	1834
Van Buren	Levi Woodbury	N. H.	1837
Harrison	Thomas Ewing	Ohio	1841
Tyler	Thomas Ewing	Ohio	1841
Tyler	Walter Forward	Pa.	1841
Tyler	John C. Spencer	N. Y.	1843

SECRETARIES OF THE TREASURY—Con.

Presidents	Cabinet Officers	Residences	Appointed
Tyler	George M. Bibb	Ky.	1844
Polk	Robert J. Walker	Miss.	1845
Taylor	William M. Meredith	Pa.	1849
Fillmore	Thomas Corwin	Ohio	1850
Pierce	James Guthrie	Ky.	1853
Buchanan	Howell Cobb	Ga.	1857
Buchanan	Philip F. Thomas	Md.	1860
Buchanan	John A. Dix	N. Y.	1861
Lincoln	Salmon P. Chase	Ohio	1861
Lincoln	William P. Fessenden	Me.	1864
Lincoln	Hugh McCulloch	Ind.	1865
Johnson	Hugh McCulloch	Ind.	1865
Grant	George S. Boutwell	Mass.	1869
Grant	Wm. A. Richardson	Mass.	1873
Grant	Benjamin H. Bristow	Ky.	1874
Grant	Lot M. Morrill	Me.	1876
Hayes	John Sherman	Ohio	1877
Garfield	William Windom	Minn.	1881
Arthur	Charles J. Folger	N. Y.	1881
Arthur	Walter Q. Gresham	Ind.	1884
Arthur	Hugh McCulloch	Ind.	1884
Cleveland	Daniel Manning	N. Y.	1885
Cleveland	Charles S. Fairchild	N. Y.	1887
B. Harrison	William Windom	Minn.	1889
B. Harrison	Charles Foster	Ohio	1891
Cleveland	John G. Carlisle	Ky.	1893
McKinley	Lyman J. Gage	Ill.	1897
T. Roosevelt	Lyman J. Gage	Ill.	1901
T. Roosevelt	Leslie M. Shaw	Ia.	1902
T. Roosevelt	George B. Cortelyou	N. Y.	1907
Taft	Franklin MacVeagh	Ill.	1909
Wilson	William G. McAdoo	N. Y.	1913
Wilson	Carter Glass	Va.	1918
Wilson	David F. Houston	Mo.	1920
Harding	Andrew W. Mellon	Pa.	1921
Coolidge	Andrew W. Mellon	Pa.	1923
Hoover	Andrew W. Mellon	Pa.	1929
Hoover	Ogden Mills	N. Y.	1932
F. D. Roosevelt	William H. Woodin	N. Y.	1933
F. D. Roosevelt	Henry Morgenthau, Jr.	N. Y.	1934
Truman	Henry Morgenthau, Jr.	N. Y.	1945
Truman	Frederick M. Vinson	Ky.	1945
Truman	John W. Snyder	Mo.	1946
Eisenhower	George M. Humphrey	Ohio	1953

THE GENERAL ACCOUNTING OFFICE

By the act of June 10, 1921, this office under the "comptroller general" was made wholly independent. It has complete and general power of audit over all branches of government except the post office, which has a separate auditing service in its bureau of accounts. The decisions of the comptroller general are final and not subject to review. He is appointed for a term of fifteen years.

DEPARTMENT OF JUSTICE

The attorney-general is head of the department of justice and chief law officer of the government. He directs and controls a large force of attorneys and marshals, not only in the office at Washington, but also in the 85 judicial districts into which the United States and the Territories are divided. He furnishes opinions and interpretations of the laws for the guidance of the president and the heads of executive departments. In the performance of this last duty he may approve and adopt the opinions of his subordinates except upon questions involving the construction of the Constitution, but upon such questions he must give his own opinion. Immigration and naturalization laws, federal prisons and paroles, are administered by this department. The department of justice conducts a bureau of investigation (F.B.I.) to secure evidence against crimes that violate Federal laws and to assist states and localities in law enforcement. It was established in 1908. See *Federal Bureau of Investigation* and *Hoover, J. Edgar*.

ATTORNEYS-GENERAL

Presidents	Cabinet Officers	Residences	Appointed
Washington	Edmund Randolph	Va.	1789
Washington	William Bradford	Pa.	1794
Washington	Charles Lee	Va.	1795

ATTORNEYS-GENERAL

PRESIDENTS	Cabinet Officers	Residences	Appointed
Adams	Charles Lee	Va.	1797
Jefferson	Levi Lincoln	Mass.	1801
Jefferson	John Breckinridge	Ky.	1805
Jefferson	Cæsar A. Rodney	Del.	1807
Madison	Cæsar A. Rodney	Del.	1809
Madison	William Pinkney	Md.	1811
Madison	Richard Rush	Pa.	1814
Monroe	Richard Rush	Pa.	1817
Monroe	William Wirt	Va.	1817
J. Q. Adams	William Wirt	Va.	1825
Jackson	John McP. Berrien	Ga.	1829
Jackson	Roger B. Taney	Md.	1831
Jackson	Benjamin F. Butler	N. Y.	1833
Van Buren	Benjamin F. Butler	N. Y.	1837
Van Buren	Felix Grundy	Tenn.	1838
Van Buren	Henry D. Galpin	Pa.	1840
Harrison	John J. Crittenden	Ky.	1841
Tyler	John J. Crittenden	Ky.	1841
Tyler	Hugh S. Legaré	S. C.	1841
Tyler	John Nelson	Md.	1843
Polk	John Y. Mason	Va.	1845
Polk	Nathan Clifford	Me.	1846
Polk	Isaac Toucey	Conn.	1848
Taylor	Reverdy Johnson	Md.	1849
Fillmore	John J. Crittenden	Ky.	1850
Pierce	Caleb Cushing	Mass.	1853
Buchanan	Jeremiah S. Black	Pa.	1857
Buchanan	Edwin M. Stanton	Ohio	1860
Lincoln	Edward Bates	Mo.	1861
Lincoln	James Speed	Ky.	1864
Johnson	James Speed	Ky.	1865
Johnson	Henry Stanbery	Ohio	1866
Johnson	William M. Evarts	N. Y.	1868
Grant	Ebenezer R. Hoar	Mass.	1869
Grant	Amos T. Ackerman	Ga.	1870
Grant	George H. Williams	Oreg.	1871
Grant	Edwards Pierrepont	N. Y.	1875
Grant	Alphonso Taft	Ohio	1876
Hayes	Charles Devens	Mass.	1877
Garfield	Wayne MacVeagh	Pa.	1881
Arthur	Benjamin H. Brewster	Pa.	1881
Cleveland	Augustus H. Garland	Ark.	1885
B. Harrison	William H. H. Miller	Ind.	1889
Cleveland	Richard Olney	Mass.	1893
Cleveland	Judson Harmon	Ohio	1895
McKinley	Joseph McKenna	Cal.	1897
McKinley	John W. Griggs	N. J.	1898
McKinley	Philander C. Knox	Pa.	1901
Roosevelt	Philander C. Knox	Pa.	1901
Roosevelt	William H. Moody	Mass.	1904
Roosevelt	Charles J. Bonaparte	Md.	1906
Taft	George W. Wickersham	N. Y.	1909
Wilson	James C. McReynolds	Tenn.	1913
Wilson	Thomas W. Gregory	Texas	1914
Wilson	A. Mitchell Palmer	Pa.	1919
Harding	Harry M. Daugherty	Ohio	1921
Coolidge	Harry M. Daugherty	Ohio	1923
Coolidge	Harlan F. Stone	N. Y.	1924
Coolidge	John G. Sargent	Vt.	1925
Hoover	William D. Mitchell	Minn.	1929
F. D. Roosevelt	Homer S. Cummings	Conn.	1933
F. D. Roosevelt	Frank Murphy	Mich.	1939
F. D. Roosevelt	Robert H. Jackson	N. Y.	1940
F. D. Roosevelt	Francis Biddle	Pa.	1941
Truman	Thomas C. Clark	Tex.	1945
Truman	J. Howard McGrath	R. I.	1949
Truman	J. P. McGranery	Pa.	1952
Eisenhower	Herbert Brownell, Jr.	N. Y.	1953

DEPARTMENT OF THE INTERIOR

The secretary of the interior has supervision of public business relating to promotion of the domestic welfare. He oversees the surveying and mapping of the country; improvement and administration of the national parks; irrigation and drainage of land requiring reclamation; the construction and operation of large dams and the disposal of their power.

The department has supervision of Indian affairs, including educational, hygienic, and relief activities on reservations; also with supervising insular affairs, fisheries, and biological surveys. It controls the distribution of appropriations for agricultural colleges and mechanical institutions in the states and territories, for certain hospitals and charitable institutions in the District of Columbia, and for roads and railway transportation in Alaska. In 1950 it took charge of Guam. The secretary supervises the conservation of petroleum resources and collects information on minerals and mining.

SECRETARIES OF THE INTERIOR

PRESIDENTS	Cabinet Officers	Residences	Appointed
Taylor	Thomas Ewing	Ohio	1849
Fillmore	Thos. M. T. McKennan	Pa.	1850
Fillmore	Alexander H. H. Stuart	Va.	1850
Pierce	Robert McClelland	Mich.	1853
Buchanan	Jacob Thompson	Miss.	1857
Lincoln	Caleb B. Smith	Ind.	1861
Lincoln	John P. Usher	Ind.	1863
Johnson	John P. Usher	Ind.	1865
Johnson	James Harlan	Iowa	1865
Johnson	Orville H. Browning	Ill.	1866
Grant	Jacob D. Cox	Ohio	1869
Grant	Columbus Delano	Ohio	1870
Grant	Zachariah Chandler	Mich.	1875
Hayes	Carl Schurz	Mo.	1877
Garfield	Samuel J. Kirkwood	Iowa	1881
Arthur	Henry M. Teller	Colo.	1882
Cleveland	Lucius Q. C. Lamar	Miss.	1885
Cleveland	William F. Vilas	Wis.	1888
B. Harrison	John W. Noble	Mo.	1889
Cleveland	Hoke Smith	Ga.	1893
Cleveland	David R. Francis	Mo.	1896
McKinley	Cornelius N. Bliss	N. Y.	1897
McKinley	Ethan A. Hitchcock	Mo.	1898
T. Roosevelt	Ethan A. Hitchcock	Mo.	1901
T. Roosevelt	James R. Garfield	Ohio	1907
Taft	Richard A. Ballinger	Wash.	1909
Taft	Walter L. Fisher	Ill.	1911
Wilson	Franklin K. Lane	Cal.	1913
Wilson	John Barton Payne	Ill.	1920
Harding	Albert B. Fall	N. M.	1921
Harding	Hubert Work	Colo.	1923
Coolidge	Hubert Work	Colo.	1923
Coolidge	Roy O. West	Ill.	1928
Hoover	Ray L. Wilbur	Cal.	1929
F. D. Roosevelt	Harold L. Ickes	Ill.	1933
Truman	Harold L. Ickes	Ill.	1945
Truman	Julius A. Krug	Wis.	1946
Truman	Oscar L. Chapman	Colo.	1949
Eisenhower	Douglas McKay	Ore.	1953
Eisenhower	Frederick A. Seaton	Nebr.	1956

POST-OFFICE DEPARTMENT

The postmaster-general is the executive head of the Federal postal service. He appoints all officers and employees of the post-office department except the four assistant postmasters-general and the purchasing agent, who are presidential appointees. The postmaster-general is thus the manager of the largest business organization in the nation, employing upwards of 500,000 persons and operating about 41,500 offices. He is also the director of the postal savings system. Having supervision over the transportation of postal matter, including the transmission of money, the department maintains a detective agency to protect property and prosecute persons who use the mails illegally.

Subject to the approval of the president, the postmaster-general makes postal treaties with foreign governments. He also makes contracts for the carrying of mail.

POSTMASTERS-GENERAL

PRESIDENTS	Cabinet Officers	Residences	Appointed
Washington	Samuel Osgood	Mass.	1789
Washington	Timothy Pickering	Mass.	1791
Washington	Joseph Habersham	Ga.	1795
Adams	Joseph Habersham	Ga.	1797
Jefferson	Joseph Habersham	Ga.	1801
Jefferson	Gideon Granger	Conn.	1801
Madison	Gideon Granger	Conn.	1809
Madison	Return J. Meigs, Jr.	Ohio	1814
Monroe	Return J. Meigs, Jr.	Ohio	1817
Monroe	John McLean	Ohio	1823
J. Q. Adams	John McLean	Ohio	1825
Jackson	William T. Barry	Ky.	1829
Jackson	Amos Kendall	Ky.	1835
Van Buren	Amos Kendall	Ky.	1837
Van Buren	John M. Niles	Conn.	1840
Harrison	Francis Granger	N. Y.	1841
Tyler	Francis Granger	N. Y.	1841
Tyler	Charles A. Wickliffe	Ky.	1841

POSTMASTERS-GENERAL—Con.

PRESIDENTS	Cabinet Officers	Residences	Appointed
Polk	Cave Johnson	Tenn.	1845
Taylor	Jacob Collamer	Vt.	1849
Fillmore	Nathan K. Hall	N. Y.	1850
Fillmore	Samuel D. Hubbard	Conn.	1852
Pierce	James Campbell	Pa.	1853
Buchanan	Aaron V. Brown	Tenn.	1857
Buchanan	Joseph Holt	Ky.	1859
Buchanan	Horatio King	Me.	1861
Lincoln	Montgomery Blair	Md.	1861
Lincoln	William Dennison	Ohio	1864
Johnson	William Dennison	Ohio	1865
Johnson	Alexander W. Randall	Wis.	1866
Grant	John A. J. Creswell	Md.	1869
Grant	James W. Marshall	Va.	1874
Grant	Marshall Jewell	Conn.	1874
Grant	James N. Tyner	Ind.	1876
Hayes	David McK. Key	Tenn.	1877
Hayes	Horace Maynard	Tenn.	1880
Garfield	Thomas L. James	N. Y.	1881
Arthur	Timothy O. Howe	Wis.	1881
Arthur	Walter Q. Gresham	Ind.	1883
Arthur	Frank Hatton	Ia.	1884
Cleveland	William F. Vilas	Wis.	1885
Cleveland	Don M. Dickinson	Mich.	1888
B. Harrison	John Wanamaker	Pa.	1889
Cleveland	Wilson S. Bissell	N. Y.	1893
Cleveland	William L. Wilson	W. Va.	1895
McKinley	James A. Gary	Md.	1897
McKinley	Charles Emory Smith	Pa.	1898
Roosevelt	Charles Emory Smith	Pa.	1901
Roosevelt	Henry C. Payne	Wis.	1902
Roosevelt	Robert J. Wynne	Pa.	1904
Roosevelt	George B. Cortelyou	N. Y.	1905
Roosevelt	George von L. Meyer	Mass.	1907
Taft	Frank H. Hitchcock	Mass.	1909
Wilson	Albert S. Burleson	Tex.	1913
Harding	Will H. Hays	Ind.	1921
Harding	Hubert Work	Colo.	1922
Harding	Harry S. New	Ind.	1923
Coolidge	Harry S. New	Ind.	1923
Hoover	Walter F. Brown	Ohio	1929
F. D. Roosevelt	James A. Farley	N. Y.	1933
F. D. Roosevelt	Frank C. Walker	N. Y.	1940
Truman	Robert E. Hannegan	Mo.	1945
Truman	Jesse M. Donaldson	Ill.	1947
Eisenhower	Arthur E. Summerfield	Mich.	1953

THE DEPARTMENT OF AGRICULTURE

The secretary directs all public business relating to agricultural industry. He administers laws on the marketing, subsidizing, and insurance of crops, to avoid alternate surpluses and shortages, to promote soil conservation and insure that the land is used in the best interests of the nation.

The department engages in agricultural research and maintains information services. It works to control plant and animal diseases and to improve crops and livestock. It provides weather reports and crop reports and estimates, and forest services, grants credits to farmers on crops, farms, and cooperatively constructed rural electrification projects.

Other duties include the inspection of packing plants, regulation of rates charged by livestock exchanges and of the operations of markets in agricultural products.

SECRETARIES OF AGRICULTURE

PRESIDENTS	Cabinet Officers	Residences	Appointed
Cleveland	Norman J. Colman	Mo.	1889
B. Harrison	Jeremiah M. Rusk	Wis.	1889
Cleveland	J. Sterling Morton	Nebr.	1893
McKinley	James Wilson	Ia.	1897
T. Roosevelt	James Wilson	Ia.	1901
Taft	James Wilson	Ia.	1909
Wilson	David F. Houston	Mo.	1913
Wilson	Edwin T. Meredith	Ia.	1920
Harding	Henry C. Wallace	Ia.	1921
Coolidge	Henry C. Wallace	Ia.	1923
Coolidge	Howard M. Gore	W. Va.	1924
Coolidge	W. M. Jardine	Kans.	1925
Hoover	Arthur M. Hyde	Mo.	1929
F. D. Roosevelt	Henry A. Wallace	Ia.	1933
F. D. Roosevelt	Claude R. Wickard	Ind.	1940
Truman	Clinton P. Anderson	N. M.	1945
Truman	Charles F. Brannan	Colo.	1948
Eisenhower	Ezra T. Benson	Utah	1953

DEPARTMENT OF COMMERCE

The secretary of commerce is charged with the promotion of the commerce of the United States and with the promotion of its manufacturing, shipping, fishing, and transportation interests. It is his duty to investigate the organization and management of corporations engaged in interstate commerce (except railroads). He is charged with the enforcement of laws for the protection of life and property on the water.

The department also has the supervision of the Alaskan fur seal industry; patents; the custody, construction, maintenance, and application of standards of weights and measurements; the gathering and distribution of information upon industries and markets. Other important services are the collection and publication of statistical information; the making of coast and geodetic surveys; the encouragement of standardization in manufacture; the weather bureau; and, in conjunction with other departments, the enforcement of the food and drug act of 1906 and the insecticide act of 1910.

The department is charged also with responsibility for developing civil aeronautics. Pilots are licensed, commercial planes are certified, landing fields and equipment are maintained.

SECRETARIES OF COMMERCE *

PRESIDENTS	Cabinet Officers	Residences	Appointed
T. Roosevelt	George B. Cortelyou	N. Y.	1903
T. Roosevelt	Victor H. Metcalf	Cal.	1904
T. Roosevelt	Oscar S. Straus	N. Y.	1906
Taft	Charles Nagel	Mo.	1909
Wilson	William C. Redfield	N. Y.	1913
Wilson	Joshua W. Alexander	Mo.	1919
Harding	Herbert C. Hoover	Cal.	1921
Coolidge	Herbert C. Hoover	Cal.	1923
Coolidge	William F. Whiting	Mass.	1928
Hoover	Robert P. Lamont	Ill.	1929
Hoover	Roy D. Chapin	Mich.	1932
F. D. Roosevelt	Daniel C. Roper	S. C.	1933
F. D. Roosevelt	Harry Hopkins	Iowa	1939
F. D. Roosevelt	Jesse Jones	Tex.	1940
F. D. Roosevelt	Henry A. Wallace	Iowa	1945
Truman	Henry A. Wallace	Iowa	1945
Truman	W. Averell Harriman	N. Y.	1946
Truman	Charles W. Sawyer	Ohio	1948
Eisenhower	Sinclair Weeks	Mass.	1953

*Prior to 1913 these officers were known as Secretaries of Commerce and Labor.

DEPARTMENT OF LABOR

The secretary of labor is charged with the duty of fostering, promoting, and developing the welfare of wage earners, improving their working conditions, and advancing their opportunities for profitable employment. He administrates and assists in the enforcement of the Fair Labor Standards act. He also gathers and publishes data on labor conditions and controversies abroad.

In addition, the secretary of labor makes available information on the cost of living and the extent of employment and pay rolls in industry and trade. The department is charged also with conduct of the national employment offices.

The secretary of labor also takes the initiative in seeking co-operation with state legislatures for promotion of labor's welfare.

SECRETARIES OF LABOR

PRESIDENTS	Cabinet Officers	Residences	Appointed
Wilson	William B. Wilson	Pa.	1913
Harding	James J. Davis	Pa.	1921
Coolidge	James J. Davis	Pa.	1923
Hoover	James J. Davis	Pa.	1929
Hoover	William N. Doak	Va.	1930
F. D. Roosevelt	Frances Perkins	N. Y.	1933
Truman	Lewis B. Schwellenbach	Wash.	1945
Truman	Maurice J. Tobin	Mass.	1948
Eisenhower	Martin P. Durkin	Ill.	1953
Eisenhower	James P. Mitchell	N. J.	1953

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

The secretary of this department supervises the extension work of the Public Health Service in the field of medical research and in the maintenance of hospitals for seamen. Through the Office of Education, which makes studies in education, the secretary allots funds to land grant colleges, and manages the teacher-student exchange program with other countries. The functions of the department also include oversight of the Social Security Administration in caring for and distributing old-age pension and other welfare funds.

SECRETARIES OF HEALTH, EDUCATION AND WELFARE

PRESIDENTS	[Cabinet Officers	Residences	Appointed
Eisenhower	Oveta Culp Hobby	Tex.	1953
Eisenhower	Marion B. Folsom	N.Y.	1955

FEDERAL AGENCIES AND COMMISSIONS

Outside of the executive departments, a large and growing number of important functions of the government are entrusted to boards or commissions. In these bodies, the theoretical division between legislative, executive, and judicial departments breaks down. A commission, for instance, may be required first to promulgate rules having the force of law, then to enforce the rules and finally to render decisions on whether alleged violators have actually broken the rules. It thus exercises, within limits, functions usually performed by Congress, president, and courts. The complexity of modern conditions and the need for regulating them have made necessary this compromise on the principles of the Constitution.

Such commissions are ordinarily established by Congress although the president also may appoint them under authority granted by Congress. Members of those established by Congress are appointed by the president subject usually to the consent of the Senate. When the terms of members are fixed by law the president may not remove a member before the expiration of his term. Otherwise he may do so at his discretion. Appeal from decisions of those commissions having judicial powers lies with the circuit court of appeals and the supreme court.

In order to systematize the numerous new bodies, Congress passed the reorganization act of 1939, under which the president might transfer them, with certain exceptions, into regular departments or group them into agencies similar in nature to departments. All such transfers would become effective within 60 days after the submission to Congress of a plan outlining them, provided Congress had not meanwhile passed a resolution disapproving the plan.

As a result of plans which became effective in 1939, three new composite agencies were set up, namely, the Federal Security Agency, Federal Works Agency, and the Federal Loan Agency.

Federal Loan Agency. The purpose of this body is to coordinate the work of bodies making or insuring federal loans. These bodies include the reconstruction finance corporation, organized to make emergency loans to industry, and the Federal housing administration, which insures loans on urban residences.

Agencies exempted from the scope of the reorganization act include all those described below, with the exception of the Smithsonian Institution and the national Munitions Control Board. Other exempt agencies are treated in other parts of this volume as shown in the index. They include the Federal Deposit Insurance Corporation, the Federal Reserve Board, the National Labor Relations Board, the National Mediation Board, and the Securities Exchange Commission. See the index also for the Tennessee Valley Authority.

Civil Service Commission. The commission was created by the Civil Service act of 1883, and consists of three members, not more than two of whom shall belong to the same political party. The members are appointed by the president, with the consent of the Senate. The objects of the act are to introduce the principle of merit into government appointments, to give security of tenure against political influence, and to protect employees against demands for financial contributions to party funds. With the approval of the president, the commission classifies the public service into various grades and conducts examinations for determining the eligibility of applicants for appointment. It certifies such eligibles, the highest three being preferred, to the appointing authority. It keeps service records of employees, and may make comment upon charges of inefficiency or ill conduct preferred against any public employee.

Federal Communications Commission. This body was created under an act approved June 19, 1934. Its duty is to supervise, and safeguard the public interest in, interstate communications, including radio and television, telegraph, and telephone. It licenses broadcasting stations, assigns wave lengths for their use, and promulgates rules regarding programs and speeches. In regard to telephone and telegraph companies, it is empowered to issue rules and to make investigations covering, among other things, the reasonableness of charges for interstate or foreign messages.

Federal Power Commission. Created by the Federal Water Power act of 1920, this commission licenses hydroelectric developments on navigable streams and values investment made as a guide to possible government purchase at the expiration of the license period, which is 50 years. Its authority was enlarged in 1935 to include regulation of interstate transmission of electricity, sale and purchase of properties by utility companies engaged in interstate commerce, and the right of individuals to hold offices in related companies. Its wide investigative powers are placed at the service of state regulatory bodies desiring to make use of them.

Federal Trade Commission. Created by an act of September 26, 1914. It is composed of five members appointed by the president, with the consent of the Senate, for a term of seven years. It has the duty of supervising and regulating corporations, partnerships, or persons engaged in interstate commerce other than those under the jurisdiction of the interstate commerce commission. Its main purpose was to create a body to deal administratively and judicially with trusts and unfair and illegal competitive practices, as these are defined by law, and particularly by the Sherman act of 1890 and the Clayton act of 1914.

The commission also is empowered to gather and to publish information and to require corporations under its jurisdiction to file reports and accounts. On application of the attorney-general it may recommend adjustments of the business of corporations to bring it within requirements of the law. The commission's mandates are known as "cease and desist orders". In practice corporations against which issuance of such orders are contemplated may give assurances that the practices complained of will be discontinued, a procedure followed in the vast majority of cases.

The commission's duties were enlarged in 1936 to include enforcement of an act forbidding price discrimination by manufacturers and wholesalers among their customers. The law authorizes the commission to set limits to price discounts on the basis of quantity and forbids discriminatory rebates and advertising allowances. The Wheeler-Lea act of 1938 strengthened its enforcement powers and charged it with preventing deceptive as well as unfair practices.

Interstate Commerce Commission. Created by an act of February 4, 1887, the powers and scope of the commission have been increased by later legislation. Among the important amendatory enact-

ments are the act of March 2, 1889; the Elkins act, February 19, 1903; the Hepburn act, June 29, 1906; the Mann-Elkins act, July 18, 1910; the acts of August 24, 1912, and May 29, and August 9, 1917; and the Transportation act of 1920. The members of the commission, originally five, were increased to seven in 1906, to nine in 1907, and finally to eleven in 1920. Appointments are made by the president with the advice of the Senate.

The commission has power to regulate the rates and service of railroads, steamboat lines, express companies, pipe lines carrying oil, gas, or water, telephone and telegraph lines, cable and wireless companies, and other "public service utilities" doing business across state boundaries. These last were made, under a law passed in 1935, to include buses and trucks doing an interstate business. The commission licenses companies engaged in such business and has wide authority to order changes in service, safety devices, and rates. Companies seeking to enter the business are required to prove that their services are in the public interest before receiving the necessary "certificates of convenience and necessity" from the commission.

Smithsonian Institution. This institution "for the increase and diffusion of knowledge," was created by act of Congress in 1846 in accordance with the will of James Smithson, of England, who in 1826 bequeathed his property to the United States government for this purpose.

The institution comprises the national museum, the national gallery of art, the Freer gallery of art, the bureau of American ethnology, the national zoological park, and the astrophysical observatory, all located in Washington. It includes also a division of radiation and organisms and an international exchange service for distributing abroad and receiving official and other important documents. The institution has subsidized many important scientific investigations and expeditions and prints and distributes numerous scientific reports. Visitors to the exhibits of the institution number annually upward of one and a half million.

United States Tariff Commission. The commission was created by the act of September 8, 1916, and consists of six members appointed by the president, with the consent of the Senate, for a term of twelve years at an annual salary of $7500. Its duties are to investigate the fiscal and industrial effects of the customs laws of the United States; to furnish the president, the ways and means committee of the House, and the finance committee of the Senate, when requested, any information at its command; and to make such investigations upon native and foreign industries affected by the tariff as may be requested by the president or by the congressional committees.

Among the duties added by later laws are studies on the basis of which the president, under the Tariff act of 1930, may raise or lower customs rates by a maximum of 50 per cent so as to equalize domestic and foreign costs of production. The commission advises and aids the department of state in negotiating reciprocal trade agreements, hears the views of Americans affected by the proposed agreements, and advises the president of discrimination against American trade by foreign nations.

Veterans' Administration. This establishment represents a consolidation of all government agencies affecting war veterans. Formed under authority of an act passed in 1930, it supervises the payment of pensions and disability allowances to veterans and their relatives, administers war risk insurance, the hospitalization, medical care, and vocational rehabilitation of veterans entitled by law to such treatment, and has charge of the payment of adjusted compensation certificates.

THE FEDERAL JUDICIARY

The Constitution (Art. III) provides that the judicial power of the United States shall be vested in one supreme court and inferior courts established by Congress and that all Federal judges shall hold office during good behavior, with compensation that may not be diminished during their term of office.

Organization. Congress in 1789 passed a judiciary act providing for the organization of the supreme court, with a chief justice and five associate justices. Later laws were revised and codified in the act of March 3, 1911. Since 1863 the court has consisted of a chief justice and eight associate justices. The annual salary of the chief justice is $35,500 and of the associate justices, $35,000.

Two attempts, one in 1802 and the other in 1866, made by Congress to reduce the size of the court by enacting that the next vacancy occurring should not be filled, were repealed before the vacancies occurred.

District courts of the United States have increased from 13, in 1789, to 81 within the continental territory of the United States. There are also 7 U. S. district courts, four in Alaska and one each in Hawaii, Puerto Rico, and the Canal Zone. All districts are entirely within the boundaries of single states. Twenty-four states have one district each, eighteen states are divided into two, four states into three, and New York and Texas into four districts. Usually there is one judge for each district court, but in two states one judge sits in both districts. In a number of districts there are two judges; in the district of New Jersey, three; and in the southern district of New York, four.

Since their first organization the supreme court and the district courts have remained practically unchanged. The system of circuit courts, however, has varied at different times. At present it has the form of ten circuit courts of appeals. Each court is formed of a member of the United States supreme court, designated as circuit justice, and several circuit judges, who are frequently appointed from among the United States district judges. No more than three judges sit at a single hearing. These courts were created to relieve the supreme court from its excessive burden of appealed litigation. They hear most cases of appeals from the district courts, and, except in a narrow range of cases, their decisions are final.

Constitutional Jurisdiction. The Constitution fixes the jurisdiction of the Federal courts and limits it to:

Cases arising under the Constitution.
Cases under Federal laws and treaties.
Cases affecting ambassadors, ministers, and consuls.
Cases in admiralty and maritime jurisdiction.
Cases in which the United States is a party.
Controversies between states; between citizens of different states; or by a state against the citizens of another state.
Cases between American citizens and foreign states, citizens, or subjects.
Cases between citizens of the same state claiming lands under grants of different states.

The Constitution limits the court's appellate power by making it subject to exceptions and regulations determined by Congress. Congress has never attempted to use this power.

In cases affecting ambassadors, public ministers, and consuls, and in cases in which the state is a party, the supreme court has "original jurisdiction." Other cases before the supreme court come to it on appeal from the district courts, where the evidence is taken. It is thus rare for the supreme court to take evidence, its business being interpretation of the law and listening to arguments thereon.

A unique feature of the United States courts is their practice of passing upon the constitutionality

of both congressional and state legislation. The Constitution (Art. VI, clause 2) provides: "This Constitution and the laws of the United States which shall be made in pursuance therewith, and all treaties made or which shall be made under the authority of the United States, shall be the supreme law of the land; and the judges in every state shall be bound thereby, anything in the constitution or laws of any state to the contrary notwithstanding."

It follows naturally from this provision of the Constitution that the supreme court and other Federal courts have been called upon to determine whether certain laws were in harmony or in conflict with the "supreme law of the land." This power was exercised very sparingly in the first 70 years of American history, but with increasing frequency later. Up to 1861, only three Federal laws had been invalidated by the court. By 1936, out of some 24,300 public laws passed by Congress, 65 were declared unconstitutional.

This system of judicial determination of the constitutionality of laws is peculiarly American and has been very sparingly admitted by the governments of other countries. The effect is to give the highest tribunal far greater authority in the field of government than any other court in the world.

Critics, including certain members of the court itself, have contended that some of the court's decisions have encroached on the functions of legislation. At any rate, the power of enforcing its own interpretation of the Constitution has placed the court in a position to determine, within limits, how wide Federal powers are. Under John Marshall's 34 years as chief justice a broad interpretation was given to Federal powers, provided they were clearly derived from the Constitution. In the present century this tendency was carried further, although with a temporary reversal in 1935-36, when numerous economic laws of the Roosevelt administration were declared invalid. A statute of 1937 provided that one-man Federal courts might not enjoin enforcement of laws on the ground of unconstitutionality and that, when injunctions were issued on this ground, appeal might be taken direct from District court to Supreme court.

It should be noted that the supreme court and other Federal courts limit their pronouncements upon state legislation to the question of whether it is in harmony with the Federal Constitution, laws, and treaties.

A majority opinion only among the justices of the supreme court is necessary to a decision. The decision presenting the majority view is prepared and signed by a member of the court designated by the chief justice. A justice holding the majority view, but upon other grounds than those expressed in the opinion of the court, may express his view in a "concurring decision." A dissenting justice may express his opposition in a "dissenting opinion."

The Court of Customs and Patent Appeals. This court was established by an act of August 5, 1909. It consists of five judges, appointed by the president for life. It reviews, on appeal, the decisions of the board of general appraisers upon the collection of customs duties and decisions of the patent office.

JUSTICES OF THE SUPREME COURT*

Name	Term	Yrs.	Born	Died
John Jay, N. Y.	1789–1795	6	1745	1829
John Rutledge, S. C.	1789–1791	2	1739	1800
William Cushing, Mass.	1789–1810	21	1733	1810
James Wilson, Pa.	1789–1798	9	1742	1798
John Blair, Va.	1789–1796	7	1732	1800
Robert H. Harrison, Md.	1789–1790	1	1745	1790
James Iredell, N. C.	1790–1799	9	1751	1799
Thomas Johnson, Md.	1791–1793	2	1732	1819
William Paterson, N. J.	1793–1806	13	1745	1806
John Rutledge, S. C.	1795–1795	..	1739	1800
Samuel Chase, Md.	1796–1811	15	1741	1811
Oliver Ellsworth, Ct.	1796–1800	4	1745	1807

JUSTICES OF THE SUPREME COURT (Cont.)

Name	Term	Yrs.	Born	Died
Bushrod Washington, Va.	1798–1829	31	1762	1829
Alfred Moore, N. C.	1799–1804	5	1755	1810
John Marshall, Va.	1801–1835	34	1755	1835
William Johnson, S. C.	1804–1834	30	1771	1834
Brock, Livingston, N. Y.	1806–1823	17	1757	1823
Thomas Todd, Ky.	1807–1826	19	1765	1826
Joseph Story, Mass.	1811–1845	34	1779	1845
Gabriel Duval, Md.	1811–1835	25	1752	1844
Smith Thompson, N. Y.	1823–1843	20	1767	1843
Robert Trimble, Ky.	1826–1828	2	1777	1828
John McLean, Ohio	1829–1861	32	1785	1861
Henry Baldwin, Pa.	1830–1844	14	1779	1844
James M. Wayne, Ga.	1835–1867	32	1790	1867
Roger B. Taney, Md.	1836–1864	28	1777	1864
Philip P. Barbour, Va.	1836–1841	5	1783	1841
John Catron, Tenn.	1837–1865	28	1786	1865
John McKinley, Ala.	1837–1852	15	1780	1852
Peter V. Daniel, Va.	1841–1860	19	1785	1860
Samuel Nelson, N. Y.	1845–1872	27	1792	1873
Levi Woodbury, N. H.	1845–1851	6	1789	1851
Robert C. Grier, Pa.	1846–1870	23	1794	1870
Benj. R. Curtis, Mass.	1851–1857	6	1809	1874
John A. Campbell, Ala.	1853–1861	8	1811	1889
Nathan Clifford, Me.	1858–1881	23	1803	1881
Noah H. Swayne, Ohio	1862–1881	20	1804	1884
Samuel F. Miller, Iowa	1862–1890	28	1816	1890
David Davis, Ill.	1862–1877	15	1815	1886
Stephen J. Field, Cal.	1863–1897	34	1816	1899
Salmon P. Chase, Ohio	1864–1873	9	1808	1873
William Strong, Pa.	1870–1880	10	1808	1895
Joseph P. Bradley, N. J.	1870–1892	22	1813	1892
Ward Hunt, N. Y.	1872–1882	10	1811	1886
Morrison R. Waite, Ohio	1874–1888	14	1816	1888
John M. Harlan, Ky.	1877–1911	34	1833	1911
William B. Woods, Ga.	1880–1887	7	1824	1887
Stanley Matthews, Ohio	1881–1889	8	1824	1889
Horace Gray, Mass.	1881–1902	21	1828	1902
Samuel Blatchford, N. Y.	1882–1893	11	1820	1893
Lucius Q. C. Lamar, Miss.	1888–1893	5	1825	1893
Melville W. Fuller, Ill.	1888–1910	22	1833	1910
David J. Brewer, Kan.	1889–1910	21	1837	1910
Henry B. Brown, Mich.	1890–1906	16	1836	1913
George Shiras, Jr., Pa.	1892–1903	11	1832	1924
Howell E. Jackson, Tenn.	1893–1895	2	1832	1895
Edward D. White, La.	1894–1921	27	1845	1921
Rufus W. Peckham, N. Y.	1895–1909	14	1837	1909
Joseph McKenna, Cal.	1898–1925	27	1843	1926
Oliver W. Holmes, Mass.	1902–1932	30	1841	1935
William R. Day, Ohio	1903–1922	19	1849	1923
William H. Moody, Mass.	1906–1910	4	1853	1917
Horace H. Lurton, Tenn.	1909–1914	5	1844	1914
Charles E. Hughes, N. Y.	1910–1916	6	1862	1948
Willis VanDevanter, Wyo.	1910–1937	27	1859	1941
Joseph R. Lamar, Ga.	1910–1916	6	1857	1916
Mahlon Pitney, N. J.	1912–1923	11	1858	1924
Jas. C. McReynolds, Tenn.	1914–1941	27	1862	1946
Louis D. Brandeis, Mass.	1916–1939	23	1856	1941
John H. Clarke, Ohio	1916–1922	6	1857	1945
William H. Taft, Conn.	1921–1930	9	1857	1930
George Sutherland, Utah	1922–1938	16	1862	1942
Pierce Butler, Minn.	1922–1939	17	1866	1939
Edward T. Sanford, Tenn.	1923–1930	7	1865	1930
Harlan F. Stone, N. Y.	1925–1946	21	1872	1946
Charles E. Hughes, N. Y.	1930–1941	11	1862	1948
Owen J. Roberts, Pa.	1930–1945	15	1875	1955
Benjamin N. Cardozo, N. Y.	1932–1938	6	1870	1938
Hugo L. Black, Ala.	1937–	..	1886	
Stanley F. Reed, Ky.	1938–1957	19	1884	
Felix Frankfurter, Mass.	1939–	..	1882	
William O. Douglas, Conn.	1939–	..	1898	
Frank Murphy, Mich.	1940–1949	9	1890	1949
Robert H. Jackson, N. Y.	1941–1954	13	1892	1954
James F. Byrnes, S. Car.	1941–1942	1	1879	
Wiley B. Rutledge, Jr., Iowa	1943–1949	6	1894	1949
Harold H. Burton, Ohio	1945–	..	1888	
Frederick M. Vinson, Ky.	1946–1953	7	1890	1953
Thomas C. Clark, Texas	1949–	..	1899	
Sherman Minton, Ind.	1949–1956	7	1890	
Earl Warren, Cal.	1953–	..	1891	
John M. Harlan, N. Y.	1955–	..	1899	
William J. Brennan, Jr., N. J.	1956–	..	1906	
Charles E. Whittaker, Mo.	1957–	..	1901	

*Names of Chief Justices appear in italics.

Court of Claims of the United States. The court was established by an act of February 24, 1855, with general jurisdiction over all claims upon the United States government, except pension claims, and, since 1915, except claims growing out of the Civil War. The court consists of five judges, the concurrence of three being necessary to a decision. Where the court finds for the complainant, judgment is entered against the United States payable out of the public treasury.

AMERICAN STATE GOVERNMENT

The United States of America is a Federal union of forty-eight commonwealths, or "states." It has been defined as "an indestructible union of indestructible states." Two classes of government are created or recognized by the Constitution: the national or "Federal" government; and the state governments. Back of both of these governments is the nation, with its political sovereignty in the entire people.

State government is older than the Federal government, which was created by the bestowal upon it of powers previously existent in the states. These powers are definitely prescribed by the Federal Constitution. All powers not given to the Federal government are reserved to the states. This constitutional arrangement gave to the modern world its first expression of "federalism."

Federal Expansion. The tendency of successful federal government is to augment gradually the scope and the authority of the national government as against the state governments. This tendency is observable in America. The theory that sovereignty still existed in the states and not in the national government was extinguished by the outcome of the Civil War, 1861–65. The existence of complete free trade between the states, as guaranteed by the Constitution, has built up an industrial organization within the United States that recognizes no state boundaries or lines. Transportation and commerce have become largely "interstate." The population moves unhindered from state to state, while domicile with political rights is a matter of automatic transfer of residence. These and other considerations have constantly tended to extend the Federal government and to strengthen its control over industry and transportation on a national scale.

Concurrent Powers. The result of this process at times has seemed to menace the original character of the state governments. Nevertheless, while the activity of the national government is more impressive and of much more interest to the average citizen of the United States, the authority of the state government comes closer to his person, to his business, and to his home. The field of administration exercised by the state embraces the establishment and control of local and municipal government, of public instruction (except so far as it is assisted and consequently influenced by Federal grants or subventions), and of public health (except where the Federal government may exercise authority in the case of national epidemic). It embraces also the care of dependents and defectives; the construction of highways and other communications; private law, including domestic relations, inheritance, rights of property, contracts; the exclusive control of corporate industry (except where it takes on an interstate character); the punishment of criminals; and the protection of public order.

In this last and important field the president may, on request of the governor of a state, apply the power of the national government. In cases where interstate commerce has suffered interference or the movement of the United States mails has been stopped by violent acts, the president has dispatched United States troops and placed localities under military control without application of the governor, and even in the face of his protest. While generally the police powers exercised by the Federal government and by the state governments are distinct fields, they are frequently used in collaboration. Thus Federal authority, under the 21st amendment to the Constitution, may be used to prevent transportation of intoxicating liquor into states which forbid its sale within their borders.

Furthermore, since about 1906 the state governments have taken on new vigor, which has expressed itself in a large variety of social and industrial legislation, in the creation of new administrative agencies, and in movements to reorganize and strengthen state administration.

Interstate Compacts. With the permission of Congress states may enter into treaties or compacts for dealing with common problems. Compacts have been authorized by Congress for concerted action on such matters as use of water from a common river, limitation of petroleum production, and regulation of labor standards. They have been found more satisfactory when involving one definite arrangement, as in a boundary agreement, but less so when used as a substitute for unified authority in meeting a complex problem.

STATE CONSTITUTIONS

The written constitutions of the American states are older than the Federal Constitution. They are, in fact, an American political invention. They grew out of the colonial charters of the period of English sovereignty. They assumed their typical form during the Revolutionary War, 1775–1783. They still bear the marks of their origin and of the political theory of that day. A century and a half of growth has occasioned an extraordinary number of changes and recastings of these organic acts, without radically altering their general type.

Upon the outbreak of the Revolutionary War in 1775, the Continental Congress, a body formed by representatives of the thirteen American colonies which were united in revolution, recommended to these colonies the adoption of new constitutions, to take the place of the governments which had existed under British royal authority. Certain colonies adopted this suggestion in the following order: New Hampshire, South Carolina, Virginia, New Jersey, Delaware, Pennsylvania, North Carolina, and Maryland. Virginia was the first state to devise a constitution with a complete frame of government and with a code of popular rights.

None of these new constitutions was "popularly ratified." Massachusetts, by its constitution of 1780, inaugurated a further step. An assembly elected for that sole purpose framed the constitution, which was then submitted to the suffrage of the people of the commonwealth. Thereby was initiated the practice of popular ratification of constitutions, now the representative procedure.

Some 140 state constitutions have been prepared and put into execution during the history of American state government. Each of the 48 American states is governed by such an organic act. Some states (Louisiana, South Carolina, Virginia, Georgia) have, in the course of their history, had as many as six different constitutions. Massachusetts still retains, with some amendments, the constitution of 1780; Maine, her constitution of 1819.

Admission to Statehood. "Admission to the Union" is an action taken by the Congress under one of its most important constitutional powers. With the exception of the 13 original states, Texas, Vermont, Maine, West Virginia, and California, all of the states, before admission, were territories governed under acts of Congress. The territories were not members of the Union. Their people had no constitutional political rights and did not participate in national elections. "Admission" of a territory to statehood, however, was admission to full equality with all other states. Congress, when it judged the time ripe for the admission of a territory as a new state, by an "enabling act," authorized an election for the purpose of drafting a constitution.

This action, if satisfactory, led to the admission by Congress into the Union. Congress, more than once, by legislation, has prescribed conditions under which a given territory should be admitted to statehood, as, by the suppression of polygamy in the case of Utah. Such limitations, however, imposed by the Federal government, become invalid as soon as the state is admitted to the Union.

Arizona was admitted to statehood in 1912 only after removing from its proposed constitution, at the insistence of the president and the Congress of the United States, a provision for the recall of judges. Immediately after admission into the Union, however, the state of Arizona exercised its right to replace this provision in its constitution. The dates of the original ratifications of the Federal Constitution and of admission of states since the formation of the Union, in 1789, are given in the table entitled *Historical Statistics of the United States.*

Amendments to State Constitutions. Three procedures exist for the amendment of a state constitution, two being operative in the great majority of states. These are (1) amendment on proposal of the legislature; (2) amendment by a constitutional convention; and (3) amendment by popular initiative. The oldest and most generally utilized method of amendment is by a proposal of the legislature. This form of procedure is authorized in every state of the Union except New Hampshire, where all amendments must originate in a constitutional convention.

The Legislative Proposal. Differing conditions attend the legislative proposal: (1) that it must be passed by two successive legislatures (in Delaware this procedure enacts the amendment); (2) passage by an extraordinary majority—two-thirds or three-fifths vote of all members elected; (3) limitations as to the number of amendments proposed at one time, or the frequency with which the same amendment can be passed. In all states but Delaware the proposal, having passed the legislature, is submitted to popular ratification.

In most states a majority of votes cast ratifies the amendment and makes it a part of the constitution. Idaho, Indiana, and Wyoming require a majority of the electors of the state; Rhode Island three-fifths, and New Hampshire two-thirds, of those voting thereon; Nebraska requires a majority of those voting on the measure, provided votes cast in favor are not less than 35 per cent of total votes cast at the election. A majority of all votes cast at the election is required in 9 states—Alabama, Arkansas, Illinois, Minnesota, Mississippi, Indiana, Ohio, Oklahoma, Tennessee.

Constitutional Conventions. Constitutional conventions or extraordinary legislative bodies, popularly elected for the purpose of revising the constitution, are the usual method where a *general revision* of the constitution is sought. In most states the proposal to call a constitutional convention is submitted to popular vote, and in six states—New Hampshire, Iowa, Michigan, Maryland, New York, Ohio — the constitution requires that such a proposal be submitted regularly at the conclusion of a certain interval of years. In Georgia, Louisiana, Maine, Mississippi, and Wyoming, the legislature may call a convention without popular approval.

Popular Initiative. Amendment by popular initiative is now authorized in Arizona, Arkansas, California, Colorado, Massachusetts, Michigan, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, and Oregon. The petition must be signed by a definite number of voters or by a number equal to a certain percentage (8 to 15) of the total vote cast for some state officer at the last preceding election. The secretary of state, having verified these signatures, places the amendment upon the list of measures to be voted upon by the people at the next general election.

In Michigan the popularly initiated amendment must receive the approval of the legislature before being placed upon the ballot. In Massachusetts it must receive the approval of at least one-fourth of all members of two successive legislatures and in both cases the legislature may submit a competing or substitute measure.

Popular Ratification. The practice of referring to popular ratification constitutions framed or revised by a convention has steadily grown. The early constitutions, except in New Hampshire and in Massachusetts, were not submitted to the people, but from 1784 to 1840 all such constitutions were submitted except in the cases of Delaware, Minnesota, and Arkansas.

During the Civil War period the practice was against submission. Between 1870 and 1890 there was a return to the pre-war practice and all constitutions drafted by conventions were submitted to popular ratification. From 1890 to 1910, of eleven constitutions adopted, five were popularly ratified. Since 1910, new constitutions or important revisions have been effected by constitutional conventions in the following states: Ohio (1912), Mass. (1917-18), Neb. (1919-20), N. H. (1918-21), La. (1913, 1921), Ill. (1920-22), and Mo. (1922-23). Arizona and New Mexico (1912) adopted constitutions before entering the Union. In all cases, except in that of Louisiana, these constitutions were popularly ratified.

CONSTITUTIONAL LIMITATIONS UPON THE POWERS OF STATE LEGISLATURES

By the Constitution of the United States, all legislative powers not expressly bestowed upon the national Congress are reserved to the states. Thus no enumeration of the powers of a state legislature is necessary in a state constitution. "All residuary legislative power" being implied, the only original restraint is that state laws must not conflict with the Constitution of the United States, with the laws of Congress, or with United States treaties.

The early state constitutions were framed at a time of great popular confidence in elected legislatures. Gradually, however, as legislatures were tempted into passing unrepresentative legislation or yielding to corrupt influences, restrictions upon the powers of legislatures were introduced by amendments to state constitutions. Louisiana in 1845 and Iowa in 1846 adopted constitutional provisions that forbade "special legislation." The constitution of Michigan (1847) and that of California (1849) contained similar restrictions on the legislature.

Special Municipal Laws. The purpose of these changes was to prohibit the legislatures from appropriating money or conferring other benefits upon private individuals or corporations. In 1850-51, the states of Ohio and Indiana prohibited state legislatures from passing special laws for municipalities. This action was to remedy a growing abuse of interfering with municipal government and even of penalizing cities in the interests of partisan politics.

The movement initiated by Ohio became general, particularly in western and southern states. Five-eighths of the states have adopted constitutional provisions that no special law shall be enacted where a general law can be made applicable. In the New England states alone are the legislatures generally free to enact laws applying to a particular person, city, town, or other corporation.

Legislative Freedom. Undeniably, the process of placing fetters upon state legislatures has been carried too far and has resulted in denying to state legislatures a discretion which is properly theirs and which it would be to the interest of state government to have exercised. A movement has become apparent to restore to state legislatures a freedom

The Kansas state capitol, in downtown Topeka, is centered in beautifully landscaped grounds. In its rotunda are famous murals by John Steurat Curry.

West Virginia's magnificent capitol building in Charleston was completed in 1932 and replaces one built in 1880. It contains 333 rooms and is one of our most beautiful state capitols.

The state of Washington's capitol, in Olympia, is designed in classic architectural style and constructed of white stone. In its lovely park is a monument marking the old Oregon Trail.

The capitol of Georgia, in Atlanta, was completed in 1889. It contains an interesting collection of famous Georgians' portraits and a fine law library.

STATE CAPITOLS

Oklahoma's capitol at Oklahoma City is a stately, colonnaded building set in 100 acres of beautiful parks. The statue dedicates the building to pioneer riders.

The capitol of Connecticut stands on a hill in Bushnell Park in Hartford. It houses many objects of wide historic interest, including the tombstone of Israel Putnam.

The National War College situated at Fort McNair, D.C., is the top educational institution of our armed forces. Operated under the Joint Chiefs of Staff, it trains selected personnel of the armed forces and State Department in strategic planning and high level policy. There are about 114 students who study intensively for ten months.

This view shows a small part of Maxwell Air Force Base at Montgomery, Alabama. This is the leading school for training air personnel in the science of aeronautical technology.

The United States Military Academy at West Point has an authorized strength of 2496 cadets, who are under strict military control during the four year course. Graduates become 2nd lieutenants in the Army or Air Force.

The United States Naval Academy at Annapolis trains the officers for our Navy and Marine Corps. Properly qualified graduates receive commissions as Navy ensigns or Marine Corp 2nd lieutenants. Many foreign naval students are also trained.

The United States Coast Guard Academy at New London, Connecticut, was founded in 1876. Its cadets receive a four year course in engineering, military science and cultural subjects and become Coast Guard ensigns when they graduate. The U. S. Coast Guard is under the jurisdiction of the Secretary of the Treasury.

ARMED SERVICES SCHOOLS

which nearly a century of constitutional amendment largely destroyed. The adoption by many states of the legislative referendum, creating, as this does, a popular check upon vicious legislation or legislative favoritism, logically would seem to call for the removal of other and hampering restrictions.

STATE LEGISLATURES

In all American states excepting Nebraska, which voted to adopt the unicameral legislature in 1937, the legislative power is intrusted to a representative body consisting of two chambers and usually known as the state legislature, or general assembly. In Massachusetts and in New Hampshire it is called the general court. The bicameral or two-chamber plan has been adopted in American states in obedience to the "theory of checks and balances," one house halting and correcting the wrong or impulsive action of the other. In all states the "upper" and uniformly smaller body, being elected for a longer term and with sometimes a higher age qualification for its members, is called the Senate. The larger or more popular house in all but four states is called the House of Representatives; in the others it is called the Assembly.

Qualifications. In all states the qualifications for voting for both houses are the same. The "aristocratic" character of the electors of the upper house long ago disappeared. Among the qualifications for election, certain states require a higher age for the Senate (frequently 30 years) than for the lower house (21 to 25 years). Residence in the state for a prescribed term before election to the legislature is a usual condition, as is residence in the district from which a member is chosen. This last requirement has the result of increasing the representative's responsibility to his constituency, since, if defeated by unpopularity in the district in which he resides, he cannot without change of residence stand for election in another. Federal officeholders are generally ineligible, as are paid officials of the state, with certain customary exceptions (notaries, national guard officers, soldiers, etc.).

Organization and Legislation. State constitutions usually provide that the lieutenant governor or vice governor shall be the presiding officer of the Senate, and provisions have been introduced into many constitutions regarding the procedure of legislation, the publication of bills, etc. Other than these, both houses are free to organize themselves in their own way. The American system of legislative committees everywhere prevails. Members of either house have an almost unlimited privilege of introducing bills, which, after being read by title, are referred to the appropriate committee for examination. The unrestrained practice of introducing bills results in legislatures being burdened, at each session, with bills which cannot be properly examined or discussed.

The interest felt by members in the passage of their bills and the political reputation made or lost by the success or failure of such measures leads to the practice of members supporting one another's projects in return for support of their own, and results in the loading of American statute books with ill-digested, unwise, and practically undebated laws.

Another embarrassment to American state legislation is the mass of detail written into statutes, the effort of the legislator being to cover every possible assumed contingency. These provisions, being frequently purely theoretical and not based upon experience with the measure, usually require a large amount of amendment or alteration by subsequent legislatures with resulting delays and embarrassments in their enforcement.

Distrust of state legislatures and apprehensions felt as to radical action by them led, in many states, to constitutional provisions limiting the frequency of legislative meetings and the duration of their proceedings. The earlier practice of annual meetings of legislatures has given way to biennial legislatures. All legislatures now meet biennially except those of New Jersey, New York, Rhode Island, and South Carolina, where the session is annual.

These and other obvious disadvantages of state legislatures have led to proposals for their reconstitution, one being to abolish the bicameral system in favor of a single legislative body. The successful practice of the provinces of the Dominion of Canada, seven of whom have single-chamber legislatures, is cited. It is sometimes overlooked, however, that in the case of the Canadian provinces, the system of ministries responsible to the provincial legislature has preserved the British practice of having most bills originate with the administration. Thus measures have the advantage of careful drafting and discussion by responsible cabinets before their introduction.

Legislative Bureaus. Another device to avoid defects of drafting, duplication, and other bad features of state legislation is the creation of the legislative reference bureau, a permanent office filled by legislative experts whose business it is to make comparative studies of state legislation, to afford information to members of the legislature, and to assist members in the preparation of their bills. Such legislative service is given in the following American states: Arizona, Arkansas, California, Colorado, Connecticut, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, and Wisconsin.

Legislative Councils. Led by Kansas and Michigan in 1933, a number of states established legislative councils with paid staffs to study, plan for, and prepare legislative proposals in advance of the sessions. They usually consist of legislators only, but may include administrative officers.

Members of state legislatures receive compensation for their services; but this compensation varies greatly in different states, as may be seen from the table *Tabulated Data on State Governments*.

REFERENDUM AND INITIATIVE OF LAWS

The original sole competence of legislatures to enact laws has been modified in 21 states by the adoption of the "legislative referendum" and in 19 states by the "legislative initiative." These modifications of "representative government" are Swiss devices and were first adopted in America as joint measures by the state of South Dakota in 1898. While usually associated, the two institutions are unlike in spirit, the referendum being a conservative practice, the initiative, radical.

A referendum of constitutional measures, as stated above, dates from the early Revolutionary constitutions. The practice is old, also, of requiring local bond issues and exceptional fiscal measures to be ratified by voters of state, county, school district, or city. But, since the example of South Dakota, the practice has spread of giving to the people the right of annulling an act of the legislature or of originating laws to be submitted to popular judgment either without legislative consideration, "direct initiative," or together with a similar measure proposed by the legislature in its place, "indirect initiative."

The referendum of a law is accomplished by securing signatures to a petition to suspend the operation of the act and to submit it to popular judgment as expressed at a general election. The number of signatures required is usually 5 per cent of the votes of the state. Such a petition must be signed and submitted to the secretary of state for verification within a certain period (usually 90 days) following the adjournment of the legislature. The initiative petition requires a higher number of signatures, usually 8 per cent. Maryland and New Mexico have the referendum only.

The states possessing both initiative and referendum, with date of adoption and percentage of signatures required, are as follows: Arizona (1912, extended, 1914, referendum 5%, initiative 10%), Arkansas (1910, ref. 6%, init. 8%), California (1911, ref. 5%, init. 8%), Colorado (1910, ref. 5%, init. 8%), Idaho (1933, ref. 10%, init. 10%), Maine (1908, ref. 10,000, init. 12,000), Massachusetts (1918, ref. 10% plus 15,000, init. 10% plus 20,000, plus 5000), Michigan (1908, ref. 5%, init. 8%), Missouri (1908, ref. 5%, init. 8%, ⅔ cong. dists.), Montana (1906, ref. 5%, ⅔ of counties; init. 8%, ⅔ of counties), Nebraska (1912, ref. 5%, init. 7% or 5% in ⅔ counties), Nevada (1904, init. only, 1912 both ref. and init. 10%), North Dakota (1914, ref. 7000, init. 10,000), Ohio (1912, ref. 6%, ½% from ½ of counties, init. 3% plus 3% indirect, ½% from ½ of counties), Oklahoma (1907, ref. 5%, init. 8%), Oregon (1902, ref. 5%, init. 8%), South Dakota (1898, ref. 5%, init. 5%), Utah (1917, ref. and init. 10% of maj. of counties), Washington (1913, ref. 6%, init. 10%).

In a number of states a still higher requirement than that given above exists for the initiative of a constitutional amendment. Maine, Montana, South Dakota, Utah, and Washington make no provision for the popular initiative of a constitutional amendment.

THE GOVERNOR

The executive power in all American states is intrusted to a governor. The office, both in its functions and in its title, is an inheritance from the colonial period. The Revolution substituted the practice of popular election of the governor for that of appointment. In all states the governor is directly elected by the qualified voters, for a definite term.

Qualifications. Among the qualifications for election as governor frequently provided by state constitutions are American citizenship, previous residence in the state of from 1 year (Connecticut, Minnesota, Washington, Wisconsin) to 7 years (Alabama, Arkansas, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Tennessee), and minimum age usually 30 years. In thirteen states, the governor is not eligible for re-election. The term varies from 2 years (20 states) to 4 years (27 states). In New Jersey it is 3 years.

Authority of Governor. As the period of early state constitution making showed a confidence in legislatures, so it exhibited a marked distrust of executive or gubernatorial authority. This prejudice survived the entire first century of the history of state governments. In no state had the governor an administrative power over state affairs comparable to that of the president over national administration. The executive departments were entrusted to officers popularly elected and independent of the governor's control. It was thus impossible to hold the governor responsible for the general conduct of the state's business and equally impossible for him to enforce a consistent policy throughout the state administration. The governor seldom had the power of appointment of state or local officials, nor the right to remove for negligence, inefficiency, or malfeasance. Beginning with the second decade of the present century, however, came a movement to enlarge the authority of the governor over state administration. One proposal was that of the so-called "short ballot," whereby a governor alone would be elected, other state officials being generally his appointees. More recently, in many states radical reorganization has been effected, both by constitutional amendment and by legislation. State services have been centralized, or organized in departments, with the suppression of numerous independent boards and commissions. The department heads are made appointable and removable by the governor, and in some states now sit with the governor as an administrative and advisory "cabinet." There has been an increase in the number of officials holding office at the pleasure of the governor rather than for fixed terms. One of the most radical of such measures was that passed in Iowa in 1933 centralizing financial control in the hands of the governor. A somewhat similar measure was passed in New Jersey the same year. The trend is toward lengthening the governor's term.

On the political side, the position of governor is an honorable and conspicuous one. His influence in state and national politics is great, and tends to increase. It is from the class of successful state governors that strong presidential candidates are usually derived. The dignity and the influence of the position are sufficient to attract, as candidates for the office, able and representative citizens. Nevertheless American state administration remains generally "decentralized" in contrast to the national administration.

The Veto Power. Although the office of governor was originally conceived as entirely distinct from the legislative power, the "doctrine of separation of powers" being generally avowed by American state constitutions, the governor has come to possess a great influence over the legislature and its legislation. This has been accomplished in several ways. First, by the bestowal upon the governor of the veto power.

In the earlier state constitutions, the veto power was generally absent, but, by successive amendments, it has been created until now it exists in all states except North Carolina. Furthermore, in eleven states (Ill., Mass., Nev., N. D., O., Okla., Oreg., S. C., Va., Wash., Wyo.) the governor's veto powers may extend not only to the entire measure, but to any item in any bill, while in 39 states the governor may veto any item in an *appropriation bill.* This provision enables the governor practically to determine the state's budget, and places upon him the responsibility of defeating riders to appropriation bills. Public opinion in American states, furthermore, has come to require the governor to frame and press upon the legislature at each session an "administrative program."

Influence on Legislation. The influence possessed by the governor over legislatures, not only by the importance of his position, but by his power of vetoing bills in which members are interested and by reason of his leadership in the party, gives a special character to what are called "administrative measures" or bills proposed or supported by him, and it is hardly too much to say that the governor is today judged quite as much for the legislation which he secures as for his general conduct of the state's executive business.

A governor, faced with an unwilling legislature, frequently goes directly to the people of the state, and, through interviews or radio addresses, organizes the force of public opinion to bear upon the legislature to favor measures upon which he has staked his political reputation. These practices, while they have contradicted the theory of the separation of powers, undoubtedly have introduced into American state government a necessary authority and have enabled the voters of the states to hold the government to a closer responsibility.

The Power to Pardon. Another important power of the governor is that of pardon. This power may be classified in its several forms as the power to "commute" a sentence or reduce it below the punishment fixed by a court, the power to "pardon" or entirely free a person from the consequences of guilt, the power to grant "reprieves" or postpone sentence, and the power to remit fines and forfeitures.

In 32 states the sole power of pardon, except in cases of treason or impeachment, resides in the governor; in 29 states the governor alone has the power to commute sentence. In 41 states he has the sole power to grant reprieves and in 22 states the

sole power to remit fines and forfeitures. In 12 states the governor has the power to pardon, when acting with his council, or on the recommendation of a board of pardons; in 9 states he similarly exercises the power of commuting sentence; and in 6 states he similarly exercises the power of remitting fines and forfeitures. In 6 states, however (Connecticut, Florida, Idaho, Nevada, New Jersey, and Utah), the pardoning power resides exclusively in a board of pardons.

The power of remitting fines or forfeitures is less frequently confided to the governor, and 21 states by constitutional provision entirely prohibit its exercise.

STATE OFFICERS

Besides a governor and a lieutenant governor (in 36 states), the usual officers are a secretary of state (all states), an attorney-general (all states), a treasurer (all states except New York), an auditor or comptroller (all but 3 states), and a superintendent of public instruction (all states). These are usually popularly elected at the same time and for the same term as the governor. In a few cases the secretary of state (Delaware, Maryland, New Jersey, New York, Pennsylvania, Texas, Virginia), or the superintendent of public instruction (7 states), is appointive by the governor, while in a few states (Maine, New Hampshire, New Jersey, Tennessee) one or more of these officers may be elected by the legislature. In 8 states the school superintendent is elected by a board of education. Other usual officers are the adjutant general of the national guard or state militia, of which the governor is the commander in chief, and a surveyor-general, or a registrar of lands.

As stated above, by recent legislation in a few states, the heads of departments now constitute a "cabinet" of the governor. Usually, however, they perform their duties independently of him and may even represent political parties other than that with which the governor is affiliated.

Nearly all other state offices have been created, not by the constitution, but by legislation, and have come into existence gradually as the state has assumed added responsibilities or taken private professions and certain classes of business under its control.

Types of Administration. Several types of administration have been adopted to discharge new forms of state business: (1) the "*ex officio* board," composed of the governor, secretary of state, the attorney-general, an executive officer, and frequently other members; (2) the "lay board," a corporation of citizens, unsalaried, and usually appointed by the governor for fixed terms, with the power to choose the executive of a state institution (educational, penal, charitable, etc.), and to direct its conduct; (3) a "bureau type" where a branch of administration is intrusted to a single directive head (commissioner of insurance, banks, corporations, etc.); (4) the "commission type" where public business is intrusted to a salaried board whose members are considered technically qualified or expert administrators and who have a joint or "collegiate" responsibility (public service commissions, boards of control, etc.).

Boards and Commissions. Practically all states have public service commissions, charged with regulating public utilities. Admission to the practice of certain professions is secured in most states only after examination and certification by boards composed of selected representatives of these professions (law, medicine, dentistry, pharmacy, architecture, public accounting). The number of these offices, boards, and commissions has multiplied to an astonishing degree, many states having over 100 such bodies. The system has obvious disadvantages; viz., duplication of expense, overlapping functions, absence of responsibility, and undue independence of common administrative authority.

REORGANIZATION OF STATE GOVERNMENT

The problem of reorganizing State administration so as to assure simplicity, efficiency, economy, and responsibility is one of the most pressing needs of American government. State governments expend annually almost $6,000,000,000. It is believed that much of this expense could be saved or more profitably directed by improved systems of administration. Reorganization has however proceeded in quite different lines. New Jersey since 1915 has consolidated numerous services into departments, usually under commissions of several members, so appointed as to be quite independent administratively of the governor or any other executive control. Other states (Cal. in 1911, Kansas, West Virginia, Alabama, Texas, North Dakota among others) have experimented with "boards of control," or "boards of administration" with financial directive control over other departments or institutions, and in some cases with powers of audit, investigation, and of purchase and supply. Over half of the states have adopted centralized purchasing agencies.

More recently the movement has taken the form of making the governor the head of the state administration, as the president is of national administration, with power to appoint and remove heads of departments and directors of administrative services. These ends have been accomplished both by constitutional amendment where necessary, and by legislation. In some states, the governor has been given control of the budget, notably California, New York, Iowa, and New Jersey. In Iowa, the spending agencies of the government are required to submit quarterly estimates of their needs to the governor, who is empowered to cut allowances if revenues threaten to fall below appropriations.

CIVIL SERVICE

One consideration operating against the "short ballot" and the enlargement of the governor's control of state administration is fear of the misuse of this power to reward political adherents and to create "political machines." The number of employees in certain states is large (52,000 in New York). The unrestricted power to employ and to dismiss so great a force undeniably offers opportunities for serious abuses. While the power to appoint department staffs is legally vested in the heads of the offices, the actual choice may be made by party leaders or "bosses" regardless of the efficiency of the service. Public service has become highly specialized and can be well discharged only by trained and conscientious officials holding office for considerable terms and free from the disturbing vicissitudes of party contests.

Tenure of Office. As in the Federal service, so in the state, including local and municipal administration, advocates of civil service reform have sought to secure laws establishing a "merit system" for public office with security of tenure for competent and faithful public servants. The movement, however, has not met with wide success, and, as yet, no state has adopted a general standard for determining the fitness of aspirants to all offices, local as well as state.

Civil service laws are in force in Alabama, California, Colorado, Connecticut, Illinois, Indiana, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Jersey, New York, Ohio, Rhode Island, Tennessee, Virginia, and Wisconsin. The usual method of administering a civil service system is by a commission, which is given power to "classify" the public positions, fix qualifications for each grade of employment, hold examinations to determine fitness, certify "eligibles" to the appointing power, keep official service records of employees, and in some cases to try or investigate charges of unfitness. Civil service laws usually declare public positions open on equal conditions to both men and women.

THE RECALL

The recall has been defined as "a special election to determine whether an official shall be superseded before the ordinary expiration of his term." It is in use in 12 states, on petition of a certain percentage of voters, as follows: Arizona (1911, 1912, 25%), California (1911, 12% at least 5 counties for state officers, 20% for local officers), Colorado (1912, 25%), Idaho (1933, 10% for state officers, 20% for local officers), Kansas (1914, 10%, 15%, and 25%), Louisiana (1914, 25%), Michigan (1913, 25%), Nevada (1912, 25%), North Dakota (1920, 30%), Oregon (1908, 25%), Washington (1912, 25% and 35%), Wisconsin (1926, 25%). California, Arizona, and Colorado apply the recall only to elected officers, Washington, Michigan, and Louisiana except judges.

LOCAL GOVERNMENT

The organization of local government (county, township, district, municipality) is entirely a function of the states. Local government serves two purposes: (1) the need of the state for agencies in conducting its administration and enforcing its laws in the subdivisions of the state; (2) the need of communities for organization to satisfy local or community needs. Theoretically, a county may be considered a local agency of the state and a town or city a community organization for determining and supplying its own public wants; but actually state and local activities overlap, or merge and separate in response to an altering social order.

Education, public health, charities, and communications are likely to command the interest of both the state and the town. Justice and preservation of public order are clearly state, not local, functions; but the American practice of "decentralizing" public authority and a prejudice for local self-government have influenced the state usually to leave these essential services to be performed by judges and peace officers locally elected and responsible but to the people of the locality.

Division into Counties. All of the 48 states are divided into counties (in Louisiana called "parishes"). Within the counties (largely rural in character), cities and towns exist as incorporated municipalities. There are more than 3000 counties in the United States, the average number for each state being more than 60. But Delaware has only 3 counties, Rhode Island has 5, while Texas has 253. In New England, county government is mainly limited to the administration of justice, though the county may be a unit of senatorial representation. Elsewhere, it is the usual unit for maintaining roads and bridges, for poor relief, for school administration, and in some states for health supervision and for agricultural aid.

County Government. County government is organized according to no general principle. Outside of Connecticut, Rhode Island, and Georgia, there is an elective board of commissioners or supervisors, with powers, in southern and western states, to assess county taxes, to care for county property, to maintain highways and roads, and to conduct county institutions. In addition, the usual officers are the judge or judges of the county or "superior" court, the sheriff, the attorney, the clerk, the recorder of deeds and other instruments, the assessor of taxes, the collector of taxes, the school superintendent, the health officer, etc. The term of office varies from two to six years.

There is an absence of any responsible head for the county administration and usually county officers are subject to a little or to no state supervision. Removal power is rarely placed in the hands of the governor.

MUNICIPAL GOVERNMENT

In 1950 more than half the population of the United States was living in a standard metropolitan area containing at least one city of 50,000 population or more. The residents living in these central cities and their outlying communities totalled 83,929,863.

City government in the United States follows no accepted plan. Three chief forms are found: the mayor and council plan with separation of executive and legislative functions; the "commission" plan; and the "city manager" plan. The first is the most common. The mayor is popularly elected and may be given a veto over legislation of the council and a large control over city offices. Earlier practice was to divide the council into two chambers.

Commission Form of Government. The commission plan had its origin in Galveston in 1901. It has been adopted in all parts of the Union but particularly in Pa., N. J., Ill., Kans., Okla., and Tenn. Pennsylvania, in 1913, made commission government compulsory for all cities of the third class. Cities of largest population which have employed this form are Newark, N. J., New Orleans, La., Jersey City, N. J., Portland, Ore., St. Paul, Minn., Oakland, Cal., Omaha, Nebr., Birmingham, Ala., Memphis, Tenn., San Antonio, Tex., Dallas, Tex., Houston, Tex., Des Moines, Iowa, Trenton, N. J., Salt Lake City, Utah, Reading, Pa., Spokane, Wash. Under this plan both executive and legislative functions are entrusted to a commission, usually of five. They are popularly elected and are chosen, not by districts, but "at large," though not necessarily all at the same election. This commission employs the city officials and directs the entire administration. In some instances it appoints a city manager, as explained below.

City Manager Plan. This plan was first tried in Staunton, Va., in 1908. Dayton, Ohio, in 1913, was the first large city to adopt it. Between that date and 1945, approximately 450 American cities altered their charters or ordinances to provide for city managers. The maximum number of adoptions, 53, occurred in 1921. In addition to these American cities, 17 cities in Canada and 2 in New Zealand have adopted the plan. Under this plan the elected city council or commission engages a manager who is the head of the entire municipal administration and confines its attention to determining policies, raising revenue, making appropriations, and supervising the administration of the manager.

Municipal Charters. Municipal governments under the American legal system have only those powers and functions which are specifically given them by their charters or by statutes. Originally a city was incorporated and provided with a charter by an act of the legislature. This practice has been altered in two ways: first, by the provision of standard types of city government (corresponding to populations of different sizes or "classes") laid down in "general laws"; and, secondly, by allowing city populations to frame their own charters, which, when ratified by the legislature, become effective.

Such "freeholders' charters" are now provided for by the constitutions of 13 states: California, Colorado, Michigan, Ohio, Missouri (cities over 100,000), Washington, Minnesota, Oklahoma, Arizona, Oregon, Nebraska, Texas, Maryland (only Baltimore and counties), while statutory provisions granting a similar "municipal home rule" have been adopted in Iowa, South Carolina, Mississippi, Florida, and Connecticut.

DEPENDENCIES OF THE UNITED STATES

The Spanish American war of 1898 brought new responsibilities which have made the United States one of the principal "colonial powers" of the world. Cuba was given its freedom under American protection. See *Cuba*. Puerto Rico and the Philippines were ceded outright by Spain to the United States by the Treaty of Paris, ratified 1899. The acquisition of the right to build the Panama canal, with other responsibilities also, flowed from the war.

Puerto Rico. After a period of military rule, a liberal government was created for the island of Puerto Rico, which was modified by the Organic act of Congress of 1917. This act granted American citizenship to the people of Puerto Rico. Legislative power is vested in two houses, a Senate of 19 members and a House of Representatives of 39 members. These are elected partly from districts and partly at large. The franchise is possessed by all citizens, and no property qualifications may be imposed. The governor, who ruled with an executive council of department heads, was appointed by the president, as were most of the executive officers.

In August 1947 the organic act was amended in response to long continued demands from the island. By the new law the governor is elected for a term of four years, beginning in August 1948, by the Puerto Rican people. This is the only case of such election in any American dependency. The governor now appoints the department heads. The president appoints the auditor and a co-ordinator of federal agencies. The new constitution drafted by the people of Puerto Rico was approved by Congress July 3, 1952. It made Puerto Rico a commonwealth.

The judiciary consists of a United States District judge and a supreme court of 5 justices, appointed by the president. The governor appoints the judges of the lower courts: 17 judges of 9 district courts, the judges and officials of the 36 municipal courts, and the justices of the peace.

Puerto Rico has a resident commissioner in Washington who has a voice but not a vote in the House of Representatives.

Virgin Islands. The Virgin islands, formerly known as the Danish West Indies, were purchased by the United States from Denmark in 1917, for 25 million dollars. At first all governing powers were vested in the governor. By the organic act of 1936 legislative powers are exercised by the two municipal councils of St. Thomas-St. John and St. Croix, who meet in joint session once a year to act on matters common to all the islands. The governor, appointed by the president, has limited veto power. The suffrage is extended to residents who are United States citizens and can read and write the English language. The islands are supervised by the Department of the Interior.

Canal Zone. By treaty with Panama, ratified 1904, the United States acquired title to the Canal Zone, a strip 10 miles wide, with use and control of waters and islands at each end of the canal for purposes of construction, maintenance, or defense of the canal. See *Panama.* This interoceanic strip is, by act of Congress of 1912, placed under the control of the president, who commits its administration to a governor, who is an army officer.

Guam. The largest island of the Ladrones or Marianas group, ceded to the United States by Spain in 1898. It is an important strategic outpost, an air and naval base, and a communications center.

Its affairs were formerly administered by the Navy department, a naval officer acting as governor; but by executive order of President Truman the civil administration was placed in charge of the Department of the Interior, the transfer being completed in June 1950. A month later U. S. citizenship was granted to the inhabitants.

The civil governor is appointed by the president. There is a Guamian Congress, made up of a House of Council and a House of Assembly, elected by the permanent residents. Its powers are largely advisory, but the veto of the governor may be overridden, and an appeal taken directly to Washington. There is a court of appeals, with an island court, a justice court, and a police court, without juries. The law administered is a code based on California law.

Guam was captured by the Japanese in December 1941, but was retaken by United States forces in July 1944. The capital and port of entry, Agana, was totally destroyed during World War II, but has since been rehabilitated.

Samoa. American Samoa, the principal island of which is Tutuila, was acquired by the United States through a tripartite treaty with Great Britain and Germany, November 14, 1899, whereby the other two countries renounced claims over this part of the Samoan islands. America had been in the islands, however, since 1872, when the harbor of Pago Pago was purchased from a native king. Since 1951 this dependency has been supervised by the Department of the Interior, with a civilian governor. Before that it was controlled by the Navy Department and a naval officer was governor. A bicameral legislature with advisory powers chosen by the Samoans was established in 1948. There are district and magistrates courts, and a High Court with a chief justice, who is an American civilian; all other judges are natives. Native lands may not be sold to foreigners.

Pacific Islands. A number of small islands in the Pacific have become important in naval defense, and for trans-Pacific aviation. These are:

Midway and *Kure* islands, 1200 miles northwest of Hawaii, claimed by the United States since 1869; under control of the Navy department.

Wake island, 2130 miles west of Hawaii; annexed in 1898 and under the Navy department. Midway and Wake figured prominently in World War II.

Johnston island, southwest of Hawaii; made a bird refuge under the Department of Agriculture in 1929.

Kingman island, on the direct route to Samoa; the smallest of our island possessions; under the Navy department.

Palmyra island, under the jurisdiction of Hawaii.

Swains island, under the jurisdiction of Samoa.

Howland, *Jarvis*, and *Baker* islands lie near the equator; they were assigned to the Interior department in 1936.

Canton and *Enderbury* islands, in the Phoenix group, were also claimed by Great Britain. In 1938 it was agreed to leave the question of title in abeyance, and they are used by both nations in common for aviation purposes.

The *Caroline*, *Marianas*, and *Marshall* islands, formerly a Japanese mandate under the League of Nations, are now administered by the United States as a Trustee under the United Nations.

Alaska. Alaska, including the Aleutian islands, was purchased from Russia in 1867 for $7,200,000. By an act of Congress of August 24, 1912, Alaska was made a "territory." It has an elective legislature of eight senators and twenty-four representatives, and a governor appointed by the president. Congress reserves to itself a large field of legislation, and much of Alaskan administration is conducted by departments at Washington.

Hawaiian Islands. The Hawaiian islands were under a native monarchy until 1893, when a revolution deposed the queen and set up a provisional government. On application of this government and by a resolution of Congress of July 7, 1898, the islands were annexed to the United States. They have a "territorial" form of government, consisting of an elective legislature of two houses, and a governor and a secretary appointed for four years by the president. The territory is represented in Congress by a delegate without vote.

Protectorates. During the first three decades of the 20th century, the United States acquired protectorates, official or unofficial, over Cuba, Panama, Haiti, Dominican Republic, and Nicaragua. These relationships were largely abrogated by treaty revision or withdrawal of troops during the administration of President F. D. Roosevelt beginning in 1933.

State	Capital	Legislature						
		Size of Legislature		Term of Members (Yrs.)		Frequency of Session	Limit of Regular Session	Salaries of Members for Regular Session Exclusive of Travel Allowance
		Sena's	Repre's	Sena's	Repre's			
Alabama	Montgomery	35	106	4	4	Biennial	36 days	$10 per diem *t*
Arizona	Phoenix	19	80	2	2	Annual	60 days	$8 per diem, 60 days *t*
Arkansas	Little Rock	35	100	4	2	Biennial	60 days	$1200 for term
California	Sacramento	40	80	4	2	Annual	None*e*	$6000 per annum
Colorado	Denver	35	65	4	2	Annual	None	$3600 per biennium
Connecticut	Hartford	36	279	2	2	Biennial	60 days	$600 per term
Delaware	Dover	17	35	4	2	Biennial	60 days	$1000 per annum.
Florida	Tallahassee	38	95	4	2	Biennial	60 days	$100 a month *h*
Georgia	Atlanta	54	205	2	2	Biennial	70 days	$10 per diem *t*
Idaho	Boise	44	59	2	2	Biennial	60 days	$10 per diem, 60 days
Illinois	Springfield	51	153	4	2	Biennial	None	$10,000 per biennium
Indiana	Indianapolis	50	100	4	2	Biennial	61 days	$1800 per annum
Iowa	Des Moines	50	108	4	2	Biennial	None	$2000 per biennium
Kansas	Topeka	40	125	4	2	Biennial	None	$5 per diem *t*
Kentucky	Frankfort	38	100	4	2	Biennial	60 days	$25 per diem
Louisiana	Baton Rouge	39	100	4	4	Biennial	60 days	$50 per diem.
Maine	Augusta	33	151	2	2	Biennial	None	$1250 per term
Maryland	Annapolis	29	123	4	4	Biennial	90 days	$1800 per annum
Massachusetts	Boston	40	240	2	2	Annual	None	$5200 per term
Michigan	Lansing	34	110	2	2	Annual	None	$4000 per annum
Minnesota	St. Paul	67	131	4	2	Biennial	90 days	$200 per month
Mississippi	Jackson	49	140	4	4	Biennial	None	$3000 per session
Missouri	Jefferson City	34	157	4	2	Biennial	None	$125 per month
Montana	Helena	56	90	4	2	Biennial	60 days	$20 per diem.
Nebraska *k*	Lincoln	43 Le	gislators;	2 yea	r term	Biennial	None	$872 per term
Nevada	Carson City	17	47	4	2	Biennial	60 days	$15 per diem
New Hampshire	Concord	24	400	2	2	Biennial	None	$200 per term
New Jersey	Trenton	21	60	4	2	Annual	None	$5000 per year
New Mexico	Santa Fe	32	66	4	2	Biennial	60 days*e*	$20 per diem.
New York	Albany	58	150*m*	2	2	Annual	None	$7500 per annum
North Carolina	Raleigh	50	120	2	2	Biennial	None	$15 per diem, 120 days
North Dakota	Bismarck	49	113	4	2	Biennial	60 days	$5 per diem, 60 days
Ohio	Columbus	34	139	2	2	Biennial	None	$5000 per annum
Oklahoma	Oklahoma City	44	121	4	2	Biennial	None	$15 a day when in session; $100 a month when not in session
Oregon	Salem	30	60	4	2	Biennial	50 days	$600 per annum
Pennsylvania	Harrisburg	50	210	4	2	Biennial	None	$3000 per session
Rhode Island	Providence	44	100	2	2	Annual	None	$5 per diem, 60 days.
South Carolina	Columbia	46	124	4	2	Annual	None	$1000 per annum
South Dakota	Pierre	35	75	2	2	Biennial	60 days	$1050 per term
Tennessee	Nashville	33	100	2	2	Biennial	None	$15 per diem, 75 days
Texas	Austin	31	150	4	2	Biennial	None	$25 per d. 120 da.; then $
Utah	Salt Lake City	25	64	4	2	Biennial	60 days	$500 per annum
Vermont	Montpelier	30	246	2	2	Biennial	None	$70 per week
Virginia	Richmond	40	100	4	2	Biennial	60 days*j*	$1080 per session
Washington	Olympia	46	99	4	2	Biennial	60 days	$1200 per annum
West Virginia	Charleston	32	94	4	2	Biennial	60 days	$1500 per annum
Wisconsin	Madison	33	100	4	2	Biennial	None	$4800 per biennium
Wyoming	Cheyenne	27	56	4	2	Biennial	40 days	$12 per diem

a Equals, for each state, number of Congressmen plus 2 U. S. Senators. *b* Not eligible to succeed himself. *c* Chief justice. *d* Afte succeed himself only once. *h* Maximum larger counties. *j* May be extended 30 days. *k* One-chamber legislature. *l* Plus expens sion. *r* Highest civil court. Highest criminal court is Court of Criminal. *s* Constitution allows only 3 consecutive term

STATE GOVERNMENTS

GOVERNOR		HIGHEST COURT					Votes in Electoral College *a* Total, 531	STATE
erm (rs.)	Salary	Name	How Chosen	Number of Judges	Term of Judges	Salaries of Judges		
4 *b*	$12,000	Supreme Court .	Elected	7	6 years . .	$12,000	11	Alabama
2	18,500	Supreme Court .	Elected	5	6 years . .	12,500	4	Arizona
2	10,000	Supreme Court .	Elected	7	8 years . .	9,000	8	Arkansas
4	25,000	Supreme Court .	Elected	7	12 years . .	24,000 *c* 23,000	32	California
2	17,500	Supreme Court .	Elected	7	10 years . .	12,000	6	Colorado
4	15,000	Supreme Court of Errors	By Governor and General Assembly	5	8 years . .	20,000 *c* 19,000	8	Connecticut
4 *g*	12,000	Supreme Court .	By Governor and Senate	3	12 years . .	17,500 *c* 17,000	3	Delaware
4 *b*	20,000	Supreme Court .	Elected	7	6 years . .	15,000	10	Florida
4	12,000	Supreme Court .	Elected	7	6 years . .	14,000	12	Georgia
4	10,000	Supreme Court .	Elected	5	6 years . .	8,500	4	Idaho
4	25,000	Supreme Court .	Elected	7	9 years . .	24,000	27	Illinois
4 *b*	15,000	Supreme Court .	Elected	5	6 years . .	15,000	13	Indiana
2	12,000	Supreme Court .	Elected	9	6 years . .	12,000	10	Iowa
2	15,000	Supreme Court .	Elected	7	6 years . .	12,000	8	Kansas
4 *b*	15,000	Court of Appeals	Elected	7	8 years . .	12,000	10	Kentucky
4 *b*	18,000	Supreme Court .	Elected	7	14 years . .	18,000	10	Louisiana
2	10,000	Supreme Judicial Court	By Governor and Council	6	7 years . .	13,000 *c* 12,000	5	Maine
4	15,000	Court of Appeals	Elected	5	15 years . .	20,000 *c* 19,000	9	Maryland
2	20,000	Supreme Judicial Court	By Governor and Council	7	Life . . .	22,000	16	Massachusetts
2	22,500	Supreme Court .	Elected.	8	8 years . .	18,500	20	Michigan
2	15,000	Supreme Court .	Elected	7	6 years . .	14,500 *c* 13,500	11	Minnesota
4 *b*	15,000	Supreme Court .	Elected	9	8 years . .	11,000	8	Mississippi
4 *b*	25,000	Supreme Court .	Elected	7	12 years . .	17,500	13	Missouri
4	12,000	Supreme Court .	Elected	5	6 years . .	11,000	4	Montana
2	11,000	Supreme Court .	Elected	7	6 years . .	12,000	6	Nebraska
4	15,000	Supreme Court .	Elected	3	6 years . .	16,500	3	Nevada
2	12,000	Supreme Judicial Court	By Governor and Council	5	Until 70 years of age	12,000	4	New Hampshire
4	30,000	Supreme Court	By Governor and Senate	7	7 years . .	25,000 *c* 24,000	16	New Jersey
2 *d*	15,000	Supreme Court .	Elected	5	8 years . .	15,000	4	New Mexico
4	50,000	Court of Appeals	Elected	7	14 years . .	35,500 *n*	45	New York
4 *b*	15,000	Supreme Court .	Elected	7	8 years . .	16,000	14	North Carolina
2	9,000	Supreme Court .	Elected	5	10 years . .	10,000	4	North Dakota
2	25,000	Supreme Court .	Elected	7	6 years . .	20,000 *c* 18,000	25	Ohio
4 *b*	15,000	Supreme Court *r*	Elected	9	6 years . .	12,500 *h*	8	Oklahoma
4 *g*	15,000	Supreme Court .	Elected	7	6 years . .	13,500	6	Oregon
4 *b*	25,000	Supreme Court .	Elected	7	21 years . .	25,500 *c* 25,000	32	Pennsylvania
2	15,000	Supreme Court .	By Legislature .	5	Life . . .	18,000 *c* 17,000	4	Rhode Island
4 *b*	15,000	Supreme Court .	By Legislature .	5	10 years . .	12,500 *l*	8	South Carolina
2	12,000	Supreme Court .	Elected	5	6 years . .	10,000	4	South Dakota
2 *s*	12,000	Supreme Court .	Elected	5	8 years . .	12,000	11	Tennessee
2	12,000	Supreme Court *r*	Elected	9	6 years . .	17,500	24	Texas
4	10,000	Supreme Court .	Elected	5	10 years . .	10,000	4	Utah
2	11,500	Supreme Court .	By Legislature .	5	2 years . .	10,500 *c* 10,000	3	Vermont
4	17,500 *q*	Supreme Court of Appeals	By Legislature .	7	12 years . .	12,500 *c* 12,000	12	Virginia
4	15,000	Supreme Court .	Elected	9	6 years . .	15,000	9	Washington
4 *b*	17,500	Supreme Court of Appeals	Elected	5	12 years . .	17,500	8	West Virginia
2	18,000	Supreme Court .	Elected	7	10 years . .	14,500 *c* 14,000	12	Wisconsin
4	12,000	Supreme Court .	Elected	3	8 years . .	11,000	3	Wyoming

two consecutive terms, not eligible to serve two terms thereafter. *e* Split or bifurcated. *f* Chief justice and chancellor. *g* Eligible to allowance. *m* Assemblymen. *n* Allowance for expenses, $3000 per annum. *p* Plus travel allowance. *q* Also maintenance of man- Maintenance during session.

SUFFRAGE REQUIREMENTS IN

A citizen of the United States includes male and female citizens of twenty-one years and over.

State	Requirements Other Than Citizenship	Previous Residence Required			
		In State	In County	In Town	In Precinct
Alabama	Literacy, payment of poll tax owed since 1901, (except members of armed forces), registration	2 years	1 year	3 months	3 months
Arizona	Literacy, registration	1 year	30 days	30 days	30 days
Arkansas	Payment of poll tax	1 year	6 months	1 month	1 month
California	Ability to read Constitution and write name, registration	1 year	3 months	.....	54 days
Colorado	Registration	1 year	90 days	30 days	10 days
Connecticut	Literacy, registration	1 year	.....	6 months	6 mos.‡
Delaware	Ability to read Constitution and write name, registration	1 year	3 months	.....	30 days
Florida	Registration	1 year	6 months	.....	.....
Georgia *a*	Either literacy, property ownership, service in U. S. war in person or through descent, or good moral character; payment of all past taxes; registration	1 year	6 months	.....	.....
Idaho	Registration	6 months	30 days	.....	.....
Illinois	Registration	1 year	90 days	30 days	30 days
Indiana	Registration	6 months	60 days	60 days*	30 days‡
Iowa	Registration	6 months	60 days	10 days	10 days
Kansas	Registration	6 months	.....	30 days*	30 days‡
Kentucky *a*	Registration	1 year	6 months	60 days	60 days
Louisiana	Literacy or good moral character, registration	2 years	1 year†	4 mos.§§	3 month
Maine	Ability to read Constitution and write name, registration	6 months	3 months	3 months	3 mos.‡
Maryland	Registration	1 year	6 months	6 months	1 day
Massachusetts	Ability to read Constitution and write name, registration	1 year	.....	6 mos.‡	.....
Michigan	Registration	6 months	.....	30 days*	.....
Minnesota	Registration	6 months	6 months	30 days	30 days
Mississippi	Literacy, property ownership (tax-clear), payment of poll tax (except members of armed forces), registration	2 years	1 year	1 year	1 year
Missouri	Registration	1 year	60 days	60 days‡	10 days
Montana	Registration	1 year	30 days	.....	30 days
Nebraska	Registration	6 months	40 days	10 days	10 days
Nevada	Registration	6 months	30 days	10 days	10 days
New Hampshire	Literacy, registration	6 months	.....	6 months	6 month
New Jersey	Registration	1 year	5 months	.....	.....
New Mexico	Registration	1 year	90 days	30 days	30 days
New York	Ability to read and write English, registration	1 year	4 months	30 days‡	.....
North Carolina	Literacy, registration	1 year	4 months	4 months	4 month
North Dakota	Registration	1 year	90 days	.....	30 days
Ohio	Registration	1 year	40 days	.....	40 days
Oklahoma	Registration	1 year	6 months	.....	30 days
Oregon	Literacy, registration	6 months	.....	.....	30 days
Pennsylvania	Registration	1 year	2 months	.....	2 month
Rhode Island	Registration	2 years	.....	6 mos.††	.....
South Carolina	Literacy or property ownership; payment of poll tax (except members of armed forces), registration	2 years	1 year	4 months	4 month
South Dakota	Registration	1 year	90 days	.....	30 days
Tennessee	Payment of poll tax (or military service), registration	1 year	6 months	.....	.....
Texas	Payment of poll tax (except members of armed forces).	1 year	6 months	.....	6 mos.‡
Utah	Registration	1 year	4 months	.....	60 days
Vermont	Registration	1 year	3 months	3 months	3 mos.‡
Virginia	Payment of poll tax due in three preceding years, registration, literacy	1 year	6 months	30 days	30 days
Washington	Ability to read or speak English, registration	1 year	90 days	30 days	30 days
West Virginia	Registration	1 year	60 days	.....	.....
Wisconsin	Registration	1 year	.....	10 days	10 days
Wyoming	Literacy, registration	1 year	60 days	10 days	10 days

*In township. †In parish. ‡In election district. §In cities of over 10,000 inhabitants. **Except veterans. ††In town or cit
a. 18 year olds may vote.

ALL STATES OF THE UNION

Residents of Washington, D. C., while citizens of the United States, do not have the right to vote.

Grounds for Disqualification, in Addition to Idiocy, Insanity, and Conviction of Felony	Adult Population 1950 Census	Votes Cast Presidential Election 1956‡‡	State
Bribery, malfeasance, election crimes, vagrancy after conviction, immorality	1,747,759	495,012	Alabama
	441,889	290,173	Arizona
	1,112,866	406,572	Arkansas
Bribery, malfeasance, dueling, being a Chinese	7,211,825	5,194,924	California
Status under guardianship, incarceration	844,748	663,074	Colorado
Bribery, dueling, immorality	1,382,373	1,116,916	Connecticut
Bribery, pauperism, corrupt practices (10 years' disfranchisement)	210,918	177,478	Delaware
Betting on elections, bribery, dueling, malfeasance, status under guardianship, incarceration	1,823,513	1,125,759	Florida
Immorality, illiteracy	2,008,828	668,682	Georgia
Status of untaxed Indian, immorality, incarceration, bigamy, bribery	349,016	272,973	Idaho
Penitentiary sentence, election offenses (5 years' disfranchisement)	5,958,601	4,407,351	Illinois
Incarceration, bribery, betting on elections	2,556,467	1,974,607	Indiana
	1,694,619	1,211,803	Iowa
Bribery, dueling, status under guardianship, dishonorable discharge from office	1,242,541	914,537	Kansas
Bribery, incarceration, maintenance in institution	1,742,978	1,053,805	Kentucky
Maintenance in institutions except soldiers' homes, "interdicted" persons, bribery, incarceration	1,587,145	617,544	Louisiana
Pauperism, status under guardianship, being an untaxed Indian, bribery, betting on elections	576,840	351,706	Maine
Bribery, election crimes	1,527,089	932,340	Maryland
Election crimes, pauperism, status under guardianship, bribery	3,206,104	2,388,129	Massachusetts
Dueling, being an Indian in tribal status	4,106,606	3,056,045	Michigan
Status under guardianship, being an Indian in uncivilized status, bribery	1,910,153	1,340,005	Minnesota
Bribery, dueling, bigamy, status of untaxed Indian	1,208,023	248,142	Mississippi
Actual service in army or navy, pauperism, incarceration, bribery, maintenance in institution**	2,643,129	1,833,673	Missouri
	372,345	271,226	Montana
	860,391	558,303	Nebraska
Dueling, incarceration, maintenance in institution	107,173	96,716	Nevada
Pauperism	352,780	266,994	New Hampshire
Pauperism, bribery	3,354,160	2,493,774	New Jersey
Status of an untaxed Indian	375,387	253,927	New Mexico
Betting on elections, bribery	10,374,446	7,187,048	New York
	2,311,071	1,165,592	North Carolina
Status under guardianship, bribery	366,590	253,986	North Dakota
Bribery	5,279,761	3,702,265	Ohio
Status of a non-native Indian, maintenance in institution,** incarceration**	1,382,108	859,350	Oklahoma
Conviction of penitentiary crime, but legislature may exempt.	1,001,716	733,692	Oregon
Bribery, election crimes	6,997,219	4,557,135	Pennsylvania
Bribery, pauperism, status under guardianship, being an Indian of Narraganset tribe	538,124	384,159	Rhode Island
Bribery, dueling, election crimes, pauperism, bigamy, immorality	1,150,867	299,968	South Carolina
Status under guardianship, bribery	401,156	294,192	South Dakota
Bribery	1,978,548	939,404	Tennessee
Bribery, dueling, pauperism, actual service in army or navy	4,737,225	1,955,545	Texas
Election crimes, bribery	389,843	335,546	Utah
Bribery, conviction within five years of violating absent voters law	237,552	152,978	Vermont
Bribery, dueling, pauperism	2,025,339	697,978	Virginia
Status as an untaxed Indian	1,559,266	1,085,553	Washington
Bribery in election, pauperism	1,171,878	821,883	West Virginia
Betting on elections, dueling, status under guardianship, bribery	2,222,423	1,550,558	Wisconsin
Betting on elections	178,581	124,166	Wyoming

‡‡Total vote cast in the United States was 62,025,576. Adult population in 48 states was 97,403,307. §§In municipality.

POPULAR AND ELECTORAL VOTE FOR PRESIDENT AND VICE PRESIDENT FROM 1789 TO THE PRESENT

Strictly speaking, there is no popular vote for president and vice president; the people vote for electors, and those chosen in each state meet therein and vote for the candidates for president and vice president. The record of any popular vote for electors prior to 1824 is so meager and imperfect that a compilation would be useless. In most of the states, for more than a quarter century following the establishment of the government, the state legislatures "appointed" the presidential electors, and the people therefore voted only indirectly for them, their choice being expressed by their votes for members of the legislature. In this tabulation, only the electoral vote for candidates for president and vice president in the first nine quadrennial elections appears. In a few instances, candidates receiving an extremely insignificant number of votes have been omitted.

ABBREVIATIONS: Amer., American; Antimas., Antimasonic; Cm., Communist; Const. Un., Constitutional Union; D. or Dem., Democrat; D. & L. R., Democrat and Liberal Republican; Dem.-Rep., Democratic Republican; Far.-L., Farmer-Labor; Fed., Federalist; F. S., Free Soil; F. S. D., Free Soil Democrat; Gr'b., Greenback; Ind., Independent; Indep., Independence; L., Labor; Nat. Rep., National Republican; P., Populist; Prog., Progressive; Pro., Prohibition; Rep., Republican; Soc., Socialist; Soc. Dem., Social Democrat; Soc. L., Socialist Labor; St. R., States' Rights; Temp., Temperance; U. L., Union Labor.

YEAR	Presidential Candidates	State	Party	VOTE				CANDIDATES FOR VICE PRESIDENT		
				States Voting	Total Vote	Electoral Vote	Popular Vote	Name	State	Electoral Vote
1789*	George Washington	Va.	. . . . .	10†	73	69	. . . . .	John Adams	Mass.	34
	John Adams	Mass.	. . . . .	. .	. .	34				
	John Jay	N. Y.	. . . . .	. .	. .	9				
	R. H. Harrison . .	Md.	. . . . .	. .	. .	6				
	John Rutledge . . .	S. C.	. . . . .	. .	. .	6				
	John Hancock . . .	Mass.	. . . . .	. .	. .	4				
	George Clinton . .	N. Y.	. . . . .	. .	. .	3				
	Samuel Huntington	Conn.	. . . . .	. .	. .	2				
	John Milton	Ga.	. . . . .	. .	. .	2				
	James Armstrong .	Ga.	. . . . .	. .	. .	1				
	Benjamin Lincoln .	Mass.	. . . . .	. .	. .	1				
	Edward Telfair. . .	Ga.	. . . . .	. .	. .	1				
	Vacancies††	. .	. . . . .	. .	. .	4				
1792	George Washington	Va.	Fed. . . .	15	135	132	. . . . .	John Adams	Mass.	77
	John Adams	Mass.	Fed. . . .	. .	. .	77				
	George Clinton . .	N. Y.	Dem.-Rep.‡	. .	. .	50				
	Thomas Jefferson .	Va.	. . . . .	. .	. .	4				
	Aaron Burr	N. Y.	. . . . .	. .	. .	1				
1796	John Adams	Mass.	Fed. . .	16	138	71	. . . . .	Thomas Jefferson . .	Va.	68
	Thomas Jefferson .	Va.	Dem.-Rep.	. .	. .	68				
	Thomas Pinckney .	S. C.	Fed. . . .	. .	. .	59				
	Aaron Burr	N. Y.	Antifed. .	. .	. .	30				
	Samuel Adams . .	Mass.	Dem.-Rep.	. .	. .	15				
	Oliver Ellsworth . .	Conn.	Fed. . . .	. .	. .	11				
	George Clinton . .	N. Y.	Dem.-Rep.	. .	. .	7				
	John Jay	N. Y.	Ind.-Fed. .	. .	. .	5				
	James Iredell . . .	N. C.	Fed. . . .	. .	. .	3				
	George Washington	Va.	Fed. . . .	. .	. .	2				
	John Henry	Md.	Ind. . . .	. .	. .	2				
	S. Johnston	N. C.	Ind.-Fed. .	. .	. .	2				
	C. C. Pinckney. . .	S. C.	Ind.-Fed. .	. .	. .	1				
1800	Thomas Jefferson .	Va.	Dem.-Rep.	16	138	73§	. . . . .	Aaron Burr	N. Y.	73
	Aaron Burr	N. Y.	Dem.-Rep.	. .	. .	73§				
	John Adams	Mass.	Fed. . . .	. .	. .	65				
	C. C. Pinckney. . .	S. C.	Fed. . . .	. .	. .	64				
	John Jay	N. Y.	Fed. . . .	. .	. .	1				
1804	Thomas Jefferson .	Va.	Dem.-Rep.	17	176	162	. . . . .	George Clinton . . .	N. Y.	162
	C. C. Pinckney. . .	S. C.	Fed. . . .	. .	. .	14	. . . . .	Rufus King	N. Y.	14
1808	James Madison . .	Va.	Dem.-Rep.	17	176	122	. . . . .	George Clinton . . .	N. Y.	113
	C. C. Pinckney. . .	S. C.	Fed. . . .	. .	. .	47	. . . . .	Rufus King	N. Y.	47
	George Clinton . .	N. Y.	Ind.-Rep.	. .	. .	6	. . . . .	John Langdon . . .	N. H.	9
	Vacancy.	. .	. . . . .	. .	. .	1				
								James Madison . .	Va.	3
								James Monroe . . .	Va.	3
1812	James Madison . .	Va.	Dem.-Rep.	18	218	128	. . . . .	Elbridge Gerry . . .	Mass.	131
	De Witt Clinton . .	N. Y.	Fusion . .	. .	. .	89	. . . . .	Jared Ingersoll . . .	Pa.	86
1816	James Monroe . . .	Va.	Rep. . . .	19	221	183	. . . . .	D. D. Tompkins . .	N. Y.	183
	Rufus King	N. Y.	Fed. . . .	. .	. .	34	. . . . .	John E. Howard . .	Md.	22
	Vacancies	. .	. . . . .	. .	. .	4	. . . . .	James Ross	Pa.	5
								John Marshall . . .	Va.	4
								Robert G. Harper .	Md.	3

* Prior to 1804 each elector was entitled to vote for two candidates for president. The candidate receiving the greatest number of votes was declared elected, while the candidate receiving the next highest vote was declared vice president.

† Three states not voting. New York legislature failed to agree on electors; N. Carolina and Rhode Island had not ratified the Constitution.

‡ The Democratic-Republican (also called Republican) party was the predecessor of the present Democratic party.

†† "Vacancies" means electors absent or not voting.

§ As there was no election the choice was decided by the House of Representatives.

POPULAR AND ELECTORAL VOTE FOR PRESIDENT AND VICE PRESIDENT FROM 1789 TO THE PRESENT—Con.

Year	Presidential Candidates	State	Party	Vote				Candidates for Vice President		
				States Voting	Total Vote	Electoral Vote	Popular Vote	Name	State	Electoral Vote
1820	James Monroe	Va.	Rep.	24	235	231		D. D. Tompkins	N. Y.	218
	John Q. Adams	Mass.	Ind.-Rep.			1		Richard Stockton	N. J.	8
	Vacancy							Daniel Rodney	Del.	4
								Robert G. Harper	Md.	1
								Richard Rush	Pa.	1
1824	John Q. Adams	Mass.	No party	24	261	84§	108,740	John C. Calhoun	S. C.	182
	Andrew Jackson	Tenn.				99§	153,544	Nathan Sanford	N. Y.	30
	Henry Clay	Ky.				37	47,136	Nathaniel Macon	N. C.	24
	W. H. Crawford	Ga.				41	46,618	Andrew Jackson	Tenn.	13
								Martin Van Buren	N. Y.	9
								Henry Clay	Ky.	2
	Vacancy									1
1828	Andrew Jackson	Tenn.	Dem.	24	261	178	647,286	John C. Calhoun	S. C.	171
	John Q. Adams	Mass.	Nat. Rep.			83	508,064	Richard Rush	Pa.	83
								William Smith	S. C.	7
1832	Andrew Jackson	Tenn.	Dem.	24	288	219	687,502	Martin Van Buren	N. Y.	189
	Henry Clay	Ky.	Nat. Rep.			49	530,189	John Sergeant	Pa.	49
	John Floyd	Ga.	Ind.-Dem.			11		Henry Lee	Mass.	11
	William Wirt	Md.	Antimas.			7		Amos Ellmaker	Pa.	7
	Vacancies					2		William Wilkins	Pa.	30
1836	Martin Van Buren	N. Y.	Dem.	26	294	170	762,978	R. M. Johnson	Ky.	147
	Wm. H. Harrison	Ohio	Whig.			73	736,250	Francis Granger	N. Y.	77
	Hugh L. White	Tenn.	Whig.			26		John Tyler	Va.	47
	Daniel Webster	Mass.	Whig.			14		William Smith	Ala.	23
	W. P. Mangum	N. C.	Ind.			11				
1840	Wm. H. Harrison	Ohio	Whig.	26	294	234	1,275,016	John Tyler	Va.	234
	Martin Van Buren	N. Y.	Dem.			60	1,129,102	R. M. Johnson	Ky.	48
	James G. Birney	N. Y.	Liberty				7,069	L. W. Tazewell	Va.	11
								James K. Polk	Tenn.	1
1844	James K. Polk	Tenn.	Dem.	26	275	170	1,337,243	George M. Dallas	Pa.	170
	Henry Clay	Ky.	Whig			105	1,299,062	T. Frelinghuysen	N. J.	105
	James G. Birney	N. Y.	Liberty				62,300	Thomas Morris	Ohio	
1848	Zachary Taylor	La.	Whig.	30	290	163	1,360,099	Millard Fillmore	N. Y.	163
	Lewis Cass	Mich.	Dem.			127	1,220,544	Wm. O. Butler	Ky.	127
	Martin Van Buren	N. Y.	F. S.				291,263	Chas. F. Adams	Mass.	
1852	Franklin Pierce	N. H.	Dem.	31	296	254	1,601,474	William R. King	Ala.	254
	Winfield Scott	N. J.	Whig.			42	1,386,580	Wm. A. Graham	N. C.	42
	John P. Hale	N. H.	F. S. D.				155,825	George W. Julian	Ind.	
1856	James Buchanan	Pa.	Dem.	31	296	174	1,838,169	J. C. Breckinridge	Ky.	174
	John C. Fremont	Cal.	Rep.			114	1,341,264	Wm. L. Dayton	N. J.	114
	Millard Fillmore	N. Y.	Amer.			8	874,534	A. J. Donelson	Tenn.	8
1860	Abraham Lincoln	Ill.	Rep.	33	303	180	1,866,452	Hannibal Hamlin	Me.	180
	J. C. Breckinridge	Ky.	Dem.			72	849,781	Joseph Lane	Ind.	72
	Stephen A. Douglas	Ill.	Dem.			12	1,376,957	H. V. Johnson	Ga.	12
	John Bell	Tenn.	Const. Un.			39	588,879	Edward Everett	Mass.	39
1864	Abraham Lincoln	Ill.	Rep.	36	314	212	2,216,037	Andrew Johnson	Tenn.	212
	Geo. B. McClellan	N. J.	Dem.			21	1,802,237	G. H. Pendleton	Ohio	21
1868	Ulysses S. Grant	Ill.	Rep.	37	317	214	3,015,071	Schuyler Colfax	Ind.	214
	Horatio Seymour	N. Y.	Dem.			80	2,709,615	F. P. Blair, Jr.	Mo.	80
	Not counted					23				
1872	Ulysses S. Grant	Ill.	Rep.	37	366	286	3,597,132	Henry Wilson	Mass.	286
	Horace Greeley	N. Y.	D. & L. R.			||	2,834,125	B. Gratz Brown	Mo.	47
	Charles O'Conor	N. Y.	Straight D.				29,489	John Q. Adams	Mass.	
	James Black	Pa.	Temp.				5,608	John Russell	Mich.	
	Thos. A. Hendricks	Ind.	Ind.-Dem.			42		Geo. W. Julian	Ind.	5
	B. Gratz Brown	Mo.	Dem.			18		A. H. Colquitt	Ga.	5
	Charles J. Jenkins	Ga.	Dem.			2		J. M. Palmer	Ill.	3
	David Davis	Ill.	Dem.			1		T. E. Bramlette	Ky.	3
	Not counted					17		W. S. Groesbeck	Ohio	1
								W. B. Machen	Ky.	1
								N. P. Banks	Mass.	1
1876	Ruth'd B. Hayes	Ohio	Rep.	38	369	185	4,033,768	Wm. A. Wheeler	N. Y.	185
	Samuel J. Tilden	N. Y.	Dem.			184	4,285,992	T. A. Hendricks	Ind.	184
	Peter Cooper	N. Y.	Gr'b.				81,737	Samuel F. Cary	Ohio	
1880	James A. Garfield	Ohio	Rep.	38	369	214	4,449,053	Chester A. Arthur	N. Y.	214
	Win'd S. Hancock	Pa.	Dem.			155	4,442,035	Wm. H. English	Ind.	155
	James B. Weaver	Iowa	Gr'b.				307,306	B. J. Chambers	Tex.	

§ As there was no election the choice was decided by the House of Representatives.
|| Owing to the death of Horace Greeley the Democratic electors scattered their vote.

POPULAR AND ELECTORAL VOTE FOR PRESIDENT AND VICE PRESIDENT FROM 1789 TO THE PRESENT—Con.

Year	Presidential Candidates	State	Party	Vote				Candidates for Vice President		
				States Voting	Total Vote	Electoral Vote	Popular Vote	Name	State	Electoral Vote
1884	Grover Cleveland	N. Y.	Dem.	38	401	219	4,911,017	T. A. Hendricks	Ind.	219
	James G. Blaine	Me.	Rep.			182	4,848,334	John A. Logan	Ill.	182
	John P. St. John	Kans.	Pro.				133,825	William Daniel	Md.	
1888	Benjamin Harrison	Ind.	Rep.	38	401	233	5,440,216	Levi P. Morton	N. Y.	233
	Grover Cleveland	N. Y.	Dem.			168	5,538,233	A. G. Thurman	Ohio	168
	Clinton B. Fisk	N. J.	Pro.				249,907	John A. Brooks	Mo.	
1892	Grover Cleveland	N. Y.	Dem.	44	444	277	5,556,918	A. E. Stevenson	Ill.	277
	Benjamin Harrison	Ind.	Rep.			145	5,176,108	Whitelaw Reid	N. Y.	145
	James B. Weaver	Iowa	People's			22	1,041,028	James G. Field	Va.	22
1896	William McKinley	Ohio	Rep.	45	447	271	7,035,638	Garret A. Hobart	N. J.	271
	William J. Bryan	Nebr.	Dem.					Arthur Sewall	Me.	149
	William J. Bryan	Nebr.	People's			176	6,467,946	Th. E. Watson	Ga.	27
1900	William McKinley	Ohio	Rep.	45	447	292	7,219,530	Theo. Roosevelt	N. Y.	292
	William J. Bryan	Nebr.	Dem. & P.			155	6,358,071	A. E. Stevenson	Ill.	155
	John G. Woolley	Ill.	Pro.				209,166	Henry B. Metcalf	R. I.	
	Eugene V. Debs	Ind.	Soc. Dem.				94,768	Job Harriman	Cal.	
1904	Theodore Roosevelt	N. Y.	Rep.	45	476	336	7,628,834	Charles W. Fairbanks	Ind.	336
	Alton B. Parker	N. Y.	Dem.			140	5,084,491	Henry G. Davis	W. Va.	140
	Eugene V. Debs	Ind.	Soc.				402,400	Benjamin Hanford	N. Y.	
1908	William H. Taft	Ohio	Rep.	46	483	321	7,679,006	James S. Sherman	N. Y.	321
	William J. Bryan	Nebr.	Dem.			162	6,409,106	John W. Kern	Ind.	162
	Eugene V. Debs	Ind.	Soc.				420,820	Benjamin Hanford	N. Y.	
	Eugene W. Chafin	Ill.	Pro.				252,683	Aaron S. Watkins	Ohio	
1912	Woodrow Wilson	N. J.	Dem.	48	531	435	6,286,214	Thos. R. Marshall	Ind.	435
	William H. Taft	Ohio	Rep.			8	3,483,922	Nicholas M. Butler	N. Y.	8
	Theodore Roosevelt	N. Y.	Prog.			88	4,126,620	Hiram W. Johnson	Cal.	88
	Eugene V. Debs	Ind.	Soc.				897,011	Emil Seidel	Wis.	
1916	Woodrow Wilson	N. J.	Dem.	48	531	277	9,129,606	Thos. R. Marshall	Ind.	277
	Chas. E. Hughes	N. Y.	Rep.			254	8,538,221	Chas. W. Fairbanks	Ind.	254
	A. L. Benson	N. Y.	Soc.				585,113	G. R. Kirkpatrick	N. J.	
1920	Warren G. Harding	Ohio	Rep.	48	531	404	16,152,200	Calvin Coolidge	Mass.	404
	James M. Cox	Ohio	Dem.			127	9,147,353	Franklin D. Roosevelt	N. Y.	127
	Eugene V. Debs	Ind.	Soc.				919,799	Seymour Stedman	Ill.	
	P. P. Christensen	Utah	Far.-L.				265,411	Max S. Hayes	Ohio	
1924	Calvin Coolidge	Mass.	Rep.	48	531	382	15,725,016	Charles G. Dawes	Ill.	382
	John W. Davis	W. Va.	Dem.			136	8,385,586	Charles W. Bryan	Neb.	136
	Robert LaFollette	Wis.	Prog.			13	4,822,856	Burton K. Wheeler	Mont.	13
1928	Herbert Hoover	Cal.	Rep.	48	531	444	21,392,190	Charles Curtis	Kans.	444
	Alfred E. Smith	N. Y.	Dem.			87	15,016,443	Joseph T. Robinson	Ark.	87
	Norman M. Thomas	N. Y.	Soc.				267,420	James H. Maurer	Pa.	
	William Z. Foster	Ill.	Workers				48,770	Benjamin Gitlow	N. Y.	
1932	Franklin D. Roosevelt	N. Y.	Dem.	48	531	472	22,821,857	John N. Garner	Tex.	472
	Herbert Hoover	Cal.	Rep.			59	15,761,841	Charles Curtis	Kans.	59
	Norman M. Thomas	N. Y.	Soc.				884,781	James H. Maurer	Pa.	
	William Z. Foster	Ill.	Workers				102,991	James W. Ford	Ala.	
1936	Franklin D. Roosevelt	N. Y.	Dem.	48	531	523	27,752,309	John N. Garner	Tex.	523
	Alfred M. Landon	Kans.	Rep.			8	16,682,524	Frank R. Knox	Ill.	8
	William Lemke	N. D.	Union				892,793	Thomas C. O'Brien	Mass.	
	Norman Thomas	N. Y.	Soc.				187,342	George A. Nelson	Wis.	
	Earl Browder	Kans.	Cm.				80,096	James W. Ford	Ala.	
1940	Franklin D. Roosevelt	N. Y.	Dem.	48	531	449	27,245,422	Henry A. Wallace	Iowa	449
	Wendell L. Willkie	N. Y.	Rep.			82	22,333,801	Charles L. McNary	Ore.	82
	Norman Thomas	N. Y.	Soc.				116,796	Maynard C. Kreuger	Ill.	
	Roger W. Babson	Mass.	Pro.				58,674	Edgar V. Moorman	Ill.	
	Earl Browder	Kans.	Cm.				49,028	James W. Ford	Ala.	
1944	Franklin D. Roosevelt	N. Y.	Dem.	48	531	432	25,602,505	Harry S. Truman	Mo.	432
	Thomas E. Dewey	N. Y.	Rep.			99	22,006,278	John W. Bricker	Ohio	99
	Norman Thomas	N. Y.	Soc.				80,518	Darlington Hoopes	Pa.	
	Claude A. Watson	Cal.	Pro.				74,758	Andrew Johnson	Ky.	
1948	Harry S. Truman	Mo.	Dem.	48	531	304	24,045,052	Alben W. Barkley	Ky.	304
	Thomas E. Dewey	N. Y.	Rep.			189	21.896,927	Earl Warren	Cal.	189
	J. Strom Thurmond	S. C.	St. R.			38	1,168,687	Fielding L. Wright	Miss.	38
	Henry A. Wallace	Iowa	Prog.				1,137,957	Glen Taylor	Ida.	
	Norman Thomas	N. Y.	Soc.				95,908	Tucker P. Smith	Mich.	
1952	Dwight D. Eisenhower	N. Y.	Rep.	48	531	442	33,927,549	Richard M. Nixon	Cal.	442
	Adlai E. Stevenson	Ill.	Dem.			89	27,311,316	John J. Sparkman	Ala.	89
1956	Dwight D. Eisenhower	N. Y.	Rep.	48	531	457	35,575,420	Richard M. Nixon	Cal.	457
	Adlai E. Stevenson	Ill.	Dem.			73*	26,033,065	Estes Kefauver	Tenn.	73

*One presidential elector on the Democratic ticket did not vote for Stevenson.

FOREIGN GOVERNMENTS

The section on foreign governments comprises accounts of all independent states recognized as possessing "sovereignty" and capable of conducting diplomatic relations. The recognized conduct of foreign affairs through fully accredited diplomatic agents is generally regarded as a test of "sovereignty." "Protectorates," or states whose freedom of action has been limited by treaties with foreign states, in return for guarantees of external security and assistance in internal administration, are included in the list of separately enumerated countries. With these are included countries under "mandate," which, in accordance with the language of the Covenant of the League of Nations, "have reached a state of development where their existence as independent nations can be provisionally recognized"; this group originally included Egypt, Mesopotamia, Palestine, and Syria. "Dependencies," or countries fully subject to the sovereignty of a foreign state, are discussed under the title of the sovereign state.

A survey and an analysis of the governments that exist today lead to the conclusion that the traditional classification of governmental forms is far from adequate for understanding the political world of today.

As used by Aristotle, who based his theory on observation of the Greek city-states, the normal forms are: monarchy, the rule of one man; aristocracy, the rule of a class; and democracy, the rule of the whole people. Aristotle thought that each of these tended to degenerate into its worse form: monarchy into tyranny, from which relief was sought in aristocracy; this into a narrow oligarchy, overthrown by a popular uprising; and then the democracy, failing to select its best leaders and split into selfish factions, turns in despair to the rule of one strong man—and the cycle begins again.

Aristotle's theory is somewhat too symmetrical to be accurate. Moreover, his classification dealt entirely with political forms, and disregarded the economic forces so significant in the modern community, but of less importance in the Greek states. For the modern world, a division into limited monarchies and republics would come nearer to the actual facts. Absolute monarchy can hardly be said to exist today; nor, on the other hand, has pure democracy ever been workable on a large scale. The representative democracy, or republic, is the nearest approach to it that has yet been devised.

But from the fundamental standpoint of the relation between the individual and his government, even this division is sometimes misleading. Great Britain and the Scandinavian countries are monarchies in form, but individual freedom of action in normal times is if anything less restricted there than in the republic of France or in some Latin-American republics. Individual freedom has been secured in modern states by constitutions, or fundamental laws, not easily changed, which protect the individual against the arbitrary action of the government.

The general course of modern political development, as illustrated by the history of some of the countries here described, has been from a strong, if not absolute monarchy, to a recognition, actual if not formal, of the will of the people as the ultimate authority. The 19th century was the period of the growth of individual freedom, political and personal, accompanied by the fulfillment, to some extent, of nationalistic aspirations. The constitutional monarchy, with the monarch retained as a matter of tradition and sentiment (and sometimes of convenience) became the accepted form of government in Europe. In the New World the necessities of the situation led to republican forms.

At the end of World War I the republican form seemed to be dominant. The economic forces, however, which had been working so strongly during the 19th century, were intensified by the economic dislocation resulting from the war. A new form of dictatorship has appeared in many countries, either above or within the framework of the republican constitution. In some instances, land-owning classes within the state appear to hold the real power and to constitute aristocracies, even under democratic forms of government. Such, for instance, has been the situation in Cuba and Paraguay. Leading European countries, as well as Japan, exhibit a concentration of power even more extreme through control of money and credit, a situation which has led directly to the rise of two new types of government. One, assuming full power over the economic life of the nation in the professed interest of workers, is known inaccurately as Communism. Russia is its exemplar. The other, known as Fascism, or the corporate state, also exercises full control over economic activities, but weighs this control in the interest of the propertied classes. Italy and Germany exemplified this type. Underlying this change is the conviction that a government is no longer neutral in the clash of economic interests and classes, each of which seeks to make governmental authority its servant.

But these two forms, however different their starting point, tend to the same goal, the complete subjection of the individual to the state. This theory of society is in direct opposition to that of democracy, which regards the well-being of the individual as of major importance, and the state as the servant, not the master. Hence the opposition of ideas today is not between monarchies and republics, but between totalitarian or authoritarian systems and democracy as it has been worked out in England and the United States.

A Political Panorama. The governments described in this section comprise a political panorama of mankind outside the United States. The methods of rule depicted range from the simple tribal government found in Saudi Arabia to the democracies represented by Great Britain, Switzerland, and the Scandinavian countries. Other governments reflect by their organization a struggling toward national consciousness on the part of peoples surrounded by more advanced nations eager to take advantage of their neighbors' weakness. China and Iran (Persia) are examples.

Classification.—The distinction between a fully independent state, a protectorate, and a dependency may sometimes be difficult to make, on theoretical grounds, as certain dependent countries appear to be moving toward independence, while others tend to retrograde toward a more subordinate status. But, in general, protectorates are recognized by the fact that while some of their activities are limited by their relations to a protecting power, they do not lose their international status; they retain their own flags and armed forces and are accorded the public respect due sovereign states.

The number of modern states, sustaining relations as theoretical equals, has risen constantly during the last hundred years. In 1907, 48 states were invited to send representatives to the second Hague Conference and this was the number considered to form the "family of nations" at that date. The number of independent states was increased by World War I. Following World War II, there were in 1951 sixty members of the United Nations, but there were a dozen or more countries not members, including such European states as Albania, Austria, Bulgaria, Finland, Hungary, Ireland, Italy, Portugal, Spain, and Vatican City, which is a special type of state.

Distribution of independent countries by continents shows that Europe has the most, with Asia and Oceania taking second place, followed by Central and South America. Then comes North America and Africa, the former, including the West Indies, with six, the latter with four.

In addition to these nations there are a number in the twilight zone between independence and

dependency. They include Outer Mongolia, Andorra, San Marino, and Morocco.

Throughout the section, each clearly independent nation is given separate treatment with a description of its governmental framework followed by a brief account of its dependencies. The members of the British Commonwealth of Nations are brought together under the general head of *British Empire*. Likewise the Central American republics are introduced together under the heading *Central American States* and then described separately in alphabetic arrangement. With these exceptions, the independent countries are arranged in one alphabetic series.

Extent of Treatment.—The following brief descriptions of modern states aim to take proper account of past political structure and of recent change. A few paragraphs furnish the facts concerning the rise of each state to an independent position; an outline of its government; the character of its local administration; and its frontiers as defined by treaty. Where a special institution has been devised by the political experience of a country, it is treated in some detail under that country, as "parliamentary government" in Great Britain; the "initiative and referendum" in Switzerland. Unless otherwise noted, governments are described as of 1939. In that and succeeding years, many governments were so affected by World War II that their status became uncertain.

Afghanistan. The government, formerly an absolute monarchy, became a constitutional monarchy in 1922 with a parliament consisting of a king, senate, and national assembly. The ruler, formerly the Amir, adopted the title of king in 1926. The senate is in continuous session; its 50 members are appointed for life by the king. The assembly of 171 members, elected from the administrative divisions of the country and from the clans, meets annually and may be summoned in extraordinary session. A grand assembly, purporting to represent the whole people is summoned at irregular intervals of about four years to consider the greater questions of policy referred to it by the king. The cabinet, presided over by a prime minister, includes ministers of war, foreign affairs, internal affairs, education, commerce, justice, health, public works, revenue, and posts and telegraphs.

The country is divided into five major provinces: Turkestan, Herat, Kabul, Kandahar, and Kataghan-Badakhshan, and four minor provinces, each under a governor (*naib* or *hakim*) with subordinate chiefs, *sirdars* or hereditary nobles, *khans* or popular representatives, and *mullahs* or leaders of the Mohammedan religion. This religion is predominant and law is based on the Mohammedan law. It is administered by local courts with a High Court at Kabul.

Afghanistan constitutes a mountainous barrier between Russia and India. Four routes cross this barrier and, by these, invading conquerors, such as Alexander the Great and Tamerlane, have passed to the conquest of India. The defense of this frontier was long regarded as the major task of British and Indian armies. Dread of Russian advance from the north, with its peril to the security of India, long affected British foreign policy.

Following the Afghan wars of 1839 and 1842, British Afghan relations were governed by the Treaty of Peshawar. A later war (1880) led to the establishment of British control over Afghanistan's foreign relations. In 1893, at a conference between Sir Mortimer Durand and Amir Abdur Rahman, an agreement was made for delimiting the frontier between Afghanistan and British Baluchistan and the North West Frontier Province of India.

British and Russian rival interests were adjusted in 1907 by a treaty which also defined their respective interests in Persia and in Tibet. Great Britain disavowed any intention further to alter the political status of Afghanistan and promised to exert a pacific influence upon that country. Russia recognized Afghanistan as outside of her sphere of influence and engaged to conduct her relations with that country through the British government. This treaty was denounced in 1918 by the Soviet government of Russia, which sent agents to Afghanistan. In February 1921, Afghanistan made a treaty with Moscow and in April made an alliance with the Turkish Nationalist government at Angora. In November 1921, a British mission succeeded in negotiating a treaty with the new amir, restoring British predominance.

Afghanistan is a member of the United Nations Organization. The United States has a Treaty of Friendship and Diplomatic and Consular Representation with Afghanistan, negotiated in 1936, and sends a minister to Kabul.

Albania (Skypanie). For the origin of this Balkan state and its conquest by Italy, see *History*. It regained its independence in 1944. In 1945 it set up a republic, on the model of Soviet Russia and Yugoslavia, with Enver Hoxha as its first president. This new government was recognized by the Allies, but in 1948 the U. S. and Britain broke off relations. It was admitted to the UN in December 1955.

Andorra. A small, neutral, autonomous republic in the Pyrenees, on the Franco-Spanish frontier. It is a surviving specimen of the semi-independence of feudal lordship, possessed in medieval times by many valleys of these mountains. It comprises 6 parishes and is governed by a council of 24 members elected for 4 years by men over 25 years old. A first and a second "syndic" are chosen by the council as presiding officers and executives of the republic. The state is under the joint suzerainty of the Spanish bishop of Urgel and the president of France, as successor to the Bourbon kings. These nominate the judges. Andorra pays nominal tribute to France and to the bishop.

Argentina (The Argentine Republic). Argentina arose out of the Spanish viceroyalty of La Plata. May 25, 1810, the city of Buenos Aires revolted and elected a provisional committee. July 9, 1816, the Congress of Tucuman declared the Argentinian provinces an independent republic. Spanish authority was never again recognized in Argentina, but independence was not completely secure until the battle of Ayacucho in Peru in 1824. Within the United Provinces of La Plata local feeling was strong, especially in Buenos Aires, and the opposition between state privileges and national authority has been a constant element in Argentine constitutional history. A period of internal struggle among local chiefs led up to the dictatorship of Juan Manuel de Rosas, from 1829 to 1852. Rosas was arbitrary, but he at least suppressed the local *Caudillos* (bosses) and gave a degree of order and unity. From 1852 orderly constitutional development has continued.

The present constitution which was adopted in 1949 follows generally the liberal constitution of 1853, but gives the central government greater control over the country's economy. It resembles the Constitution of the United States, particularly in its union of the provinces of the country into a federal republic. These provinces are 16, besides one federal district, Buenos Aires. In addition, there are 9 territories over which the national government has direct control. The provinces, like the American states, elect their own legislatures and governors and have a constitutional jurisdiction over provincial affairs. Powers not granted to the nation are retained by the provinces, but the Federal government has more extensive powers than those granted by the United States Constitution. This condition arises from the fact that the provinces were artificially created federal units and from the need felt for a strong central authority.

Executive Organization.—Under the American theory of separation of powers, the Federal government is declared to be divided into executive, legislative, and judicial departments. The executive authority is conferred upon a president who oc-

cupies the position of an independent executive, but who is limited by numerous constitutional provisions to prevent the abuse of authority or the assumption of dictatorship. Both president and vice president are elected indirectly through a college of electors, equal to double the number of senators and deputies in the Federal Congress, chosen by direct vote of the citizens of the 14 provinces. The tenure is 6 years. Amendments under President Perón in 1949 allowed the president to succeed himself, and increased his power. The vice president becomes president *pro tempore* if the president leaves the federal capital, which he may not do without the consent of Congress. Conditions of eligibility for election as president or vice president include: the age of 30 years; membership in the Roman Catholic Church; an annual minimum income of approximately $2000; and native birth or, in case of birth abroad, native parentage.

In addition to the usual powers of an American executive, the president of the Argentine Republic makes all appointments to federal offices without the limitation of senatorial confirmation, except in the appointment of magistrates of the supreme and superior courts, diplomatic representatives, governors of provinces, and officers of the army above the rank of colonel, where the advice and the consent of the Senate are required. The president is the administrative head of the government of the federal district. He has the right of presentation for appointment to bishoprics.

The president is assisted by a cabinet of eight ministers. They are appointed by the president, may be removed by him, and in practice are responsible to him alone, although a provision of the constitution declares that "every minister is responsible for the acts which he authorizes." Ministers cannot be members of Congress, but they may attend sessions and can be compelled to attend them. The president has the right of convoking Congress both in ordinary and in extraordinary sessions, and of proroguing it. There is no constitutional means to compel him to convoke Congress, a difficulty which has been severely criticized by Argentinian publicists.

The Congress.—The federal legislative authority is vested in a Congress composed of a Senate and a Chamber of Deputies. The 34 senators are elected by the legislatures of the 16 provinces and by a special body of electors in the federal district. The term is 6 years, one-third retiring every 3 years. The Senate is the judicial body in cases of impeachment.

Deputies are elected by the people in electoral districts based on population. The term is 6 years, half of the chamber being renewed every 3 years. All tax bills and bills for the raising of troops must originate in the Chamber of Deputies. To the deputies alone belongs the right of preferring charges of impeachment, which, by an unusual provision of the constitution, extends to common crimes as well as to constitutional offenses. The president has a veto power which may be overridden by a two-thirds vote of both houses.

Judiciary.—Argentinian private law is nationalized and expressed in civil, penal, commercial, and mining codes. The system of national and provincial courts and the division of jurisdiction between them resembles that of the United States. There is a national supreme court with five judges in Buenos Aires, and below it courts of appeals and district courts. Each province, like our states, has also its own system. Trial by jury is not generally used.

All boundary disputes have, happily, been concluded. (See *Chile, Bolivia, Brazil.*) After the war with Paraguay, 1864–70, the frontier was settled by a treaty of February 3, 1876, which determined the title to part of the disputed territory, and provided that the rights over the remainder should be submitted to the arbitration of the president of the United States. The decision was rendered by President Hayes.

Austria. Following World War I the dual monarchy of Austria-Hungary was dismembered by the Treaty of Versailles into Austria, Czechoslovakia, Hungary, and Yugoslavia. In 1918 Austria became a republic and continued as an independent state until forcibly annexed by the German Reich in 1938. After the liberation of Austria by the Allies in 1945, the republic was reestablished but, owing to the persistent delay of the Soviet Union in negotiating an Austrian peace treaty, the country was under occupation by the United States, Britain, France, and the U. S. S. R. until May 1955, when the treaty restoring sovereignty to the Republic of Austria was signed in Vienna by the foreign ministers of the occupying powers. It became a member of the UN in December 1955.

Belgium, Kingdom of (*Royaume de Belgique*). Belgium is composed of 9 ancient provinces,—West Flanders, East Flanders, Anvers (Antwerp), Brabant, Limburg (in part), Luxemburg (in part), Liege, Namur, and Hainaut. Two French-speaking Prussian "circles," Eupen and Malmedy, and the neutral territory of Moresnet were added to Belgium by the Treaty of Versailles. The provinces were a part of the Low Countries and remained Spanish possessions after the revolt of the Protestant northern provinces which later became the Kingdom of the Netherlands. France coveted them for their wealth and strategic position, and the decadent Spanish monarchy was too weak to hold them. To protect the Netherlands they were taken from the Bourbon king of Spain by the Treaty of Utrecht in 1713, and became the Austrian Netherlands under the House of Hapsburg. They were overrun by the French Revolutionary armies, and were at first re-united with the northern provinces in the Batavian Republic. This was changed to the Kingdom of Holland under Napoleon's rule and then absorbed by France. By the Congress of Vienna they were again joined to the northern provinces in the buffer kingdom of Holland. Disputes arising over questions of religion, language, and taxation led to revolt in 1830, and Belgian independence was established by the intervention of Great Britain and Prussia, who wished to avoid a general European war and prevent Belgium from becoming a dependency of France. Their constitution, framed in 1831, has been much praised as a scientific charter of liberal, representative, monarchical government.

The King.—By the constitution, sovereignty is vested in the Belgian nation, but the leadership of the state is vested in the "king of the Belgians." The kingship was conferred upon Prince Leopold of Saxe-Coburg-Gotha, who was an uncle of Queen Victoria of England. Leopold I was succeeded in 1865 by his son Leopold II; in default of sons, Leopold II was succeeded in 1909 by his nephew, King Albert. Leopold III succeeded his father in 1934. The constitution applies to kingship the strict "salic law" whereby the throne can be occupied only by a male. While the government is conducted by ministers responsible to Parliament, the king exerts large influence on national policy. The unity of the nation in defiance of Germany's demand in 1914 is attributed in no small degree to the firm attitude of King Albert.

Parliament.—Parliament consists of a Chamber of Deputies and of a Senate. The Chamber of Deputies consists of 202 members, or of not more than one to each 40,000 population. They sit for 4 years unless a dissolution is ordered. Eligibility consists of citizenship, possession of civil and political rights, age of 25 years, and residence in Belgium. The Senate is renewed every 4 years and, besides the sons of the king, is composed of 3 classes: (1) elected senators (equal to half the number of deputies), from 21 categories or walks of life; (2) provincial senators chosen by provincial councils; (3) Co-opted senators chosen by the Senate.

The ministry, organized with a fairly permanent body of officials, *functionnaires*, is divided into 15 departments: foreign affairs; interior; education;

agriculture; public works; labor and social insurance; justice; finance; national defense; colonies; communications; foreign trade; economic affairs; public health; and reconstruction.

Provincial Autonomy.—The provinces, representing one-time separate principalities, have a considerable degree of autonomy which is recognized by the constitution. Each has a provincial assembly chosen by the qualified electorate. In the intervals between assembly meetings, a "permanent commission" of six representatives watches over the conduct of provincial affairs. The head of the provincial administration is a "governor," appointed by the king. In his hands particularly are all details of police. The governor, like the French prefect, is the local representative of the different ministries at Brussels. Each province, moreover, is divided into 4 or 5 *arrondissements*, each of which has a commissioner and a staff of officials responsible to the governor.

Belgian Communes.—The real Belgian local autonomy, however, is expressed in the "communes," the towns. These are among the most famous cities of Europe. In them, modern municipal life took its rise. Ghent (Gand), Bruges, Ypres, Antwerp (Anvers), Malines, Bruxelles, and Mons represent centuries of civil growth and stubborn attachment to municipal rights. In the Belgian kingdom, there are some 2672 communes. They are governed according to a common plan and are under one municipal law, but here the comparison with French communes largely ceases. The center of civic government is the *hotel de ville*, frequently a noble example of Gothic architecture. Here the council meets and here are the offices of the burgomaster, or municipal head, and of his two to four assistants, called "echevins," each of whom superintends the work of one or more branches of municipal administration. The burgomaster of the Belgian commune is more than a local official. He is the representative of the kingdom in his town, has the sole command of the police, and, in matters of public safety, exercises a jurisdiction independent of the municipal council.

The Belgian nation is composed of two distinct European peoples, the Flemish and the Walloons. The Flemish occupy the northern portion of Belgium; in speech (Flamand) and in physical appearance they are akin to the Dutch. The Walloons are a darker, less phlegmatic race who speak French. The dividing line between these two populations has not altered in centuries; it runs east and west across the country and passes directly through the field of the battle of Waterloo. The "Flemish movement" of recent decades represents a revival of the Flamand language, through its employment in literature and in public instruction. The movement has had important political aspects.

Prior to 1914, suffrage was undemocratic. A system of plural voting granted two votes to the possessor of certain means, and three votes to those having additional qualifications. Following the World War, measures were taken to democratize the suffrage. Belgium was one of the earliest countries to adopt a plan of "proportional representation." The "d'Hondt system," the plan devised, has been widely imitated. Suffrage is universal.

Belgium, while a small country of less than eight million people, possesses not only extensive overseas industrial interests, but also a vast African empire—the Belgian Congo. This area, which embraces a large part of the Congo River system and the higher central plateau region of Katanga, was acquired personally by the late King Leopold II, who organized the neutralized "Independent State of the Congo," with himself at the head and as the heaviest investor. The enterprise was financially successful; but it led to cruel exploitation of the natives, and in 1908 the Belgian state took over the Congo as a national possession. The territory was increased in 1919 by a mandate over Ruanda and Urundi, formerly parts of German East Africa.

By the treaties of London of 1831 and 1839, the neutrality of Belgium was guaranteed by Great Britain, Austria, Russia, Prussia, and France. She defended her neutrality against Germany in 1914, and was occupied by the Germans. Freed by the Allies she repudiated her status of guaranteed neutrality. In 1940 Belgium joined Holland and France in resisting German invasion, but her king and army were forced to surrender, and the country again was occupied. Her government-in-exile returned with the Allies in 1944, but refused to recall King Leopold, who had been held captive in Germany, and set up a "regency" under his brother, Prince Charles. Leopold was recalled in 1950, but agreed to delegate his powers to his son, who, following his father's abdication in 1951, became King Baudoin I.

Bolivia. The revolution against Spain, 1809-10, initiated in the territory of Bolivia, then known as Upper Peru. After the achievement of independence in 1824, the Bolivians met with representatives of Argentina to determine whether or not they would join that country. They unanimously voted to remain a separate nation under the style of the "Republic of Bolivia," the name being taken from Simon Bolivar, the liberator of South America. The independence of the republic was proclaimed August 26, 1825. The territory claimed for the new republic was that which, under Spanish authority, was subject to the Audiencia of Charcas.

Constitutional System.—Bolivia has experienced many constitutional changes—1829, 1831, 1834, 1836 (a confederation with Peru, dissolved in 1839), 1841, 1843, 1851, 1861, and 1880. The present constitution dates from October 30, 1938. It allows a wider opportunity for social legislation, and enlarges the power of the president in this field. The executive power is given to a president, who is elected by popular vote for 4 years and is ineligible for a following second term. The ministers, or department heads, are his appointees and executive agents.

The Congress is composed of a Senate of 27 members, 3 from each department into which the republic is divided, and of a Chamber of 120 deputies. All members of Congress are elected by popular vote. Senators have a 6-year term, one-third retiring every 2 years, while the deputies are elected for 4 years, one-half retiring every 2 years. There is a supreme court, with 10 judges appointed by Congress for a 10-year term, and a district court in each department.

For administration, the republic is divided into 8 departments, *departamentos*, administered by prefects, *prefectos*; 3 national colonial territories; 71 provinces, under subprefects; and 940 cantons, under *corregidores*. Municipal districts are headed by *alcaldes*. Prefects and subprefects are appointed by the president; the lower administrative officers, by the prefects. Municipal councils are elected by popular vote and have a certain degree of autonomy. In 1952 universal suffrage was decreed.

Western Bolivia is Andean, with a population largely of native Indians. Prior to the "War of the Pacific," 1879–1883, Bolivia claimed Pacific Coast territory. Chile's victory in this war against Bolivia and Peru extinguished Bolivia's rights to a Pacific port and the country still remains without direct access to the sea. Two Chilean-built railways from the ports of Antofogasta and Arica connect Bolivia with the Pacific. In 1928, in accordance with a treaty of 1904, Chile relinquished to Bolivia that part of the Arica railroad in Bolivian territory. The Tacna-Arica settlement of 1929 between Chile and Peru left Bolivia's aspirations for a Pacific port unsatisfied.

Brazil (The United States of Brazil). A federal republic, comparable in area to the United States of America. It was a dependency of Portugal from the time of its discovery in 1500 until 1822, except for a period of 60 years, 1581–1640, during which Portugal was united to Spain. The vast area comprising

the Amazon region and most of the east coast of South America was divided under Portugal into a number of jurisdictions or "captaincies," a fact which may in part explain the tendencies that have opposed centralization in government and have made Brazil a federal republic.

Brazil was the seat of the Portuguese government and the residence of the royal family from 1807 to 1821. On the return of the Portuguese royal family to Portugal, a national congress assembled in Brazil and chose Dom Pedro, the king's eldest son, as "Perpetual Defender of Brazil." In the same year, Dom Pedro proclaimed the independence of Brazil and was chosen constitutional emperor. Brazil remained an American empire until 1889, when Dom Pedro was dethroned and the imperial family was exiled. The decree of banishment against the family was repealed August 6, 1920.

The Republic.—A republican constitution was promulgated in 1891 bearing a close resemblance to the Constitution of the United States, the old provinces acquiring the position of states. The country was governed under this framework of law until 1930, when the union was saved only at the cost of civil war. A new constitution was adopted in 1934, the chief alteration being the large powers granted to the federal government to control economic activities. These powers include the right to regulate industry, gradually to nationalize the banks and insurance companies, and to take over any form of industry, subject to payment of compensation. This constitution was altered in the direction of still greater centralization in 1937.

The union comprises 21 states, a federal district, and seven territories. Five of the territories were separated from existing states in 1943, to form a ring of border districts around the land boundary. Each state is self governing, but federal laws must be enforced within them. The federal government may intervene to reorganize state finances.

By the constitution of 1937 the executive authority is placed in the hands of a president elected for a 6-year term. The constitution provides, however, that the president at that time, Dr. Getulio Dornelles Vargas, should hold office until the constitution was approved by a plebiscite on a date determined by him. The president may legislate by decree.

As laid down by the 1934 constitution, the president must be a native of Brazil and more than 35 years of age. No candidate for the presidency may be related to the president by blood or by marriage. There is no vice president. The president is commander in chief of the army and navy, appoints and dismisses ministers, and within certain limits has the power to declare war and make peace.

The departments of government are ten, namely: finance; justice and interior; war; marine; foreign affairs; communications and public works; agriculture; labor, industry, and commerce; instruction and public health; and aviation.

Federal legislative authority is intrusted to a national Congress which was remodeled by the constitution of 1937. The Senate, formerly composed of two members from each state and from the federal district, is now abolished. In its place is a Federal Council of 30 members, one from each state, chosen by its legislature, and 10 appointed by the president. Their term of office is six years. A Chamber of Deputies is provided for, consisting of about 150 members chosen from each state in proportion to its population. They are elected, not directly, but by municipal governments and selected groups of citizens. The make-up of these bodies is such as to leave legislation largely in the president's hands. Pending the choosing of these bodies after approval of the constitution, legislation was by executive decree, a council of National Economy, composed of representatives of "Syndicates" being given temporary charge of economic interests. Its composition suggests a corporate state under presidential control. Under this regime Brazil expected to do away with concessions to foreign nationals within a "reasonable time."

The supreme federal tribunal is composed of 16 judges. There are federal courts and a federal jurisdiction within each state. Federal judicial appointments are for life. State courts administer state law. Foreigners enjoy all civil rights, but are prohibited from practicing certain professions, such as stockbroking, auctioneering, and the law.

After the fall of Vargas, October 1945, a constituent assembly framed a new constitution, which was ratified on September 18, 1945. Among other changes the new constitution established a bicameral congress with full law making power. Legislation may be initiated by the president or any member of congress. The president and vice president are elected for a five-year term. The president may veto bills, but his veto may be overridden by a two-thirds majority of both houses voting in joint session. He may declare a state of siege with the consent of the congress.

Frontier Settlements.—The frontiers of Brazil adjoin the territory of every other South American state except Ecuador and Chile, and also touch the possessions of France, Great Britain, and Holland. Boundary disputes with the Guianas were settled by negotiation and arbitration in 1901, 1904, and 1906.

The boundary between Brazil and Venezuela was settled in 1905, after a long period of negotiations, and the demarcation was made by a mixed commission in 1914. In 1872, Brazil and Paraguay signed a treaty whereby the title to Brazilian territory north of the Rio Apa was determined. The boundary with Argentina was settled by an arbitral decision by the president of the United States in 1895. The Brazilian contention was sustained. A remaining boundary difficulty between Brazil, Peru, and Colombia was settled by agreement at Washington, March 4, 1925.

In boundary negotiations with Uruguay, Brazil, by a treaty of 1851, secured rich territory that, by a treaty of 1777, had been admitted to belong to Spain. In this case, as in others, Brazil was able to acquire territories beyond those fixed during the period of Spanish domination. Thus, by means of a series of remarkable negotiations and awards, there was ended the long competition between Spain and Portugal that began in 1493, when the bull of Pope Alexander divided between these two countries the discovery and the conquest of the world.

Both in World War I and World War II, Brazil participated as a belligerent against Germany, showing herself the leading Latin American power in respect of co-operation with the United States for the defense of the Americas. This policy owed something to the fact that Brazil is closer geographically to the land masses of the Eastern Hemisphere than is any other American country. In both wars Brazil rendered naval assistance.

BRITISH EMPIRE

The British Empire embraces the numerous countries and possessions which owe allegiance to the British crown. Their status within the Empire differs greatly but they may be classified under the following groups: Great Britain and Northern Ireland; the self-governing Dominions; the colonies, which do not have responsible government although they may have elected legislatures; protectorates; the mandates. The legal bond between all of these countries is allegiance to the British sovereign, whose title, by act of Parliament passed in 1927, reads as follows: "George VI, by the Grace of God, of Great Britain, Ireland and the British Dominions beyond the seas, King; Defender of the Faith, Emperor of India." The Indian Independence act of 1947 provided, however, for the omission of the last title.

By parliamentary acts of 1920 and 1922, the Irish Free State became a self-governing dominion, while Northern Ireland continued to be represented in the British Parliament besides having a parliament of her own. Great Britain comprises England, Wales,

and Scotland. The thrones of England and Scotland were united in 1707 by the Act of Union, when their Parliaments were combined into a single legislature.

Seat of Government.—Adjoining the ancient city of London is Westminster, which was chosen as a residence by the Norman kings, and is the seat of British government. Here are "Whitehall street" and "Downing street," with the residence of the prime minister; Westminster Hall and Abbey; and the modern houses of Parliament. The British sovereign lives at Buckingham palace or other royal residences, or at Windsor castle on the Thames, 21 miles from London. From this latter ancient residence of British sovereigns, the present king adopted in 1917 the family name of House of Windsor.

The British Monarchy.—Excepting the interruption of the Cromwellian period, England has been governed continuously as a monarchy since Saxon times. The monarchy, which was firmly established on a national basis by William the Conqueror and by his successors, attained its greatest power and influence under the Tudors, Henry VII, Henry VIII, and Queen Elizabeth; but their successors, the Stuart kings, aiming at an absolutism attained elsewhere in European kingdoms, were summarily checked by Parliament, which beheaded Charles I and expelled James II.

The constitutional history of England is largely the conflict between king and Parliament for state control. The result has been the complete supremacy of Parliament and the reduction of the sovereign to a symbol of national loyalty and to a position of simple influence. "The king rules but does not govern." All crown powers are exercised in his name by ministers who are no longer his choice, but who are a committee of members of Parliament, dependent upon the House of Commons for continuance of office.

Ministers.—There are some 80 high officials known as "ministers," selected by the "prime minister," the actual leader of the majority in the Commons. The chief ministries are the lord chancellor, who presides over the House of Lords and over the supreme court of judicature, and is a general minister of justice; the chancellor of the exchequer, who is the financial minister; seven secretaries of state—home affairs, foreign affairs, dominions, colonies, war, air, India; the first lord of the admiralty; the presidents of the boards of trade and education; the ministers of health, labor, and agriculture and fisheries; the secretary for Scotland; and the attorney-general. Several offices,—lord president of the privy council, the first lord of the treasury, lord of the privy seal, and the chancellor of the Duchy of Lancaster,—have become sinecures; they are usually taken by the prime minister and by members left free of administrative duties, or "without portfolio."

Of these ministers, a minor group constitutes, with the prime minister, the "cabinet." The cabinet determines policies, settles the budget and financial schemes for submission to Commons, institutes practically all legislation, and takes responsibility at all times before Parliament for the conduct of affairs throughout the vast British Empire. A refusal of the House of Commons to follow the cabinet's lead or to enact its measures results either in the immediate resignation of the ministry or in "an appeal to the country," that is, the dissolution of the Commons and an election of a new House. Periods of government take the name of the prime minister; as, the "third Gladstone ministry," 1892–94, "the Lloyd George ministry," 1916–22.

Parliamentary Government.—This historically established organization for conducting the government has given to the world the widely imitated institution of "parliamentary," "responsible," or "ministerial" government, as distinguished from "presidential government" wherein the chief executive has a tenure independent of the legislative or parliamentary body.

The British Parliament consists of the House of Lords and of the House of Commons. The members of the Commons are elected for a term of 5 years, or until a dissolution of the House. A member need not, and seldom does, reside in his "constituency." Since 1911, members of Commons receive an annual compensation of £400. The House of Lords has a membership of about 740 and includes the archbishops of Canterbury and York; bishops of the English Church; and "peers," created by the sovereign on recommendation of the prime minister, comprising, in order of rank, dukes, marquises, earls, barons, and "life peers." The House of Lords has decided that a peeress in her own right is not entitled to a seat in the Lords.

Down to 1911, the Lords had a legislative position comparable with the Commons, except in initiation of financial legislation. Its opposition to legislation demanded by the Commons could be overcome only by the threat to create enough new peers favorable to the law to "swamp the Lords." In 1832, this threat was effectual in securing the passage of the "Reform act" and was used in 1911 to pass the "Parliament act" whereby the supremacy of the Commons is recognized. Under this act, if the Commons passes an act in three successive sessions within an interval of not less than two years, it may become a law without the consent of the Lords. No "money bill" may be denied assent by the Lords, and the "speaker" of the Commons is the final judge of whether or not any certain act is a money bill. The king must give assent to every bill of Parliament. To refuse would be an unconstitutional act; in fact, it would be an act of revolution.

Sovereignty.—The "King, Lords, and Commons" legally have complete sovereign powers; no political act is beyond their competence. They can legally alter, in any particular, the constitution of Great Britain and her colonies. Until the passage of the Statute of Westminster in 1931, they had the theoretical right to legislate for the self-governing dominions also. Since that time the dominions have had the power to alter their own constitutions, which formerly were acts of the British Parliament.

The constitution of Great Britain consists of a great number of separate acts, as well as of established practices which can be altered only by Parliament itself. These acts have never been codified or reduced to a single charter, and in this sense the British constitution is "unwritten." Since it can be changed by Parliament itself, it is spoken of as "flexible" as distinguished from "rigid" or "written" constitutions.

Previously to 1832, suffrage in Great Britain was restricted to the aristocratic and land-owning class. By the "Reform acts" of 1832, 1867, and 1884, it was successively extended, and, by the "Representation of the People act" of 1918, full manhood suffrage was realized, and the vote was given to women 30 years of age. By the "Equal Franchise act" of 1928, women were admitted to complete equal suffrage with men. The voting age is 21, with residential qualifications. Voting has for many years been carefully protected by a Corrupt Practices act. Thus, under the forms of a monarchy, Great Britain, now almost the last remaining kingly government of consequence, has become in fact one of the most democratic of countries. The families of the nobility, however, continue to exercise a political leadership and an influence not found today in any other country.

Local Government.—For purposes of local government, Great Britain is divided into "administrative counties" (62 in England and Wales, 33 in Scotland) and "boroughs." County government is ordered by the Local Government act of 1888, which provides elective councils to supervise local government and to appoint the county officials. Its chief responsibilities are for local communications, education, asylums, and police.

English boroughs or towns, before 1835, were close corporations, governed largely in the interests of a

narrow body of "freeholders." By the Municipal Corporations act of that year, a systematic and more liberal form of city government was introduced, whereby the borough council became the city administration. This body acts through committees and employs city officials who, while relatively few in number, are chosen for experience and qualifications. The most usual of these is the "clerk." While conforming to a general type, the powers of boroughs are expressly given by charters or by acts of Parliament, and the latter body is constantly importuned to extend the functions of boroughs. Nearly all so-called "private bills" are of this character.

The "mayor" of an English town is in no sense the head of its administration. The office, usually held for one year, is important in a social and a civic sense, and frequently imposes upon the occupant considerable expenditure for entertainment and for representation of the borough.

London.—The government of London must be described separately. At its center is the ancient "City of London," once surrounded by walls embracing about a square mile east of Charing Cross. This is still an "unreformed" English borough, governed by a close corporation of "councilmen" and "aldermen." The "lord mayor of London" is the presiding head; he resides in "Mansion House" and is an important civic figure in British life. Surrounding the city is the county of London, made up of 28 boroughs with district governments; but the London County council, created in 1888, has definite general powers over the whole area. The "Metropolitan Police Area" includes London county, and extends over adjacent territory to an extent of nearly 700 square miles. To the metropolitan police is intrusted the public order of this central part of England. This highly trained force, with its headquarters at New Scotland Yard, is directly under the home secretary of Great Britain.

THE DOMINIONS

The dominions are former British colonies which have developed into practically independent nations, possessing virtually a parity with GreatBritain in the British Commonwealth of Nations. The ties that bind them to England are those of sentiment and interest, voluntarily accepted and patriotically guarded. The powers of their independent parliaments embrace all their national interests. Government is in the hands of ministers, responsible to these parliaments. The governor-general, who is appointed by the Crown, represents the imperial tie, although even that tie was abolished by the Irish Free State in 1936.

At the Imperial Conference of 1926, the status of the dominions was defined in the following language: "They are autonomous communities within the British Empire, equal in status, in no way subordinate to one another in any aspect of their domestic or external affairs, though united by common allegiance to the crown and freely associated as members of the British Commonwealth of Nations." The statute of Westminster, passed in 1931 by the British Parliament and accepted in 1932 by dominion action, gave legal effect to the above definition and recognized certain treaty-making rights of the dominions.

Canada, Australia, New Zealand, and South Africa have possessed dominion status for more than a generation. India and Pakistan received dominion status in 1947; Ceylon in 1948. The support given by the dominions to the Empire in war is entirely voluntary and based upon their own actions. They are not bound by treaties of the British government except upon their own assent.

Australia. The Commonwealth of Australia is a federal union of six "original states," formerly British colonies, formed in 1901 in pursuance of an act of the British Parliament, passed in 1900, after five of the colonies, by acts of their legislatures, confirmed by popular referendum, had expressed themselves in favor of union. The five states are New South Wales, Victoria, Queensland, South Australia, and Tasmania; the sixth state, Western Australia, joined immediately. Northern Australia is a territory ceded to the federal union by South Australia in 1911; on the same date, New South Wales ceded a district, later named Canberra, as a federal territory to be the seat of the commonwealth government.

The Federal government consists of a governor-general, who represents the crown; of a Senate composed of 36 members, 6 chosen by each state; and of a House of Representatives having 76 members, who are chosen by each state in proportion to its population. The senators are chosen for 6 years and the representatives for 3 years, unless Parliament is dissolved earlier. As in the United States, the federal jurisdiction consists of "enumerated powers," while other or "residuary" powers are reserved to the states.

The administration is conducted by a prime minister and by 8 other ministers responsible to Parliament. There is a federal judiciary, including a high court. The constitution may be amended by an act of Parliament, ratified by a majority of voters in a majority of the states. Australia has a small permanent army and a volunteer militia. The "Royal Australian Navy" is a unit of the British fleet. Australia accredits a minister to the United States and has Trade Commissioners in Canada, France, and other countries.

Each state has a governor, a Parliament of two chambers (except Western Australia, which has one chamber), and a responsible ministry. In all the states, women vote and have equal political rights.

Canada. This country was originally a French settlement ceded to England in 1763. The portion colonized by the French, known as Lower Canada, and Ontario, or Upper Canada, which was inhabited by British settlers, were united in 1867 with two other British colonies—Nova Scotia and New Brunswick—to form the Dominion of Canada. To this union were subsequently admitted, as provinces of the federation, Manitoba, 1870, British Columbia, 1871, Prince Edward Island, 1873, Alberta and Saskatchewan, 1905, Newfoundland, 1949. The Dominion now embraces all of the British possessions on the mainland of North America.

In Canada was developed and inaugurated the principle of self-government which is now possessed by the so-called dominions or self-governing nations of the British Empire. The early British colonial policy in America was to reserve executive power to a proprietary, or royal, governor, while granting local legislative power to a representative assembly. The laws of the colonies were subject to the approval of the governor and of the home government. This system was provocative of great friction.

Self-Government.—After the separation of the colonies composing the United States, the desire for self-government reawoke in Canada and led to continuous difficulty with the royal governors and even to local rebellion. In 1838, when political relations in Canada had reached a deadlock, the British government sent out a commission of inquiry headed by Lord Durham, who recommended the recognition of self-government in the Canadian colonies and the formation, in each colony, of a ministry that would be politically responsible to the legislature and not to the British government. This principle was adopted. The governor, or representative appointed by the British crown, became the nominal representative of imperial authority, while a "premier" responsible to the local Parliament became the actual head of government.

While all actions are still taken in the name of the British monarch, the right to veto, which is legally retained, has been most sparingly exercised. Thus was established in Canada a political order which gives free rein to the political capacities of the Canadian people and places upon them the solution of their internal problems. This concession preserved the loyalty of the Canadians to the British

crown and has made them firm supporters of the empire.

The same system has been extended to Australia, South Africa, and other British dominions.

Following the Civil War in the United States and the successful establishment of the federal principle, a strong movement arose in Canada looking toward the union of the several colonies into a single commonwealth. This was accomplished in 1867, as stated above, by the British North America act.

Government is federal. The organic law assigns certain powers to the provinces and reserves all other powers to the Dominion government. Thus the principle upon which functions are distributed is the reverse of that in the United States.

Canadian citizenship was first legally created and defined by an act proclaimed in January 1947. Heretofore Canadians had been "British subjects;" now they are "Canadian citizens."

Powers of Dominion.—Certain subjects are specifically enumerated as reserved to the Dominion Parliament. They are as follows:

The public debt and property.
The regulation of trade and commerce.
The raising of money by any mode or system of taxation.
The borrowing of money on the public credit.
Postal service.
The census statistics.
Militia, military and naval service, and defense.
The fixing of, and providing for, the salaries and allowances of civil and other officers of the government of Canada.
Beacons, buoys, lighthouses, and Sable island.
Navigation and shipping.
Quarantine, and the establishment and maintenance of marine hospitals.
Seacoast and inland fisheries.
Ferries between a province and any British or foreign country, or between two provinces.
Currency and coinage.
Banking, incorporation of banks, and the issue of paper money.
Savings banks.
Weights and measures.
Bills of exchange and promissory notes.
Interest.
Legal tender.
Bankruptcy and insolvency.
Patents of invention and discovery.
Copyrights.
Indians and lands reserved for the Indians.
Naturalization and aliens.
Marriage and divorce.
The criminal law, except the constitution of courts of criminal jurisdiction, but including the procedure in criminal matters.
The establishment, maintenance, and management of penitentiaries.
Such classes of subjects as are expressly reserved from the provincial legislatures.

Powers of Provinces.—The powers expressly bestowed upon the provincial legislatures are as follows:

The amendment of the provincial constitution, except as regards the office of lieutenant governor.
Direct taxation for provincial purposes.
Borrowing of money on sole credit of the province.
The organization of the provincial administration.
The management or sale of provincial lands.
Reformatory prisons.
Hospitals, asylums, and charitable institutions other than marine hospitals.
Municipal institutions.
Local excises.
Provincial works, including railways, canals, telegraph systems, shipping lines.
The incorporation of stock companies.
Solemnization of marriage.
Definition of property and civil rights within the province.
Administration of justice, including provincial courts.
Imposition of punishments for enforcing provincial laws.
In general, all matters of a merely local nature.

Immigration.—There is one important matter in which the Dominion and the provinces have acted concurrently; namely, the settlement of public lands and the encouragement of immigration. All public or crown lands belonged to the provinces, until, in 1869, the Dominion government acquired the territory of the Hudson's Bay Company. The *encouragement* of immigration and the distribution of homesteads have remained mainly provincial enterprises, but the provinces have ceased to *regulate* immigration, the Dominion code governing this matter. The government of British Columbia passed several acts restricting Oriental immigration into that province, but these acts were invalidated by the Dominion government at Ottawa.

Education.—A further subject which is the main concern of the provinces but in which the Dominion government is authorized to act, is education. In French Canada, where the population is predominantly Catholic, schools are mainly parochial. In other provinces, Protestants predominate. The organic act, while conferring upon the provinces the conduct of education, provided that nothing in provincial laws should "prejudicially affect any right or privilege with respect to denominational schools which any class of persons have by law in the provinces." This provision was intended to protect the educational rights of minorities in the different provinces. The administration of this provision has not been free from contention and has played an important part in Canadian politics.

The Senate.—The Parliament of the Dominion consists of two houses—a Senate and a House of Commons. A senator must be 35 years of age, a natural born or naturalized subject of the king, possess at least four thousand dollars in excess of liabilities, be a resident of the province for which he is appointed, and, in the case of Quebec, he must either be a resident of the district which he represents or hold the qualifying amount of real property therein. Senators are nominated for life by the governor-general, but their actual selection rests with the Canadian prime minister. The Senate consists of 96 members, 24 from Ontario, 24 from Quebec, 10 from Nova Scotia, 10 from New Brunswick, 4 from Prince Edward Island, and 6 from each of the following: Manitoba, British Columbia, Alberta, Saskatchewan. The total number may not exceed 104.

House of Commons.—The House of Commons is elected for a five-year term. It may be dissolved by the governor-general on the advice of the prime minister. Women vote and are eligible for election. The province of Quebec is guaranteed a representation of 65, the other provinces' representation being proportionate to their population, as determined by the decennial census. The Representation Act of 1933 provides 82 members for Ontario, 65 for Quebec, 12 for Nova Scotia, 10 for New Brunswick, 17 for Manitoba, 16 for British Columbia, 4 for Prince Edward Island, 21 for Saskatchewan, 17 for Alberta, and 1 for the Yukon Territory.

Privy Council.—The imperial relation is represented in the person of the governor general, appointed by the British government from among the most distinguished representatives of British achievement. His salary is 10,000 pounds per annum, paid by the Canadian government. Five years has been the usual, but not invariable, duration of the appointment. He has no part in actual government, which is confided to a cabinet, called the King's Privy Council for Canada and composed of the Canadian prime minister and from 15 to 22 additional ministers. These ministers are members of Parliament, and the prime minister is the leader of the dominant political party. The prime minister receives $25,000 a year and $4000 allowance for each session; other ministers receive $15,000 a year, as does the leader of the opposition.

The department of external affairs conducts the diplomatic relations of Canada. The Dominion has representatives at London, Washington, Paris, Tokyo, and Brussels (for the Netherlands and Belgium).

Legislation.—Bills originate in either house, except finance bills, which may originate only in the House of Commons. The Senate may reject a finance bill but not amend it. Most bills are initiated by the House, except bills for divorce which, by usage, always originate in the Senate. Between 1867

and 1913 the Senate amended 21½ per cent of the bills it received from the House and rejected 2 per cent. While the position of a senator is a highly privileged one, senators have never played a political rôle comparable to that of the members of the House of Commons and are seldom offered seats in the cabinet. Members of both houses receive the same compensation—$4000 for the session, with a deduction of $25 per day for every day beyond 15 in which a member does not attend. The speaker of the House of Commons receives $6000 and the leader of the opposition in the Commons $10,000.

Courts.—Judges in Canada are appointed and paid by the Dominion government, to hold office for life or during good behavior. The supreme court of Canada receives appeals from the provincial courts and questions may be referred to it by the governor-general in council. A ruling may thereby be obtained on the constitutionality of any law without the delay and expense of litigation. In civil cases within certain limitations, appeals from the supreme court and from the highest provincial courts may be carried to the judicial committee of the privy council in England. In recent years, a strong sentiment has arisen opposing such appeals as inconsistent with the status of a self-governing nation.

Provincial Governments.—The powers of provincial governments have already been noted. Each of the nine provinces has its own parliament and administration. With the exception of Quebec, the legislature consists of a single chamber. A lieutenant governor, appointed by the governor-general, represents the federal union, but actual government is in the hands of a premier and provincial ministers responsible to the provincial parliament. The territory of Yukon is governed by a chief executive office and an elected council of three members.

Ireland. Previous to 1920, Ireland was a part of the United Kingdom, with representation in the Parliament at Westminster, and was administered by a government at Dublin Castle, presided over by the lord lieutenant of Ireland. The bestowal of "home rule," provided in an act of Parliament of 1914, was prevented by the attitude of the northern or Ulster population, which opposed a united, autonomous government in which it would be a religious minority.

World War I suspended the solution of the Irish question, but it saw the culmination of the separatist movement in the "Easter Rebellion" of April 1916, in Dublin. Following the peace and the proclamation of a revolutionary "Irish Republic," Ireland again became one of the most pressing problems of the British Parliament, and the situation was met by the passage of the Government of Ireland act of December 23, 1920. This provides for two local parliaments and two administrations, one for Northern Ireland, comprising the 6 counties of Antrim, Armagh, Down, Fermanagh, Londonderry, and Tyrone, and one for the rest of the country, Southern Ireland, including 26 counties.

Northern Ireland.—This act was acceptable to the Ulster "Unionists," and a Parliament, which, according to the act, consists of a Senate with 2 *ex officio* and 24 appointed members and of a House of Commons of 52 elected members, was opened in Belfast in June 1921. A lord lieutenant, as representative of the crown, heads the administration; but, in accord with the principle of dominion autonomy, government is conducted by a cabinet of 8 ministers, including the prime minister, responsible to the Parliament. Northern Ireland is represented in London by 13 members in the House of Commons.

Eire.—In the South, the Sinn Fein or Irish Republican party, which predominated over the nationalists or home rule advocates, rejected the act.

Ireland, outside of "Northern Ireland," became the Irish Free State, later renamed Eire.

The Irish Free State was formally inaugurated on December 6, 1922. A constitution was adopted by the Dail on October 11 and ratified by the Imperial Parliament on December 4. This constitution was replaced by a new one adopted by referendum in 1937.

The new charter of government sets up a republic with no organic link with Great Britain. Sovereignty is vested in the people beneath the Holy Trinity. Irish territory is defined as the whole of Ireland. Two official languages are established, Irish and English, the name of the country in the former tongue being known as Eire, which name was designated as official.

The president is elected for a seven-year term by direct vote of the people under a proportional representation plan. He must be an Irish citizen at least 35 years of age. Candidates for the presidency, except former presidents, must be nominated by at least 20 members of Parliament (*Oireachtas*) or by not less than four county councils.

Legislature. The legislature consists of two houses, the Assembly (*Dail*) and Senate (*Seanad*), which meet annually for a maximum term of seven years. The Senate consists of 60 members, 11 nominated by the prime minister, 6 elected by the universities, and the remaining 43 elected from 5 panels of candidates representing the following vocations: art and literature; agriculture and allied interests; labor, whether organized or not; industry, including banking and finance; and public administrations and social services. Membership of the Dail is fixed by law from time to time subject to a rule that there shall be one member for each 20,000 to 30,000 of the population but at least three members from each constituency.

The president is assisted by a cabinet closer to the British than to the American type. Its 7 to 15 members must have been elected to Parliament, and Parliament selects the prime minister (*taviseach*), who is head of the cabinet. The prime minister selects the other members, of whom the vice prime minister (*tanaiste*) and those in charge of the department of finance must be members of the Dail.

A fourth governmental body, known as the Council of State, is provided, its function being to give advice to the president. Members include the prime minister, the vice prime minister, chief justice, president of high court, chairman of the Senate, ex-presidents, past incumbents of the first three of the posts named and a maximum of seven other members appointed by the president.

Two kinds of courts are established. The high court accepts trial cases; the supreme court hears cases on appeal. The supreme court is empowered also to pass on the constitutionality of laws. The number of its members is fixed by Parliament.

Criminal cases, except those involving minor offences, are tried by a judge and a jury of twelve whose verdict must be unanimous. In civil jury cases, it is sufficient if nine members agree.

The president may, but is not required to, dissolve the Dail if the prime minister loses his majority in the house. He may convene either house on the advice of the Council of State. His messages to the people must receive the prior approval of his cabinet. His signature is required before a bill passed by Parliament becomes law. He is commander of the army.

There is no vice president. If the president is incapacitated or absent from the country, his duties are taken over by a commission consisting of the president of the high court, the prime minister, and the chairman of the Senate.

The constitution forbids divorce. It provides for free, but not compulsory, education. A natural right to private property is declared to exist, which, however, is to be regulated according to social justice. The constitution may be amended by act of Parliament ratified in a popular referendum.

The last constitutional link with Britain was severed by the Republic of Ireland Act of 1948, which repealed the law permitting the King of England to sign the credentials of Irish foreign representatives. It came into effect April 18, 1949, on

which day—Easter Monday—the Republic of Ireland was officially proclaimed.

New Zealand. This country was established as a British colony in 1840 and was granted responsible government in 1852. Its designation was changed to "Dominion of New Zealand" in 1907.

The executive power is vested in the governor-general, who is appointed by the crown and guided by the advice of the Executive Council, which, in addition to the governor-general, consists of the prime minister and fourteen other ministers. The governor-general may withhold consent to bills or may reserve them for the decision of the crown, but this constitutional power is sparingly exercised.

The legislative branch consists of the House of Representatives, composed of 80 members, including 4 Maoris, who represent the native race. The members are elected for a three-year term. Women have voted in New Zealand since 1893.

New Zealand has both a military and a naval force, and training is compulsory.

Northern Ireland. See *Ireland*.

South Africa. The Union of South Africa comprises the former self-governing colonies of Cape of Good Hope, Natal, the Transvaal (The South African Republic, 1884–1900), and Orange Free State (Orange River Colony, 1900–1910), which, in accordance with the South Africa act of the British Parliament of 1909, were united May 31, 1910, under a federal government. The legislative power of the union is vested in a Parliament consisting of the king of England, a Senate, and a House of Assembly. The king is represented by a governor general.

The Senate comprises 40 members. Thirty-two are elected, 8 for each province, and 8 are appointed by the governor-general, 4 of whom are selected for their acquaintance with the colored races. The lower house consists of 150 elected members. Electors must be British subjects with 5 years of residence in the Union. Each province has a legislative council, elected for 3 years, and an executive committee presided over by the provincial administrator, who is appointed by the governor-general of the Union. Ordinances of the provinces may be vetoed by the Union government.

The Union is self-governing in the sense that administration and definition of policy are in the conduct of a prime minister and a ministry responsible to the Union Parliament. The grant of a unified, self-governing status to South Africa, in 1909, with the enfranchisement of the population which had so tenaciously resisted the British armies in the Boer war, was a remarkable exhibition of bold and liberal dealing on the part of Great Britain. The results fully justified the strength of the concession; for, though the Boer population predominates, they have been loyal to the Commonwealth.

COLONIES AND PROTECTORATES

These present a great variety of type. A number of the possessions are mere military outposts and naval bases occupied and held for strategic reasons, to control routes of trade and to defend imperial interests. Such are Gibraltar on the Spanish peninsula at the entrance to the Mediterranean; Aden at the eastern entrance to the Red Sea; the island of St. Helena in the south Atlantic; Ascension, which in 1922 was annexed administratively to St. Helena; and the Falkland islands, east of the Strait of Magellan, the scene of the sea fight of December 8, 1914, in which Admiral Sturdee destroyed the German cruiser fleet under Admiral von Spee.

The island of Malta, strongly fortified, guards the route through the Mediterranean; Singapore guards the Straits Settlements and the passage to the Far East; and Hongkong represents British power in South China. Previously to 1901, British policy sought to control or to share control of the passageway between the two American continents; but, in that year, by the Hay-Pauncefote Treaty, Great Britain yielded political predominance to the United States. See *Panama*.

Another group of possessions, once better known as "plantations," were partially colonized by Englishmen for the cultivation of sugar and other products. Such are the American colonies of Bermuda, Jamaica, Barbados, Trinidad, the Windward islands, the Bahamas, British Honduras on the mainland of Central America, British Guiana in South America, and the island of Mauritius and the Seychelles in the Indian Ocean.

At one time, the cultivation of sugar cane gave extraordinary prosperity to the British West Indies and enriched the island planters. Slave labor was introduced from West Africa, but the competition of modern sugar cane production resulted in the economic decline of these plantations. The British population has almost disappeared, and these islands have become colonies of blacks. The freeing of the slaves and their abandonment of the plantations led to the introduction of indentured coolie labor from India, from which has followed a considerable settlement of these East Indians, especially in Jamaica, Guiana, and Mauritius.

In 1953 the British West Indian islands agreed to federate within the Crown Commonwealth. British Honduras in Central America and British Guiana in South America did not commit themselves.

Colony Government. These colonies are all administered by English governors, usually officials of long colonial experience, who are subject politically to the secretary of state for the colonies. To a limited extent, representation is secured by administrative or legislative councils composed partly of officials and partly of local residents, British and natives, appointed or chosen; but the supreme control in all matters is at Westminster.

Protectorates. Another large class of dependencies consists of "protectorates." In these countries, British supremacy is asserted against all foreign political influence, and a greater or less control is exercised through British "residents"; but native rulers are left in place and their power is frequently strengthened and improved. Such are the Federation of Malaya, and, on the mainland of Borneo, Sarawak, which was conquered about 1840 by a gentleman adventurer, Rajah James Brooke, and was thus brought under British protection. Protectorates are handled by the secretary of state for colonies.

African Dependencies. In South Africa, Basutoland, Bechuanaland, and Swaziland are reserves for the native tribes. In the first named, the land is possessed by the natives who, in a century, have increased from 40,000 to 500,000. They are handled as protectorates under resident commissioners, who report to the high commissioner for South Africa. In 1953 the new Federation of Rhodesia and Nyasaland was set up, amalgamating Northern and Southern Rhodesia and Nyasaland into a union with a crown-appointed governor-general, a Federal assembly, and a large measure of independence.

Southwest Africa is a former German possession conquered in 1915 and administered by the Union of South Africa under a mandate of the League of Nations. In West Africa are the crown colonies and protectorates of Sierra Leone, Gambia, Gold Coast, Nigeria, and parts of the former German possessions of Togoland and Cameroon, which are divided as mandates between Great Britain and France.

In March 1957 the Gold Coast was given its independence with a British governor general and was renamed Ghana. British Togoland was included.

British East Africa embraces a great area included in Kenya Colony and protectorate, formerly known as East Africa Protectorate; Tanganyika Territory, formerly German East Africa, which was conquered in 1918 and divided into mandates under Belgium and Great Britain; the Uganda Protectorate, which includes several native "kingdoms" supervised by British representatives; and the island of Zanzibar, governed by a native sultan under the advice of a British resident.

In the Pacific, Papua, or British New Guinea, is now a possession of Australia. The former German possessions comprising eastern New Guinea, the Bismarck archipelago, and the Solomon islands, all lying south of the equator, were occupied by an Australian force in September 1914 and were transferred to Australia as a mandate by the League of Nations, December 17, 1920. Similarly, the German Samoan islands, ceded by the Treaty of Versailles, constitute a mandate administered by New Zealand. Nauru island, also a former German colony, rich in phosphates, is a mandate of Great Britain; it is administered under a joint agreement by the governments of Great Britain, Australia, and New Zealand.

The Fiji islands constitute a British crown colony, the governor being high commissioner for the western Pacific. Tonga, or the Friendly islands, by an Anglo-German agreement of 1899, subsequently acceded to by the United States, is a British protectorate, as are the Gilbert and Ellice Islands colony and the British Solomon islands. The New Hebrides are a protectorate of both Great Britain and France and are jointly administered under a convention of 1906. There are both British and French residents.

British colonial policy is governed by a few clear political principles: maintenance of peace and public security for natives as well as for foreigners; accessible and exact justice through British-conducted courts; respect for native religions and institutions wherever these are compatible with the rights of society and the individual; economic development and the freedom of industry and trade. The securing of markets for goods of British manufacture has been a constant motive in the upbuilding of the empire.

The success of this vast undertaking is due to close adherence to a slowly developed set of principles and traditions, to the protection of British prestige and reputation, and to the intrusting of authority to a select and trained administrative personnel, moved by a high *esprit de corps*. This great and complex empire not only completely stood the shocks and strains of the World War and emerged compacted and aggrandized, but also, in war material and in armed men, proved a military resource of most impressive proportions. These facts reveal the British Empire as probably the greatest and most extraordinary political institution in human history.

While the authority of Parliament at Westminster is constitutionally absolute over the whole empire with the exception of the self-governing Dominions, Parliament is seldom called upon to act, legislation for the crown colonies usually taking the forms of decrees and statutes issued by the British ministry and known as "orders in council." Appellate courts exist in all the colonies; but the supreme court of appeal is in London, and is known constitutionally as the judiciary committee of the king's privy council. Authority to legislate for the dominions was renounced in 1931.

India, Pakistan. In 1936 a federal constitution was established for India, with an elected bicameral legislature, and governmental powers divided between the legislature and the governor-general. At the end of World War II the British government called a convention, which met December 9, 1946, to draft a constitution. It also appointed an interim ministry with Pandit Jewaharlal Nehru as premier. In the convention various difficulties arose from the antagonism between Hindus and Moslems. The latter, fearing for their security under a Hindu majority, demanded a separate state. After long discussion the convention agreed to a division of the peninsula, and on August 15, 1947, the two dominions of India and Pakistan were proclaimed.

India. The draft constitution of February 1948 provided for a "Union of States," headed by a president chosen by an electoral college made up largely from the legislative bodies. He is advised by the prime minister and a council of ministers. Legislation is by a parliament of two houses, the House of States, composed of 250 members, and the House of the People, with about 500 members, elected by universal suffrage for five years. There is a Supreme Court of India with a chief justice and seven or more associates. Each state has its ministry, and a legislature of one or two chambers. The new constitution was adopted in November 1949, and the first president was inaugurated January 26, 1950.

Pakistan. Pakistan consists of two separate areas 1000 miles apart in the northeastern and northwestern corners of India, with its capital at Karachi. It includes the provinces of India which are predominantly Moslem. Its constitution provides for a governor-general and a ministry under a prime minister. It is a member of the United Nations.

Ceylon. Ceylon was made a dominion February 4, 1948. Its organization provides for a governor-general, a ministry, and a two chamber parliament. Great Britain agrees to assist in its defense. It was admitted to membership in the United Nations in December 1955.

Bulgaria. Bulgaria, long a subject territory of Turkey, obtained autonomy in 1878, by the treaty of Berlin, which ended the Russo-Turkish war. In 1885 Rumelia, the Bulgar-inhabited province south of the Balkan mountains, obtained union with Bulgaria. In 1908, during the revolution in Istanbul, Bulgaria declared her complete independence, and her reigning prince, Ferdinand, of the house of Saxe-Coburg-Gotha, proclaimed himself king of the Bulgarians. By the second Balkan war, 1913, Bulgaria lost territory to Rumania. In World War I she suffered further losses, but by treaty in 1924 regained an outlet to the Ægean. After World War II she retained the southern Dobruja, ceded by Rumania in 1940.

The first constitution of Bulgaria was adopted in 1879, and amended in 1893 and in 1911. The legislative power was entrusted to a one chamber assembly, called the *Sobranje*, whose members were chosen by national manhood suffrage for a four year term. The government was conducted by responsible ministers, but the king had considerable power. The country was divided into departments under prefects, who were appointed by the central government.

As the result of a revolution in 1934 the constitution was suspended. The group which then seized power seemed to intend a corporate state like Italy, but political disorders prevented any stable establishment. In World War II Bulgaria unwillingly joined the Axis powers, and later came completely into the hands and under the control of Russia.

The monarchy was abolished by popular vote in September 1946. In October a constituent convention controlled by the five pro-Russian parties, which made up the "Fatherland Front," adopted a draft constitution. This constitution is based on the equality of people, guarantees freedom of the press, assembly, and speech; and asserts that Bulgaria is a "people's republic, with a representative government." The head of the state is a president, elected for four years. He may not serve more than two successive terms. A single-chamber assembly, also elected for four years, has the legislative power. It elects the head of the state, and the premier, and will control the executive. Private enterprise and belongings earned by labor and saving will be protected by the state. The constitution declares, however, that the land belongs to those who work upon it.

CENTRAL AMERICAN STATES

The southern portion of the continent of North America, between Mexico and the westerly boundary of Panama, is usually termed Central America. Apart from British Honduras, it is now composed of five republics. These formed a single unit of government, the "kingdom of Guatemala," during the long period of Spanish empire. The center

of administration was Guatemala City, where resided the "governor and captain-general" and the *audiencia* or court. To this jurisdiction belonged also Chiapas, now a state of the Mexican republic.

The independence of this kingdom followed promptly on the revolutionary movement in Spanish America and was established in 1823 by the national constitutional convention, which met at Guatemala City July 1, 1823, and decreed the provinces to be free and independent states, confederated in a nation entitled "The United Provinces of Central America." This convention, among other liberal actions, decreed the abolition of slavery.

On November 22, 1824, it promulgated the constitution, obviously framed under the influence of the Constitution of the United States, and provided for a Federal government of Central America. The provinces, meanwhile, organized their local or state governments. Almost at once, conflict arose between the adherents of the church and of the more conservative order, and the liberals. Separatist tendencies manifested themselves between the peoples of the several districts, and in 1839 the federation was dissolved. For nearly a century following this date, efforts were made to reunify Central America; but these efforts too often took the form of coercion or warfare by one state upon another, and sprang from the personal ambition of local "dictators."

In 1906, the government of the United States interposed to stop warfare between Guatemala, Honduras, and Salvador. On the U. S. S. *Marblehead*, a convention was signed, providing for the re-establishment of peace and for the reference of future differences to the arbitration of the presidents of the United States and of Mexico. Following this action came a conference at the city of Washington in 1907, which evolved a series of treaties designed to compose the differences between the Central American states and to bind them together in a greater unity.

A Central American court of justice was established and located at Cartago, Costa Rica. It was dissolved in 1917 on expiration of its treaty term of ten years. In 1922-23, by invitation of the United States, representatives of these states met at Washington in a Conference for Limitation of Armaments. Conventions and a treaty were signed renewing and amplifying certain terms of the treaties of 1907.

Meanwhile other attempts at unification have been undertaken. On January 19, 1921, delegates of Guatemala, Salvador, Honduras, and Costa Rica signed a treaty of union providing for the unification of those republics into a "federation of Central America." A provisional constitution was formulated, which left the constitutions of the separate states in force, so far as they were not contrary to the federal instrument, and which left in vigor treaties with foreign states.

The Swiss influence showed itself in the vesting of executive authority of the federation in a "federal council" (See *Switzerland.*), to be composed of a representative and of an alternate from each state, elected by popular vote for a term of 5 years. The legislative authority was conferred upon a Senate, elected by the Congress of each state for 6 years, and upon a Chamber of Deputies chosen by popular vote from electoral districts. Judicial authority was vested in a supreme court and in inferior courts, to be established by law. This compact was not entered into by Nicaragua, and was rejected by the Congress of Costa Rica. Its undertaking by the three remaining states was prevented by a revolution in December 1921, in Guatemala City.

The somewhat obscure history of Central America well illustrates the difficulties of establishing a federal union in the face of local attachments and dissentions, a difficulty triumphed over in the United States of America only at the cost of an exhausting civil struggle. The influence of the United States, which has been at times a strong factor in Central America, has been consistently thrown on the side of the unification and strengthening of these small states into one larger republic, illustrating vividly the fact that, in the foreign relations of the United States, the vicious principle of "divide and rule" has found no place. A concise statement of the government and politics of each country follows:

Costa Rica. Because of its elevated plateau area, Costa Rica enjoys the advantage of a favorable climate. The population consists largely of descendants of white colonists. Her isolation and the character of her population have given Costa Rica a somewhat more fortunate history than is possessed by other Central American states.

This country was the last to recognize the dissolution of the "federation of Central America." Her present constitution was framed in 1871 and embodies certain features indicative of the results of the studies of Spanish American publicists in which are modifications of constitutional law as originally elaborated in the United States. The government of the republic is declared to be "popular, representative, alternative, and responsible" and to be "vested in three different powers, to be known as legislative, executive, and judicial." No hereditary office or purchasable title is permitted. Civil liberty is fully defined by a series of articles, one of which confers the right to the writ of habeas corpus. The Roman Catholic religion is declared the religion of the state, which contributes to its support. Other religious worship is permitted.

The legislative power is confided to a single body called the "Constitutional Congress" composed of deputies chosen for 4 years, one-half renewable each 2 years in the proportion of one for each 15,000 inhabitants. The Congress meets annually, on May first, for a session of 60 days and may be called in extra session by the executive. In addition to possessing national legislative authority, the Congress appoints the justices of the supreme court.

In the event of the president's death or of his disability, the Congress determines the exercise of executive power, and appoints at its first session three individuals termed the first, second, and third "designates," *designados*, who succeed to the executive power in the order of appointment. The Congress, moreover, may hear charges against the president or against any member of the supreme power, and may order his trial before the supreme court of justice. The Congress ratifies all treaties and conventions and is specifically empowered, by a three-fourths vote, confirmed by a special constitutional assembly elected for that purpose, to grant a concession for an interoceanic canal.

The system of elections was formerly indirect through a college of electors, but is now direct. There is universal and compulsory suffrage.

During the recess of the Congress, a "permanent commission" of five deputies continues in session, with the powers of interpreting laws in cases of doubt, of preparing and putting in order unfinished business, of suspending the constitutional guarantees, and, at the request of the executive power, of passing urgent decrees. It may also be consulted by the executive on matters of importance.

The executive power is confided to a president, who must be a Costa Rican by birth and over 30 years of age. No candidate may be a relative of the actual president. The term is 4 years. He may not leave the territory of Costa Rica during his term nor for one year thereafter without the permission of the Congress. The several secretaries of state constitute a "council of government."

The territory of Costa Rica is divided for administration into provinces, cantons, and districts. In each province are a governor, appointed by the president, and his agent. In the chief town of each canton is a municipal council with powers fixed by law. Under this somewhat conservative constitution, Costa Rica has enjoyed political stability.

By a convention of March 17, 1910, a boundary dispute between the republics of Costa Rica and Panama was submitted to the chief justice of the United States for arbitrament. This arbitration was not fully accepted by either republic, and the armed forces of each state invaded the disputed territory. War was averted by the peremptory insistence of the United States upon an acceptance of the decision.

Guatemala. Like Mexico, Guatemala is a country with a large Indian population, living in highland villages. The people preserve their native speech and much of their own character in spite of their profession of Christianity. The presence of this illiterate, laborious, and militant element has influenced its history and institutions.

The present constitution, promulgated March 15, 1945, preserves many of the features of the constitutions of 1878, 1887, 1927, 1935, and 1939. The suffrage is extended to men, and to literate women over 18. Voting is secret and compulsory.

Legislative power is vested in the *asemblea nacional* to which is sent approximately one deputy for every 50,000 inhabitants, chosen for a four year term, one half retiring every two years. The assembly may force a minister's resignation by a vote of lack of confidence. It also elects the commander in chief of the army, whose officers are not eligible to the assembly or the presidency.

The executive power is in the hands of a president elected for a six-year term. A president may not be reelected for twelve years, after the expiration of his term. At any attempt to violate this clause, the people may legally rebel. The president has the veto power, but may be overruled by a two-thirds vote. He may suspend political rights in an emergency, but must report such action to the assembly.

The constitution also provides for a council of state, *consejo del estado*, of seven members, three appointed by the assembly, and four by the president. It has large advisory powers.

For local government the country is divided into 22 departments, each governed by a "political chief," *jefe politico*, who is appointed by the president, and responsible to him. Mayors of towns are elected by popular vote.

The Indians constitute about 60 per cent of the population. They have been freed from their former liability to compulsory labor, and the old laws in regard to peonage and debt have been amended.

The constitution asserts the claim of Guatemala to the territory known as Belize, or British Honduras.

Honduras (*República de Honduras*). Honduras revolted against Spain with the other Central American provinces in 1824. In 1838 Honduras adopted its own constitution which has been repeatedly revised. The present constitution was adopted in 1936.

The government of Honduras consists of a single chamber congress of 38 deputies, popularly elected for a 6-year term, and a president, similarly elected for 4 years. In the recesses of congress a committee transacts routine or emergency business. The president administers the government through a council of 6 ministers. For administrative purposes the country is divided into 17 departments and one territory.

Nicaragua (*República de Nicaragua*). The present constitution of the country was promulgated in 1939. The legislative power is vested in a Congress consisting of (1) a senate of 16 members chosen for 6 years and of ex-presidents, who sit for life, and (2) of a chamber of deputies elected for 6 years by popular suffrage from the departments, one member for each 30,000 inhabitants or major fraction thereof. The president is popularly elected for a 6-year term; he may not be immediately re-elected. Three *designados* are selected by Congress to call a new election in case of a vacancy. The president appoints the political heads of the 16 departments and two districts (*comarcas*). The Mosquito Indian reserve, relinquished by Great Britain in 1905, now forms the department of Zelaya.

Frequent revolutions which disturbed the country led to intervention by the United States, and, in 1912, to the landing of forces which remained in the country until 1925. In 1905, by an executive agreement, the president of the United States appointed a customs administrator and gave assistance in meeting the foreign obligations of the country.

By the Bryan-Chamorro treaty of 1916, the United States obtained, by payment of $3,000,000, exclusive rights to build in Nicaraguan territory an interoceanic canal, with a naval base on Fonseca bay and a leasehold of the Corn islands. The building of the proposed canal would involve rights of Costa Rica, for the purchase of which negotiations have proved fruitless.

The withdrawal of the United States Marines in 1925 was followed by the outbreak of revolution in 1926. The United States government, after landing marines for the protection of foreign life and property, was compelled to renew intervention in 1927. By mediation between the opposing forces, both armies were disbanded and an agreement reached between the rival parties to abide by the results of a general election, which was successfully held in 1928 under American supervision.

Salvador (*República de El Salvador*). Salvador became an independent republic in 1839, when the Central American Federation was dissolved. A constitution first proclaimed in 1824 was repeatedly modified. In 1945 the constitution of 1886, repealed in 1939, was reinstated, with some alterations. Women were given the suffrage. The president is elected for four years by direct popular vote, and may not be immediately reelected. Law-making power is vested in a single-chamber national assembly, elected each year. This assembly elects the judges of the higher courts for three year terms. Provision is made for social legislation.

Following the Bryan-Chamorro treaty of 1916, by which Nicaragua ceded to the United States the right to a naval station in Nicaraguan territory fronting on the Gulf of Fonseca, Salvador united with the republic of Honduras in opposing in the Central American court of justice the right of Nicaragua to cede a naval base on a body of water formed by territory of all three republics. The court upheld the complaint and directed Nicaragua to cancel its treaty. Nicaragua refused to recognize this decision. The United States, however, did not take advantage of the rights conferred by Nicaragua.

Chile. The republic of Chile arose from the Spanish captaincy-general of the same name. On September 18, 1810, the inhabitants of Chile deposed the Spanish authorities and created a provisional government. Spanish arms exerted themselves to retain this province and it was not until 1818 that Chile became free. A dictatorship under General O'Higgins lasted until 1826.

The Chilean constitution of May 25, 1833, was long the oldest constitution in force in South America. For decades a stable and effective government was maintained through the active participation in politics of an aristocratic class strongly united by family associations. In more recent years, political changes of a democratic character have been evident and the country adopted a new constitution which came into effect in 1925, substantially altering the form of government and tending to vest more power in the president of the republic. This chief executive is elected by direct popular vote for a term of 6 years but is ineligible for immediate re-election. The heads of departments form a cabinet, appointed by the president and directly responsible to him, although they have the right of speaking in the Congress.

The Congress comprises a Senate and a Chamber of Deputies. The Senate consists of 47 members representing groups of provinces, each group electing 5 for a term of 8 years, one half of the body

being renewed each 4. The Chamber of Deputies consists of 143 members elected by departments or groups of departments. All registered, literate citizens of 21 years or more have the right to vote.

An unusual power, that of passing upon the ability of the president, senators, and deputies to exercise office, is entrusted to a special body called the *Tribunal Calificador*, which consists of 5 members, 1 each from past presidents and vice presidents of the deputies and senate, 2 from members of the supreme court, and 1 from the judges of the court of appeal where Congress meets.

The judiciary comprises a national high court of justice, 8 courts of appeal, departmental courts of first instance, and minor district courts. Justices of the supreme court are appointed from names proposed by the council of state, and hold office during good behavior.

The internal administration is centralized. The republic is divided into provinces governed by *intendentes* appointed by the president. The provinces are divided into departments under governors, and each department into subdelegations. In the municipal districts there are popularly elected councils.

A serious boundary dispute of long standing with Peru was settled in 1929. Another, with Argentina, was adjusted in 1902 by an arbitral award of the king of England. This was followed by a treaty of agreement between these two countries.

China. China, the oldest political society in the world, has in recent years experienced far-reaching social and constitutional changes that cannot well be appreciated without an account of the previous régime.

China before 1912.—From 1644 to 1911 the Chinese throne was occupied by a line of emperors, successors of the 17th century Manchu conquerors. It was the policy of these rulers to keep the masses of China excluded from foreign influence and to resist all change. The empire consisted of 5 main elements: China proper divided into 18 provinces; Manchuria similarly divided into 3 provinces and largely assimilated to the Chinese culture; and the outlying dependencies of Mongolia, Tibet, and Sinkiang or Chinese Turkestan. Earlier, ill-sustained sovereign rights over Burma, Indo-China, Korea, and the maritime province of Siberia were lost during the latter half of the 19th century, by the encroachments of the British, the French, the Japanese, and the Russians.

The imperial family, from their residence in the Forbidden City at Peking, governed their vast state through a bureaucracy, largely Chinese, which was recruited through a competitive examination system. The imperial administration was confided to a number of boards or commissions, while at the head of each province was a governor, or, in certain cases, a "viceroy" with jurisdiction over two provinces. These deputies of the throne had largely independent powers which extended to the armed forces under their commands and even to the minting of provincial coinage and to the construction of public works and fortifications. However, all were dependent upon the will of Peking, which could at any moment transfer or degrade them.

Within the province, authority was confided principally to district magistrates, *hsien*, beneath whom the ancient social life of town and farming village functioned with a minimum of interference and with a maximum of individual freedom. Society was essentially democratic, there being no aristocracy, beyond a few Manchu nobles, and no privileged class except the educated officialdom open to all. Caste was nonexistent. While taxes were not burdensome, public administration was venal, negligent, and wholly inefficient to meet outside pressure or violence.

A series of disastrous foreign wars and aggressions, culminating in defeat by Japan in 1895, forced concessions of territory—Kiaochow to Germany, Liaotung peninsula to Russia, Weihaiwei and Kowlun peninsula to Great Britain. The disastrous Boxer outbreak which occasioned allied invasion, the capture and sacking of Peking and the flight of the court, shook the foundations of the monarchy. The Russo-Japan war (1904-05) saw Manchuria divided into "spheres of influence" between these two nations, rivals for the spoils of China's territory.

Reform and Revolution.—The evidences of the backward and decayed position of China induced the throne to undertake a series of reforms covering particularly the educational system, the administration of justice, and the conduct of provincial governments. Representative institutions—provincial legislatures and legislative assemblies for districts, towns, and villages—were decreed. These steps seemed designed to produce a gradual development toward constitutional monarchy, but the revolutionary movement proceeded too fast; on February 12, 1912, the emperor abdicated and a republic was proclaimed.

Present Government. Subsequent to 1925 China was swept by a nationalist movement, in part inspired by Soviet propaganda. In the resulting fighting and contention, national authority was destroyed, the office of president becoming vacant after 1926, although a cabinet simulated office at Peking. In October 1928, the Nationalist party, *Kuomintang*, having won a military triumph, established a government at Nanking, which was recognized by the leading nations.

The Nationalist government is essentially a party government, in which the central executive committee of the Kuomintang appoints the members of five councils (*yuan*), which carry on the government. The five councils are the executive, which establishes ministries and commissions for executive and other duties; the legislative, with power to make laws and decide on budgets, peace, war, and international affairs; the judicial, having charge of the administration of justice and the discipline of officials; the examination council, which determines qualifications and fitness for public service; and the control council, which exercises the powers of impeachment and auditing. The head of the national government is the president of the central executive committee of the Kuomintang.

As a result of the undeclared war between Japan and China, the Nanking government was forced to move its seat westward, to Hankow and later to Chungking. Under war conditions Chiang Kai-shek, as generalissimo and later also as president, exercised almost dictatorial power. In five northern provinces a Communist government, not in accord with the Chungking government, exercised control. After the surrender of Japan dissensions arose with the Communists in the north, who in 1949 gained full control of the Chinese mainland, setting up a government that is in effect a one-party dictatorship. Many countries have recognized this Communist regime, but the United States has not.

Foreign Relations.—China's impediments in foreign relations—extraterritorial jurisdictions, indemnities, customs control, and territorial encroachments, have been gradually removed. A rising national spirit has expressed itself in boycotts on foreign trade, student demonstrations, and appeals to international conferences. At the Conference of Washington (1922), China, generally supported by the United States, secured from the nine powers represented a general agreement to safeguard her rights and interests. When later the United States and Great Britain became allies of China against Japan, the partnership led to the abrogation of extraterritorial rights which these nations had enjoyed in China since 1842 and 1876. The new treaties, signed January 11, 1943, restored Chinese sovereignty over their settlements, and withdrew the exemption of their nationals from Chinese law.

In 1931–32, Japan struck decisively against China by seizing Manchuria and organizing there a new state known as Manchukuo.

In July 1937, as a result of local fighting, Japan invaded China without a declaration of war, and extended its control over large areas of eastern China. Japan set up two puppet governments, at Peiping and Nanking. After the surrender of Japan the authority of Chiang Kai-shek's Nationalist government was recognized in southern China, but not by the Communists of the north. American mediation through General Marshall was unsuccessful, and soon after Marshall's departure in December 1946, open civil war broke out. Meantime, a National Assembly, called by Chiang Kai-shek, but not recognized by the Communists, had adopted a new constitution, December 25, 1946. This move failed to halt the Civil war, which now raged more furiously than ever. On January 21, 1948, Chiang Kai-shek relinquished his leadership in favor of a "caretaker" government, but this did not bring peace. On September 21, 1949, the Communists proclaimed the People's Republic of China. Chiang Kai-shek resumed the presidency of the Nationalist government December 5, 1949. With China largely under Communist control, the National government withdrew to the island of Formosa.

Chinese Dependencies. The revolution of 1911, with its weakening of the imperial prestige, loosened the hold of the government upon the outlying possessions. In December 1911, a revolution took place at Urga in Mongolia; the Chinese officials were expelled and the "Hutuktu" or "living Buddha" was proclaimed ruler of Mongolia.

In 1912, Russia recognized the autonomy of Mongolia and agreed to support this status, to which China assented in 1913. The overthrow of the Russian empire in 1917 altered the situation. In 1919 China canceled this convention and attempted to restore her authority, but a Russian army entered Mongolia in 1921 and remained until 1925. An autonomous soviet government, controlled by Moscow, governed at Urga. In 1924, Russia agreed to recognize "Outer Mongolia" as a part of the Chinese republic and to withdraw the Red Army. Nevertheless, Russian influence continued to prevail. "Inner Mongolia," where Japanese influence is preponderant, declared its independence of China in 1935. In November 1937, an autonomous government under Japanese protection was set up at Kalgan.

Chinese authority in Tibet in the past was represented by two officials, *ambans,* in charge of foreign and military affairs, but administration was in the hands of Tibetans, under the Dalai Lama. In 1904, a British Indian military expedition penetrated Tibet and occupied Lassa. A convention between Great Britain and Tibet, forbidding disposition of Tibetan territory without British consent, was adhered to by China in 1906. During the revolution of 1911, the Tibetans expelled the Chinese representatives. In 1912, China dispatched an expedition against Tibet; but the British government objected. In 1950 Chinese communist forces invaded Tibet. The Tibetan government appealed twice to the United Nations, but nothing was done. In 1951 Tibet signed a treaty surrendering to China control of foreign affairs and defense, and became a part of the Chinese People's Republic.

The territory of Chinese Turkestan or Sinkiang (New Dominion) is largely ruled by native chiefs known as "begs." Although formerly under the viceroy of Kansu and Shensi provinces, it is now treated as a separate province under a Chinese governor. The power of Russia has penetrated into this region and exerts an increasing pressure.

Tannu-Tuva, a district north of Mongolia and west of Lake Baikal, set up in 1934 an independent republic under Soviet protection. Its legislative body of 30 members, called the Little Heruldan, elects the president.

In August 1945 the Nationalist government made a treaty of friendship with Russia, adjusting their mutual rights in Manchuria, and agreeing that outer Mongolia should be independent should it so desire. The plebiscite showed a desire for independence, and in 1946 China recognized Outer Mongolia as an independent republic. Its independence is guaranteed by the Sino-Russian treaty of 1950.

At the surrender of Japan, Formosa, taken by Japan in 1895, was restored to China.

Colombia. Upon the revolt of Spanish America from Spain, a republic was formed by the union of the "viceroyalty" of New Granada, the "captaincy-general" of Venezuela, and the "presidency" of Quito. This united state was called Great Colombia and a government was formed, based upon a constitution adopted in 1821. Venezuela withdrew from this state in 1829, forming a separate republic, and Ecuador (former presidency of Quito) seceded in 1830. The remaining territory reorganized as the Republic of New Granada, with a constitution adopted February 29, 1832. A new constitution was formed in 1843 and another in 1853. The constitution of 1858 transformed the former centralized government into a federal form, composed of eight states, styled the "Granadan Confederation," *Confederación Granadina.* In 1863, the name of the state was changed to the United States of Colombia.

Federalism and Centralization.—Colombia remained a federal republic modeled upon that of the United States, with a corresponding measure of independent authority accorded to the eight states of which it was composed, until the revolution of 1885, which brought about a new centralized government designated by the constitution of August 4, 1886, as "The Republic of Colombia." This act is the basis of the present fundamental law. By this constitution, the independence of the states was suppressed and they were transformed into "departments," with governors appointed by the president of the republic. The state of Panama protested against this suppression of its sovereignty, which action later became a ground for the justification of secession. Colombia is an example of a state (New Zealand being a second) which, having experimented with the federal principle, returned to centralized government. In the case of Colombia, it may be said that federalism was not based, like that of the United States, Germany, or Switzerland, upon a former independence of political units.

The constitution accords with political principles common to the republican governments of America. The president is popularly elected by direct vote for a term of four years and is ineligible to succeed himself. Congress is composed of a Senate and a House of Representatives. Judicial authority is vested in a supreme court, in district courts, and in inferior courts. In each department the chief executive, termed the "governor," is an appointee of the president and and agent of the national administration.

Recent Reforms.—The constitutional changes of 1886 represented the triumph of conservative principles of the clerical or conservative party. They led to revolutionary outbreaks which ended in the persistent defeat of the liberals. These disturbances led to the assumption of dictatorial powers by the president from 1904 to 1910. Constitutional changes of importance followed this period. The national electoral franchise was restricted to male citizens able to read and write, or to the possessors of certain property. Capital punishment was abolished. Senators were chosen by electoral assemblies in the departments. The supreme court was given the right to determine the constitutionality of laws. The vice presidency was abolished and was replaced by two "designates" annually elected by Congress. The term of the president was reduced to 4 years and he was made ineligible for re-election until after the end of another 4-year period. Further amendments in 1936 gave suffrage to all citizens, decreased the president's veto powers, and made provision for further social legislation. Amendments in 1945 excluded women from the franchise; senators are now to be chosen by direct vote. See also *Panama*; and, for boundaries, *Brazil*, *Peru*, *Ecuador*, and *Guatemala*.

Colombia remained neutral to the end of World War I. She joined the League of Nations November 13, 1919, with a reservation that the acceptance of Article X would not imply recognition of the independence of Panama. For the settlement of Colombia's objections to Panama's recognition, see *Panama.*

Cuba. From the time of its discovery by Columbus to January 1, 1899, Cuba was a colony of Spain and her last important possession in the New World. The persistent revolts of the Cubans and the severities of Spanish rule during the 19th century repeatedly gave concern to the American government and to the American people and in 1898 led directly to the Spanish American war. By the Treaty of Paris, signed December 10, 1898, Spain relinquished her sovereignty over the island. The United States expressed its resolution to leave the island to the political control of the Cubans.

American Intervention.—A period of military government by American forces lasted from 1899 to May 20, 1902, during which time public administration was reorganized, yellow fever was eradicated, and Cubans were inducted into public office. A constitutional convention, sitting at Havana from November 5, 1900, to February 21, 1901, framed the organic law for the republic. In determining the relations that should subsist between Cuba and the United States, the American Congress enacted a measure known from its author, Senator Platt of Connecticut, as the "Platt amendment." It stipulated that the Cuban republic shall not incur a public debt in excess of her fiscal resources without the consent of the United States; that the sanitary measures introduced by the military administration shall be sustained; that naval stations in the island may be leased by the United States; and that, finally, "the United States may exercise the right to intervene for the protection of Cuban independence and for the maintenance of a government adequate for the protection of life, property, and individual liberty."

Under this convention, the United States intervened in Cuban affairs five times before its abrogation by a new treaty, which became effective on June 9, 1934. Cuban independence was thereby reestablished, so that American influence is now restricted by the regular usages of international law.

The first Cuban Congress elected under the constitution met May 5, 1902, and American rule came to an end on May 20. Great material progress followed Cuban independence, but politics were unsatisfactory. Legislative promises to grant municipal autonomy and other progressive reforms were unfulfilled, and in July 1906 revolution broke out.

Second Intervention.—In compliance with the Platt amendment and in response to the urgent requests of the Cuban president, the United States again intervened and, by the presence of troops but without the use of violence, established a provisional government which lasted from September 1906 until January 28, 1909. During this period, necessary laws were decreed, including an electoral law designed to make popular suffrage free and effective. From the latter date, the government of Cuba remained stable until 1933, in which year President Machado was driven out. United States naval forces stood by, exercising a steadying influence. Constitutional rule was restored in 1936. The present constitution was adopted in 1940.

The executive power is entrusted to a president, chosen for four years by electoral votes based on the popular vote in each province. He may not be re-elected for eight years after his term expires. A vice president is similarly elected. Universal suffrage prevails.

Congress comprises two houses—a Senate of nine members from each province and a House of Representatives chosen from the provinces on a basis of one for each 35,000 or major fraction of its inhabitants. Senators are chosen for eight years and representatives for four; one-third of the Senate and one-half of the House retire each two years. The ministers are responsible to Congress, and any or all of them must resign on a vote of non-confidence.

As in the United States, the supreme court is endowed with the power of passing on the constitutionality of laws. Church and state are separated.

The republic is divided into six provinces: Pinar del Rio, La Habana, Matanzas, Las Villas, Camaguey, and El Oriente. Each province has a governor appointed by the president and a provincial council made up of municipal officers, who are themselves appointed by the governor.

Czechoslovakia. A central European republic, established after World War I. It consisted of the former Austrian and Hungarian domains of Bohemia, Moravia, Slovakia, and Ruthenia. It existed under a republican constitution from 1920 until its absorption by Germany in 1938–39. A Czechoslovakian government-in-exile was formed in London, fostered resistance at home, and became a member of the United Nations. As the Russians advanced on the eastern front the government returned and took over the liberated territories.

The re-established government exercised authority over its former territory and people, except that Ruthenia was ceded to Russia, and the Germans and Hungarians were expelled. In 1945 a temporary national assembly was called. Decrees were issued nationalizing all large industries, including the motion picture industry, which is entirely under state control. Close political and economic relations were established with Russia. The next year elections to a constituent parliament made the Communists the leading party. Under Communist and Russian pressure, the all-party government was forced out in February 1948, and a new constitution, on Communist principles, was adopted.

Denmark. The three Scandinavian countries have, at periods of their history, been united. In 1381 Denmark and Norway united under a common sovereign, separating in 1814.

Denmark is a limited monarchy. The present constitution, which is a modern version of the constitution of 1849, was signed June 5, 1953. By its terms the legislative power is vested jointly in the king and parliament (*Folketing*). The executive power is held by the king, who appoints the prime minister and presides over the cabinet, which handles new bills and important measures. The Folketing consists of a single chamber composed of 179 members, 135 of whom are elected by proportional representation. An additional 40 seats are divided among the various political parties to equalize the representation. The Faroe Islands and Greenland, which have equal status with other parts of the kingdom, have 2 representatives each. The Folketing is elected for 4 years and meets annually, but may be dissolved earlier by the king. Suffrage is universal; the voting age is 23. Any voter is eligible for election to the Folketing. In the first election under the new constitution, the Social Democrats obtained 74 seats; Moderate Liberals 42; Conservatives 30; Social Liberals 14; Communists 8; Faroe 2; Greenland 2; and Slesvig Party (German Minority) 1.

The king can neither make war nor sign peace treaties without the consent of the Folketing. Under certain circumstances the constitution permits the transfer of some sovereign powers to international organizations, if approved by five-sixths of the Folketing members or a plebiscite majority. Since 1953, women may succeed to the Danish throne.

Local Government; *Courts.* Denmark is divided into 22 counties, *amter*; the counties into districts, or "hundreds;" and these into parishes. There are 88 urban muncipalities, each with a mayor and council.

There is a supreme court at Copenhagen, with a chief justice, 12 associates, and 11 special judges. Superior courts sit at Viborg and Copenhagen. There are minor local courts.

The established church is the Evangelical Lutheran Church, of which the king must be a member. While the great majority of the people are members

of this church, its officers have no part in politics and dissenters have complete religious freedom.

By reason of war in 1866, Denmark was compelled to cede to Prussia the provinces of Schleswig and Holstein. The Treaty of Versailles, 1919, provided for the taking of a plebiscite in northern Schleswig to determine the future of this territory. A southern demarcation voted for adherence to Germany; a northern, for admission to Denmark; and, on July 7, 1920, this latter territory was reunited to the kingdom. In 1916, Denmark sold to the United States the Danish West Indies, now known as the Virgin Islands. For Denmark's relations with Iceland, see *Iceland.*

Colonies. Denmark's only colonial possession is Greenland, governed by a commission, with special care for the interests of the natives. Trade with Greenland is a state monopoly. Denmark has held Greenland since the 18th century; questions of title were finally cleared up in 1916, when the United States, as part of the treaty of purchase of the Danish West Indies, gave up all claims arising from Admiral Peary's discoveries in the northern parts of the island. See *Greenland.*

Ecuador. A republic located in high Andean country, but including territory bordering the Pacific coast and lying directly over the equator, a circumstance from which it takes its name "Ecuador." For early union with Colombia, see *Colombia.* From 1830 until 1953, Ecuador, whose political history has been much disturbed, has had nearly a score of constitutions.

The government is a centralized republic. The president is elected by direct popular vote but cannot succeed himself. Congress consists of a Chamber of Deputies elected for two years and a Senate elected for four years. Representatives are also chosen from special groups, including education, business, agriculture, and certain racial categories.

The 17 provinces are administered by governors appointed from Quito. The Galapagos Islands are governed as a territory.

Frontiers.—The territorial boundaries of Ecuador are still in part unsettled. A boundary treaty with Colombia was signed July 15, 1916, and a delimitation of the frontier was completed July 9, 1919, by a joint commission. Unsuccessful attempts were made in 1894 and again in 1904 to adjust the boundaries with Peru by the mediation of the king of Spain. In 1941 hostilities again broke out, but a compromise was effected by the mediation of Argentina, Brazil, Chile, and the United States. Peru received the larger part of the disputed territory, but Ecuador retained the eastern Andean region.

Ecuador remained neutral in World War I, but broke off relations with the Axis powers in 1942. American bases, established on the mainland and in the Galapagos Islands, were returned in 1946.

Egypt. An exceedingly ancient state, occupying the slender valley of the Nile. For several centuries a province of the Ottoman empire, Egypt was granted autonomy in 1811 under a viceroy, whose title was changed to "khedive" in 1867. Under the khedive Ismail, an active but extravagant effort to modernize the country took place. The Suez canal was built with foreign aid and was opened in 1869. Financial bankruptcy led to the appointment in 1879 (khedivial decree of November 10) of two controllers-general nominated by France and England.

In 1882, by reason of military rebellion, England intervened and her armed forces occupied the country. Administrative reorganization was placed in charge of an English financial adviser. France refused to join in this intervention and remained critical of British occupation until the Anglo-French agreement of 1904, whereby France recognized England's place in Egypt in return for support in Morocco. See *Morocco.*

During the period of British intervention, great material improvement was made in Egypt's condition, and, in 1898, the vast Egyptian possession of the Sudan was reconquered by an Anglo-Egyptian army under General Kitchener. On the entry of Turkey into World War I, a British protectorate was declared, December 18, 1914, the sovereignty of Constantinople was renounced, the actual khedive was deposed, and a new ruler with the title of "sultan of Egypt" was installed. On February 28, 1922, the British government announced that the protectorate would be terminated and that Egypt would be recognized as an independent, sovereign state. By a treaty in 1936, Great Britain agreed to withdraw her armed forces over a 10-year period but with provision retained for co-operation between British and Egyptian troops in case of war.

The sultan was proclaimed king in 1922. A constitution was promulgated in 1923. In 1930, this constitution was abrogated by royal decree, and a less liberal constitution proclaimed. In 1934, this constitution was abolished by the king, under pressure, and the constitution of 1923 was restored the next year.

Dissatisfaction with the palace regime of King Farouk I, which led to rioting in Cairo early in 1952, resulted in the abdication of Farouk in July 1952, and his forced departure from Egypt. He was succeeded by his infant son, Ahmed Fouad II, under a regency. But in September 1953, General Mohammed Naguib became premier. On June 18, 1953 the monarchy was done away with and a republic proclaimed, with Naguib as provisional president and premier. In November 1954, Naguib was deposed by General Gamal Abdel Nasser who became premier. Nasser proclaimed a new Egyptian Constitution in 1956.

The Anglo-Egyptian Sudan was a joint condominium of the British and Egyptian governments, and, by treaties of 1899 and 1936, was administered jointly by the two countries, with the British and Egyptian flags being used together. In 1953 an Anglo-Egyptian agreement was signed granting immediate self-government to the Sudan and self-determination by 1956. Egypt, however, retained control of the waters of the Nile. On January 1, 1956, the Sudan proclaimed itself a free independent republic.

Estonia. Lying between the two great Teutonic and Slavic races in eastern Europe are three small peoples of different descent and character who are akin to the Finns,—the Esths, the Letts, and the Lithuanians. One of the results of World War I was the proclamation, by these peoples, of the independent republics of Estonia, Latvia, and Lithuania.

By a decree of the Russian provisional government of April 12, 1917, local self-government under a national council was accorded Estonia. In November, this council declared the independence of Estonia and assumed sovereign powers until a constitutional assembly could meet. Following the German invasion, the national council was maintained by missions abroad and was recognized in May 1918 by the governments of Great Britain, France, and Italy. In May 1919, Estonia was again proclaimed an independent republic and its status was recognized by the allied powers.

On September 28, 1939, Estonia signed a treaty of "mutual assistance" with Soviet Russia. This treaty expressly declared the sovereignty of Estonia to be unimpaired, but the concession to Russia of the right to establish and garrison naval and air bases gave that power practical military control of the country. The Communist party in Estonia soon sought union with Russia. On August 6, 1940, Estonia was admitted into the Soviet Union.

Ethiopia (Abyssinia). An ancient kingdom in Northeast Africa. It was wantonly invaded by Italy in 1935, and the capital, Addis Ababa, was taken in 1936. Emperor Haile Selassie appealed to the League of Nations, and sanctions were imposed against Italy, but this did not prevent Mussolini from annexing Ethiopia. The country was liberated

by the British in 1941, and for awhile was jointly administered by the English and Ethiopians.

In accordance with a resolution passed by the General Assembly of the United Nations in 1950, the neighboring Italian colony of Eritrea was federated with Ethiopia on September 15, 1952, thus giving Haile Selassie's hitherto landlocked kingdom an outlet on the Red Sea. In 1955 a new constitution was promulgated by the emperor, granting Ethiopians the right to vote for the first time.

Finland. One of the new republics that emerged as a consequence of the World War and the partial disintegration of the Russian Empire. The country, which had been autonomous under Sweden, was united with Russia by conquest in 1809. Between 1899 and 1904, through the policy of the czar and of the Russian bureaucracy to Russianize all parts of the empire, Finland lost most of her autonomous privileges. But the reforms granted as a result of Russia's defeat in the war with Japan restored to Finland in 1904 her previous status. Under the direction of the Russian government, the Finnish diet in 1906-07 acquired a new constitutional charter. This constitution was suspended during the World War, but was restored in 1917 by the revolutionary government. Independence was declared by Finland in December 1917, after the Bolshevik revolution. In June 1918, the diets elected Prince Frederick of Hesse, brother-in-law of the German kaiser, king of Finland, but in the following December the king was deposed. Finland was declared a republic. Its independence was recognized in May 1919 by the nations, including the United States, assembled at the Peace Conference.

According to the present constitution, government belongs to the people, represented by a parliament of 200 members, in the Finnish language called the *Eduskunta* and in Swedish, *Riksdag*. Its members serve for 3-year terms. The executive power is vested in a president, who is chosen for a term of 6 years by the direct vote of all Finnish citizens. The president supervises the administration, conducts foreign relations, and is commander in chief of the army. Foreign treaties, as well as the decision of peace and war, require the ratification of the Chamber. The president may initiate legislation and may dissolve the Chamber; he exercises the pardoning power and presides over the council of state, or cabinet of ministers, when present. He has a suspensive veto on legislation, during which suspensive period the president may request the counsel of the supreme court or of the supreme administrative court. If a measure is then not approved, it may become a law only after its re-enactment without alteration by a newly elected Chamber.

While these provisions would seem to create a strong and independent president of the American type, other provisions indicate a disposition to establish a parliamentary responsibility. The constitution provides that the decisions of the president, except for supervising administration and for directing the "arraignment of ministers," must be countersigned by a minister, and that ministers must decline countersignature if the president's action is contrary to the fundamental law; that, furthermore, the council of ministers must enjoy the confidence of the Chamber.

The suffrage is possessed by all citizens, men or women, 24 years or over except tax delinquents or poor-relief recipients. A system of proportional representation is provided through voters' associations, membership in which is optional.

The supreme court is established by the constitution; trial courts, by legislation. A supreme administrative court, which is a tribunal of last resort on questions of administrative law, is established by the constitution. Both the supreme court and the supreme administrative court have the right to address the president on the subject of necessary legislation.

While the president is intrusted with the enforcement of laws, a novel office seems to have been created in the election of a "solicitor," by the Chamber of Representatives. He supervises the enforcement of laws in court and other proceedings.

The provinces into which Finland is divided are administered by governors appointed by the president. Local autonomy for the communes is established as a principle in the constitution.

The relations between Finland and the Soviet Russian republic were determined by a treaty which established the frontier. Following independence, Finland advanced claims to the Aland islands, which, though inhabited mainly by Swedes, were judged necessary to the naval security of Finland. The question of ownership was referred by the Allied council of premiers to the League of Nations in June 1920, and in June 1921 a decision was given, uniting these islands to Finland.

In November 1939, Finland refused to agree to a "mutual assistance" treaty with Russia similar to those concluded with the Baltic states, and, on November 30, Russia attacked Finland. After a vigorous resistance, Finland was forced to accept a peace, ceding Viborg and the Karelian isthmus, with military bases on the Gulf of Finland. When Germany later invaded Russia, Finland declared war (June 25, 1941), retook the ceded territory, and joined the Germans in the siege of Leningrad. Following the Russian successes of 1943, peace negotiations with Russia began, but were broken off. Repeated defeats during the summer, however, forced the Finns to accept an armistice (September 2, 1944) by which they agreed to expel the German troops and break off relations with Germany, give up again the territory lost in 1940, with other military bases and the Petsamo area, and pay in kind an indemnity of $300,000,000.

France. The French Republic (*la République Française*). The present government of France, the Fourth Republic, came into formal existence in January 1947. Its predecessor, the Third Republic, was established after the fall of the Second Empire of Napoleon III, during the Franco-Prussian war of 1870. Its development was gradual, with the result that its constitution took the form of a series of constitutional laws, the last adopted in 1875. This Third Republic weathered the assaults of royalists and imperialists, and dealt with the clerical interest by separating church and state in 1905.

The Third Republic fell before the German armies in 1940. On July 10, a National Assembly voted 569 to 80 to invest the Pétain government with plenary powers until a new constitution could be framed. An authoritarian régime, having its seat at Vichy, headed by Marshal Pétain, and controlled by the Germans, exercised a shadowy authority until the Liberation. Then the provisional government of the Committee for National Liberation, headed by General DeGaulle, was recognized, and directed the election, in October 1945, of a constituent national assembly charged with framing a new constitution.

The work of this convention was rejected by a plebiscite in May 1945, largely through the influence of General DeGaulle, who feared that its single chamber legislature and weak executive would not leave France strong enough to meet the political struggles which he foresaw. A second convention produced the present constitution, which, although opposed for the same reasons by General DeGaulle, was adopted, October 13, 1946, by a popular vote of 9,200,467 to 7,790,676, with a third of the voters abstaining.

Administration. Much that is fundamental in French government is contained in earlier laws which have survived constitutional changes. Particularly is this the case with administrative laws, which have undergone little change since their enactment under Napoleon in 1800. A French statesman is said to have remarked to an English visitor: "When you English change your government, you carefully preserve the façade and rebuild the rooms behind it. Now in France we tear down the façade and rebuild it—but behind it is the same old house."

The Departments.—Under this system, France is divided into districts called "departments," 90 in number, 3 having been recreated from the provinces of Alsace and Lorraine, regained by France at the conclusion of the World War. The island of Corsica and the fortified area of Belfort are also included in the above 90 departments. The departments are arbitrary divisions, approximately equal in area and in population and have no relation to the historic provinces, such as Normandy, Picardy, Champagne, or Gascony, which the French Revolution erased as political subdivisions. The departments are all named after physical features, such as rivers and mountains.

Each department is subdivided, for convenience of administration, into two or more *arrondissements*. In each department and in each arrondissement a town is designated as the seat of administration and is called the "chief place," *chef lieu*. In each chief place is a public building, the seat of local government, called the "prefecture" or "subprefecture."

The Prefect.—The entire public administration, national and local, within the department, is in charge of a trained official called the prefect, *préfet*, who is appointed and directed by the minister of the interior and who is never a native of the department whose affairs he directs. The prefect reports not alone to the minister of the interior, but to the other ministers of the government whose local interests he superintends. In the arrondissements, subprefects assist the prefect. To further aid and counsel this important official, there is the "prefectural council," composed of three or four trained functionaries who, presided over by the prefect, constitute an "administrative court" to hear complaints against public actions, to adjust taxation, to examine departmental and communal budgets, and to settle questions of jurisdiction.

General Council.—To supply a measure of local representation, there is a departmental assembly or local legislature called the "general council," *conseil général*, which consists of from 17 to 67 members, according to the size of the department. This council is elected by the people of the department for a term of 6 years, one-half elected each 3 years. The general council meets at least twice a year, its most important tasks being to examine the departmental budget and the rates, and to audit the economic conduct of the prefectural government. Within the arrondissements is a lesser territorial subdivision, the "canton," which has no administrative significance but is the jurisdiction of the justice of the peace, *juge de la paix*, and is an election district for the general council.

Communes.—The entire territory of France is comprised in municipal organizations called "communes," the number exceeding 36,000. They vary greatly in size and in population. All, except Paris, are governed under a single brief code, the municipal law of 1884. Each commune has a municipal council composed of from 10 to 36 members, elected by universal French male suffrage for 4 years, by "general ticket," and a "mayor," *maire*, elected by the municipal council, who may be assisted by one or more aids called "adjoints." All serve without pay. The position of mayor is highly honorable, has been filled by many statesmen of distinction, and is sometimes held by one trusted individual for many years.

The mayor has large powers, not only as a local official, but also as the agent of the national government for all its interests within the commune. He controls the local police and, like the prefect above him, may issue police ordinances, *arrêtés*, covering a wide field. For the enforcement of laws and for the maintenance of public order, he is responsible, not to the government or the inhabitants of the commune, but to the prefect of the department. Against excessive or illegal actions of the mayor, appeal may be had to the prefectural council and from that court an appeal is made to the highest administrative court, the council of state at Paris.

The Council of State (Conseil d'état). This body, historically a heritage from the "Ancient Régime," reformed by Napoleon, in recent decades has developed as the supreme administrative court into a regulatory organ of administration of the first importance. Its decisions form a legal corpus known as the administrative law, *droit administratif*. It is the capstone of a system of centralized administration which has been found equally serviceable under empire, monarchy, or republic.

The system above described is that of the Third Republic. The constitution of 1946 provides that it may be modified by law. It recognizes departments, and such special units as may be found necessary. It declares that each unit shall freely administer its affairs by universal suffrage through elected councils. Co-ordination and supervision within the departments is to be assured by delegates of the government designated by the cabinet.

The Constitution of 1946. The preamble of this constitution reaffirms the traditional rights of man, with some additions. It emphasizes the rights of workers, especially to support; and the duty of the state to furnish free and secular education. France is an indivisible republic. Sovereignty belongs to the French people and is exercised generally through the National Assembly. Suffrage for the first time is extended to both sexes.

The Parliament. The parliament consists of two chambers, the National Assembly and the Council of the Republic, both elected on a territorial basis, but details are determined by law. Members of the National Assembly are elected by direct popular vote. The Assembly is the supreme law-making body. It meets annually in January; its meetings are public, but it may hold secret sessions. To it the budget is submitted, and it has the initiative in expenditures. It only may declare war or grant amnesties. It receives proposals of laws from the Cabinet or its own members, and acts through committees.

The Council of the Republic is more like the English House of Lords than like our own Senate, or the former French upper chamber. The absence of such a second chamber was one of the principal reasons for the rejection of the first draft constitution. The leftist parties, which had brought about its omission at that time, were still strong enough to limit its powers. Members are chosen by a complicated indirect system, and the assembly may add more members if it sees fit. It has no control over the ministers. It examines laws passed by the assembly, and has two months in which to propose amendments, but if the assembly rejects them, the original bill becomes law. The Council may only advise against and slightly delay a measure of which it disapproves.

Treaties must be ratified by the assembly, and their provisions may override domestic law.

The President and Cabinet. The president is elected by Parliament, for a term of seven years, and may be once reelected. No member of a family which has reigned in France can be chosen. His position is one of great dignity and little power. Every official act must be countersigned by the premier and a minister. He appoints important officers "in cabinet." He has no effective veto, but may, within ten days, ask the assembly to reconsider a measure.

The premier is the real head of the executive. He is appointed by the president, but must be approved by a majority of the assembly. He and his colleagues are collectively responsible to the assembly, and must resign on a vote of censure or a refusal of confidence.

France has a number of political groups, which seem unable to coalesce into traditional American or British alignment of government and opposition parties. In this situation a French ministry must depend upon the support of a generally unstable coalition, which may break up at any time. Hence they are apt to be weak and short-lived. The new constitution attempts to meet this situation by requiring an absolute majority of the delegates for a vote of

censure or loss of confidence, and by allowing the dissolution of the assembly under some conditions. On the "fall" of a ministry the president invites to form a government the leader who seems most likely to command the confidence of the assembly, and if he accepts and is approved by the assembly he chooses his colleagues to head the various ministries. Ministers have the right to speak in the assembly, and may be called upon to defend their policies.

The French ministries vary in number, depending on public needs and political conditions. A typical list would be: Foreign affairs, defense, finance, justice, war, marine, air, interior, agriculture, education, public works, communications, colonies, labor, public health, reconstruction, food. Each ministry has a "sub-secretary," who retains office under successive administrations, and each ministry is divided into "divisions" and "bureaux."

Two other bodies, provided for in the constitution, are an Economic Council, which advises the assembly and cabinet on matters within its domain; and the superior council of the magistracy, charged with the appointment and disciple of magistrates.

The constitution may be amended by special procedure in parliament with or without a referendum.

French Colonial Possessions. France possesses a colonial empire second only to that of Great Britain. During and immediately after World War II, it was badly shaken by the Japanese invasion of Indo-China and the subsequent revolt of the Annamese; and by the division between the Vichy government and the "Free French." In the constitution of 1946 provision is made for a reorganization of the empire, now the French Union.

The French Union is to include on the one hand the French Republic; on the other, the territories and the associated states. The president of France is its head. Its central organs are the High Council and the Assembly of the French Union; both are composed of members from France and from the colonies. Each of the overseas territories has its assembly, but the administration is in the hands of a French representative. They send representatives to the French parliament, and their citizens have the rights of French citizens.

The organization described below is that of the Third Republic, under which it was, in the main, acquired and developed. Of older possessions, dating from the period of American colonization, are Guadeloupe and Martinique, small islands in the West Indies; French Guiana which is on the mainland of South America, and was notorious as a penal colony; and Saint Pierre and Miquelon, the sole vestiges of French Canada. These islands are under governors sent from the French service, but they have local representative institutions. Gaudeloupe, Martinique, Guiana, Reunion, French India, Senegal, and Cochin-China are represented in the French National Assembly, according to the principle adopted as far back as the French Revolution.

In 1830, France entered upon the conquest and the reorganization of Algeria, a country largely "assimilated" to the French pattern of government.

In 1881, Tunis was invaded and, by treaty with the "bey" or native ruler, is under French protection. A resident-general and a staff of French officials administer the country with native participation.

The large island of Madagascar, after a period of French protection, marked by varied military operations, became a colony in 1896. It is administered by a governor-general and by a consultative council of administration. In 1914, the Comoro islands were placed under the authority of the governor-general of Madagascar. The island of Reunion or Bourbon, north of Madagascar, has been a French colony since 1643. For the protectorate over Morocco, see *Morocco.*

The greatest expansion of French colonizing power has been in West Africa and in the Sahara. These areas include the following colonies: Senegal, French Guinea, Ivory Coast, Dahomey, French Sudan, Upper Niger, and Mauritania. To these are added the former German colony of Togoland as a mandate. All these possessions are united under the administration of the governor-general of French West Africa, with residence at Dakar. France also has in Africa a Congo region—Equatorial Africa—and, on the Gulf of Aden, French Somaliland.

In Far East Asia, French possessions before World War II were organized as French Indo-China. It comprised the colony of Cochin-China (ceded by Annam in 1862), and the protected native states of Annam, Cambodia, Tonking, and Laos. French intervention in Annam began as early as 1787, but the final creation of a protectorate dates from 1884, in which year similar authority was established in Tonking. Laos passed under French control in 1893.

Under the constitution of 1946, these dependencies became the Federation of Indo-China, within the French Union: the Viet-Nam Republic (mainly Assamese, and including Tonking and Northern Assam); the protected kingdoms of Cambodia and Laos; the southern highlands; and Cochin-China. The Japanese occupation, however, had stirred up old feelings of nationalism, and a desire for independence. Since 1946 Cochin-China has become an autonomous republic; Laos and Cambodia have had constitutions since 1947, all within the Union; but the Communist or Vietminh forces in Viet-Nam attacked the French at Hanoi late in 1947, opening the Indo-China war. Years of guerrilla fighting followed, until the rebels, with Communist China's backing, gained control of Northern Viet-Nam. Fighting ceased after an armistice was signed at Geneva, Switzerland, July 21, 1954. The French agreed to withdraw south of the 17th parallel, while the Communists agreed to recognize the French-sponsored governments of Laos and Cambodia. The fate of Southern Viet-Nam, which is still in French possession, will be determined by popular vote of the people by 1956.

On the coast of India, France, in 1954, ceded to India a few small sites, vestiges of the brilliant attempt to secure an Indian empire, in which attempt she was defeated by England in 1763. The most important of these places was Pondicherry.

French possessions in the Pacific include New Caledonia and smaller dependent islands; the New Hebrides, administered jointly with Great Britain under a "condominium"; the Society islands (Tahiti); the Marquezas; the Tuamotu group; and the Leeward islands.

Germany (*Deutsches Reich*). The union of Germany was effected in 1871 under a constitution framed by Prince Bismarck, which created a new German federal state under the leadership of Prussia. It was made up of 25 states: 4 kingdoms, Prussia, Bavaria, Saxony, and Württemberg; 18 lesser principalities, grand duchies, and mark-graviates; and 3 "free cities," Hamburg, Lübeck, and Bremen, survivors of the old "Hanseatic League" of German trading cities. The states retained their own interior administration, generally monarchical, except in the free cities.

The Reichstag.—The Federal government comprised a legislature consisting, first, of an elective body, the *Reichstag*, or diet, of 397 members chosen by popular election on the basis of universal manhood suffrage. The districting of members remained unchanged after the first apportionment, and, with the great industrial growth of Germany, resulted in the under-representation of the cities.

The Bundesrat.—The upper house was a unique institution, the heritage of earlier German diets, and was called the *Bundesrat*, or "federal council." It was composed of 61 representatives of the federated states, of which Prussia had 17. These members were the appointees of the governments represented and were usually high ranking members of these governments, under whose instructions they acted. The Bundesrat had predominant powers. It initiated practically all legislation, and no bill

could be considered by the Reichstag without the consent of the Bundesrat. It prepared the federal budget and supervised, generally, the imperial administration. It took cognizance of the failure of any state to execute imperial laws and could sanction the employment of armed force to coerce a state into obedience. Its membership represented the highest political experience and reputation of the empire. It was presided over by the imperial chancellor, who was the head of the national administration and controlled all its political departments. This official was the personal choice of the German emperor and was responsible to him alone.

The imperial chancellor was usually prime minister of Prussia as well, and head of the government of that predominant state. Bismarck established the principle that other imperial ministers, foreign affairs, finance, war, navy, etc., were responsible to the chancellor, and must report to the emperor through him.

King and Emperor.—Prussia, by military and political success, had achieved the unification of Germany, and the constitution provided that the king of Prussia should perpetually hold the office of German emperor, *Deutscher Kaiser*. The position constituted not a sovereignty over Germany but a "presidency," *praesidium*, of the nation and a military leadership, *Kriegsherr*.

Revolution of 1918.—Germany's defeat in 1918 produced a violent reaction against the monarchical and militarist system. On October 28, 1918, two laws, which were designed to meet the growing political dissatisfaction, were passed. The first law amended the constitution so as to make the chancellor responsible to the Reichstag. A second law permitted members of the Reichstag to become secretaries of state. The principle of parliamentary government was thus introduced. At the same time the kaiser, in a letter to the chancellor, announced the surrender of his "fundamental rights" to the people.

These acts, however, did not prevent revolution, which broke out at the beginning of November. Soldiers' and workers' councils, in imitation of the Russian revolution, seized numerous cities. A "general strike" was declared in Berlin. On November 9, the emperor abdicated and the crown prince renounced the throne. The conduct of government was surrendered to the leaders of the Social Democrats, and the republic was proclaimed. These acts mark the end of the former régime and the beginning of a transformation of government throughout Germany.

All the monarchical governments vanished. The princes resigned or were replaced. Republics everywhere arose. Constituent conventions were held in the various states, which prepared democratic constitutions. The result was that the German Empire or commonwealth became a union of republics. Coburg united with Bavaria and seven small states of central Germany, December 24, 1919, to form the state of Thuringia.

The Republic.—The new German constitution, by a clause which suggests a provision of the Constitution of the United States, required in each state a republican constitution, a universal, equal, direct, and secret franchise of male and female voters, and a system of proportional representation. Thus all states acquired popularly elected diets or assemblies, which, except in Prussia, consisted of a single chamber, *Landtag*. The conduct of government was intrusted to a commission or "cabinet" of ministers, or to a "state council," responsible to the Landtag. The chairman of this body bore the title of "president" or "premier." The German states, in forming their new executives, followed the Swiss practice of board or collegiate executives.

The Prussian constitution provided for a diet and for a state council, *Staatsrat*, elected by the assemblies of the provinces into which Prussia is divided. The state council advised and, to a degree, controlled the diet, and it might veto the diet's legislation. The diet elected the "premier" of Prussia, and he chose the other ministers. All were responsible to the diet.

The new constitution of the German Empire was framed by a constituent convention which met at Weimar. It was promulgated August 11, 1919, and became effective at once. The empire was given power to change the boundaries of states, with their consent by law, against their consent by a constitutional law. Prussia, toward whom this provision was mainly directed, was guaranteed against dismemberment for at least two years. The Reichstag, or popular legislative chamber, was elected on most liberal suffrage conditions. By the general election of March 5, 1933, it consisted of 647 members. The former Bundesrat reappeared as an imperial senate, the *Reichsrat*, in which Prussia had 26 votes; Bavaria, 11; Saxony, 7; Württemberg, 4; Baden, 3; Thuringia, 2; Hesse, 2; Hamburg, 2; other states, 1 each—a total of 66.

The powers of the national government were much enlarged. It was given full control of foreign relations, defense, customs, taxation, and railroads. The national legislature was empowered to revise and to enlarge the powers of the national government.

Parliamentary government was completely recognized. The "cabinet," composed of the chancellor and of ministers, required the support of the Reichstag. War could be declared or peace could be concluded only by a law of the national legislature. The constitution guaranteed equality before the law; freedom of religion, of speech, and of the press; and abolished all class privileges of whatever kind.

The President.—The president of the empire was elected by the whole German people for a term of 7 years. He had the unusual power of ordering a referendum of laws which did not command his approval or of proposed laws on which the chambers disagreed. While most executive acts had to be performed through ministers, responsible to the Reichstag, the president commanded the armed forces of the Reich and might declare martial law or a "state of siege." Finally, he might dissolve the Reichstag and order a new election. The president might be removed from office by vote of the people, on proposal of the national legislature.

Economic Constitution.—The Weimar constitution is further remarkable for the place it accorded to labor and to industry. It included an "economic constitution" providing "factory workers' councils," leading up to a "national workers' council." The participation of laborers in the management of industry was guaranteed by economic councils of employers and employees. The national economic council had the right to be heard on all cabinet bills of a social or economic character before these bills were introduced into the Reichstag. The council itself might propose laws.

Nazi Rule.—On March 23, 1933, the principal provisions of the Weimar constitution were set aside by vote of the Reichstag, which entrusted complete dictatorial powers to Adolf Hitler until April 1, 1937. Hitler immediately placed governors, or *Statthälter*, in control of the individual states and empowered them to appoint state premiers who were to pick their own cabinets. The cabinets were made independent of the state legislatures, being responsible solely to the national dictator. These legislatures were later dissolved.

All law-making activities were centered in a cabinet of 16 members headed by the *Führer and Chancellor*, the title adopted by Adolf Hitler after the death of President Von Hindenburg in 1934. "Führer" means "leader," and the office carried with it supreme authority, or "leadership," in the army, all civil offices, and party activities. The cabinet promulgated laws, and could alter the constitution.

"Leadership," the dominant idea in the government, meant the suppression of class and group conflicts, so as to make a "totalitarian" state. It meant

also the dominance of the group from which the leaders came. In carrying out the "unification" of the social order all labor unions were dissolved, factory councils representing employers, workers, and the party took their place. Farmers were forbidden to mortgage or sell their land; they could get credit only from the state. Labor battalions of youth under government control were organized. Education was "unified" by seeing to it that teachers and textbooks were in accord with the party doctrine. An attempt was made to unify the churches under state direction, with an infusion of Teutonic mythology. A ministry of propaganda was organized to create and lead public opinion. Anti-Semitic laws discriminated against the Jewish race.

Allied Government. Under the Allies Germany was divided into four zones of military government and occupation. Russia occupied eastern Germany to the upper Elbe; the United States, the south, including most of Bavaria and Württemberg, Hesse, and Hesse-Nassau; Great Britain, the northeastern section, including the Ruhr, Hamburg, and Bremen; and France, an area along the upper Rhine. Berlin was occupied by the four powers jointly, and the four Allied commanders in chief formed a control council with supreme authority. The Nazi party was suppressed, and its former members removed from office. A court was set up at Nuremberg for the trial of "war criminals." The economic unity of Germany, as stated in the Potsdam declaration, was blocked by Russian and French opposition. Great Britain and the United States, however, agreed to an economic union of their zones, and France later joined them.

Germany suffered heavily from the requisitions and expenses of the occupying armies, and the removal of manufacturing plants and other property as "reparations." On the other hand the American and British governments contributed largely to the support of their zones. As the tension between Russia and the western powers grew more acute, German economy suffered from the stoppage of trade between east and west. In Berlin the four-power government of the city was broken up by the Soviet withdrawal, and the blockade of the western sectors. (See *United States—History.*) In 1948, the Western powers, since Russia refused to co-operate, began to take tentative steps to form a political organization in the three western zones, and Russia the next year took similar steps in the east.

Territorial Acquisitions. In March 1938, Austria was absorbed by Germany and became the Ostmark, a territorial division of the Reich. The Sudetenlands, the borderlands of Czechoslovakia, were occupied October 1-10, 1938, and annexed to the Reich, as a result of the Munich Agreement. Bohemia and Moravia were left independent, but on March 16, 1939, the German government declared them a protectorate of the Reich, known as the Protectorate of Bohemia and Moravia. Memel was demanded from Lithuania and restored to Germany March 21, 1939. Lithuania had held it since World War I. Danzig, controlled by a Nazi party government, was annexed to the Reich at the beginning of the war with Poland. For the acquisitions from Poland, see *Poland.*

After the surrender of Germany the territory east of the Oder was partitioned between Russia and Poland. Austria was again separated from the Reich. The country was divided into four zones of military occupation; Vienna was jointly occupied. In April 1945 a coalition government under Dr. Karl Renner was formed under Russian auspices, and later recognized by the United States and Great Britain. The Moscow Conference of Foreign Ministers (March–April 1947) failed to agree on an Austrian treaty.

Greece (Kingdom of Hellas). The territory of modern Greece is composed, in part, of land freed from the Turks by revolutionary struggles that commenced in 1820, and, in part, of additions made by successful war. In 1830, the independence of Greece was recognized by the Conference of London. By a treaty of May 7, 1832, Greece accepted as king Prince Otto of Bavaria, who ruled for 11 years without a constitution and was assisted only by a council of state. A military revolution of 1843 resulted in the meeting of a constituent assembly and in the framing of the constitution of 1844, in which the influence of the French liberal monarchical charter of 1830 and that of the Belgian constitution are apparent. A revolution in 1862 altered the dynasty, and the crown was accepted June 1863, by George, prince of Denmark. In 1864, a constitution was promulgated, which retained the monarch, who exercised his powers through a council of ministers responsible to a legislature consisting of a single chamber, the *Bulé.*

Following the military debacle in Asia Minor in 1922, a military revolution compelled the abdication of King Constantine on September 27, 1922. He died in exile January 11, 1923. The National Assembly, elected December 16, 1923, proved anti-Royalist, and compelled the further abdication of King George II, son of King Constantine, and the exile of the royal family. On March 15, 1924, the National Assembly voted the overthrow of the monarchy and the establishment of a republic, which was endorsed by an overwhelming majority vote of a plebiscite in April. The republic was proclaimed May 1. A period of dictatorships followed. A new constitution published September 24, 1926, was revised in 1927 and, more radically, in 1935. In that year a royalist group seized power and secured a plebiscite recalling King George II, November 25, 1935. In 1936 General John Metaxas and a military group established a corporate state, which continued until the death of Metaxas in 1941. When Germany overran Greece the king and cabinet fled to Cairo. Both the Greek people and the government in exile were torn by factional quarrels, and the liberation of Greece by the British was followed by civil war. Under the interim government of Archbishop Damaskinos a plebescite recalled King George in September 1946. On his death, April 1, 1947, he was succeeded by his brother Paul I. Meantime the British found it necessary to withdraw their support, and the economic situation was becoming desperate. The United States then offered a credit of $250,000,000, both for relief and, as President Truman said, to stop the advance of Communism. Raids by Greek guerillas, receiving aid from Greece's northern neighbors, with the support of Russia, led to the appointment of an investigating committee by the United Nations. In 1951, Greece joined the North Atlantic Treaty Organization.

By the Balkan wars of 1912-13, Greece obtained Macedonia, Southern Epirus, the islands of Lemnos, Samos, Crete, and several other Ægean islands. By the Treaty of Sèvres, she obtained Smyrna and a part of the western coast of Anatolia, but lost them by the treaty of Lausanne in 1924. By the Allied treaty with Italy in 1947 she regained the Dodecanese islands.

Haiti (*République d'Haiti*). Originally a French colony, Haiti became independent after a bloody revolt of the Negro slaves (1791–1803). The whites were exterminated or expelled, and in 1804 a Negro state was set up, under the aboriginal name of Haiti.

The constitution and laws of the government purported to construct a republic after the French model. In practice, however, the government, for more than a century, was a military despotism in the hands of the president.

The present constitution came into force December 6, 1950, succeeding the constitution of 1946. It provided for a president elected for a six-year term by direct popular vote and not eligible for re-election. The National Assembly is bicameral. The Chamber of Deputies consists of 37 deputies, elected for four years. The 21 senators are elected for six years. Both deputies and senators are elected by the primary assemblies of the departments. The Na-

tional Assembly has the sole right to amend the constitution. The administration is carried on by departments under the president's direction. Women over 30 years of age are eligible for office, but before the end of 1953 are to have full political rights.

American Intervention. In 1915, the United States intervened to terminate political disorders, American nationals having made substantial loans to the Haitian government. A native police force under American officers, aided by American marines, maintained order until 1934, when the protectorate was terminated, although a fiscal adviser remained until 1941 to supervise collection of debts.

Hungary (The Kingdom of Hungary). Revolution broke out in Hungary October 31, 1918. King Charles, the last ruler of the Habsburg family, abdicated November 13. Hungary was declared an independent republic and a government was formed with Count Michael Karolyi as president. On March 22, 1919, the Karolyi cabinet resigned and was succeeded by a soviet government under Bela Kun. With the assistance of a Rumanian army of occupation, the soviet government was overthrown and in August 1919 a national government was again set up in Budapest.

A parliament in 1932 entrusted the executive power to Admiral Horthy, as "regent" for an unnamed king. The legislature established was a bicameral body, consisting of a National Assembly and a Chamber of Magnates. This system ended with the Russian occupation at the end of World War II, when a provisional government was set up. In October 1945 parliamentary elections gave the Small Landowners party, non-communist and conservative, a substantial majority. Russian pressure, heavy demands for reparations, and runaway inflation brought about a desperate economic situation. In May–June 1947 the Communists, with Russian backing, executed a *coup d'etat*, founded on an alleged conspiracy of the government against itself, and took possession of the government, against the protests of Great Britain and the United States.

By the Treaty of Trianon, between the Allies and Hungary, ratified by Hungary November 13, 1920, the territory was reduced to about half the size of the old kingdom of Hungary through cessions to Austria, Czechoslovakia, Rumania, and Yugoslavia. Hungary regained a portion of its lost territory during World War II, but was deprived of it by the peace treaty of February 10, 1947.

Iceland. From 930 to 1264, Iceland was an independent republic. It was joined to Norway in 1264 and with Norway came under the rule of Danish kings in 1381. It so remained until December 1, 1918. By the act of Union of November 30, 1918, it was recognized as a sovereign state in personal union with Denmark through the monarch. This act was to expire in 1943, and Icelandic opinion was against its renewal. On the invasion of Denmark by the Germans, Iceland was occupied by British troops, who later were replaced by Americans. On May 17, 1941, Iceland declared its complete autonomy under an elected regent. Formal separation from Denmark took place June 17, 1944.

The present constitution of Iceland was adopted on May 18, 1920, but was radically amended in 1934. The executive power is exercised in Iceland through a ministry responsible to the Icelandic legislature, the *Althing*, which consists of from 38 to 49 members. Of the members, 38 are elected by universal suffrage. The capital chooses 6 by proportional representation and the other constituencies elect 32 by simple majorities. A possible total of 11 additional members are distributed to parties which have too few representatives in proportion to their voting strength.

The Althing meets as two chambers. The Upper House consists of one-third of the members of the Althing, its members being chosen by vote of the Althing. The other two-thirds form the Lower House. The two sit together to vote on bills approved by one House and disapproved by the other, a two-thirds majority being required for affirmative action. Budget bills form an exception, a majority being sufficient for adoption.

Ministers, three in number, have free access to either chamber but vote only in that chamber of the Althing of which they are members.

Indonesia. The Republic of Indonesia came into existence after World War II as a result of the wave of nationalism which swept the modern world. It comprises the former Netherlands Indies, or Dutch East Indies, the possession of which made the Netherlands a colonial power second only to Great Britain and France. It includes Java, Sumatra, most of Borneo, Celebes, the Molucca or Spice Islands, Bali, Lombok, Sumbawa, and part of Timor, the Aru and Ke islands farther east, besides thousands of smaller islands. All are part of the Malay archipelago and lie along the equator off the mainland of Asia between the Philippines and Australia. They have a total area of 735,865 square miles, and an estimated population of 76,500,000, largely centered in Java and Madura.

Under Dutch administration Java and Madura were brought to the highest state of cultivation. The original exploitation policy of the Netherlands became greatly enlightened during the 19th century; but after the Japanese occupation of the islands during World War II the Javanese objected to returning to their colonial status.

The Japanese invaded Java early in 1942, quickly captured the capital, Batavia (now Jakarta), and soon afterwards the naval base at Surabaja. When Japan surrendered in 1945, the authority of the Netherlands government was restored in the Netherlands Indies, but on the islands of Java, Madura, and Sumatra a nationalist uprising headed by Ahmed Sukarno took over from the Japanese. The Indonesian Republic was proclaimed, and Sukarno became president of the de facto republic. Allied troops, mostly British Indian forces, endeavored to quell the revolution, but fighting continued until negotiations between the Dutch and the nationalists resulted in the Cheribon agreement in November 1946. By the terms of this agreement, which was formally signed in March 1947, the Netherlands-Indonesian Union was to be organized by January 1949. It was to consist of the various autonomous states which had sprung up during the revolutionary period. Unfortunately, difficulties arose in carrying out the terms of the agreement, and fighting was resumed. The United Nations then intervened and another truce ensued. Finally, late in 1949, agreements were signed at the Hague, granting sovereignty to the United States of Indonesia, equal with the Netherlands in a Netherlands-Indonesian Union, with the queen of the Netherlands at its head. This included all the former Netherlands Indies with the exception of West Irian (Netherlands New Guinea), the status of which was left to future negotiations. A provisional constitution was adopted in August 1950, and from a number of federated units Indonesia emerged as a unified state with a strong central government. The legislative power is exercised by the House of Representatives, which meets at Jakarta. In 1950, Indonesia became a member of the United Nations. In 1954, Indonesia and the Netherlands agreed to dissolve their union, but the fate of Western New Guinea remained undecided, with the Netherlands still in possession.

Irán (*ē-rän'*; E. *ī-răn'*). The former greatness of this state, both in ancient times and for some centuries of the early Christian era, is a matter of common knowledge. To understand the political importance and varied fortunes of Iran, reference should be made to the fact of its position, whereby in the past it was able to dominate adjacent territory in periods of strength, and yet was open to invasion from northern steppes and western plains in times of weakness. Its modern history is a record of decay, during which it has been and remains a field of concern to the two rival powers in western Asia—Russia and the British Empire. The former covets Iran

as a pathway to southern ports, while Great Britain's concern springs mainly from dread of threat to India and her routes of empire.

Russia's military collapse in 1905 (Russo-Japanese war) allayed British fears, and this, combined with common repugnance to German advance toward Iraq (Baghdad Railway project), served to bring these two governments to a compromise in 1907, which ended for the time a rivalry more than a century old. The convention signed at Saint Petersburg, now Leningrad, August 31, 1907, covered Afghanistan and Tibet as well as Iran. In the latter country, it created a northern "sphere of interest" for Russia and a southeastern sphere for Great Britain, within which neither country was to oppose the activities and the influence of the other.

Meanwhile Iran was experiencing revolution against the absolutism of the king or shah. In 1906, the shah issued a rescript for the election of a National Assembly, *Mejlis*, which should be a limitation upon the autocracy and begin a constitutional régime. This body assembled in October 1906, and on December 30, 1906, a constitution for the kingdom was accepted by the shah. The development of constitutionalism was prevented by foreign influence and by the decadence of the nation.

The country is divided into 26 provinces, which are ruled by governors-general directly responsible to the central government. The governors-general usually have the right of nominating lieutenant governors of the districts within their own jurisdiction. Some of the governments are very small and do not bear division into districts, while others comprise several provinces. Revenues are collected for the governors-general by chiefs of tribes residing in their governments or by magistrates, the latter being appointed by the governor for each village or each quarter of a town. In some instances these magistrates are elected locally.

World War I produced a complete suspension of the Iranian constitution. Germany, through Turkey, attempted to gain control of the country, but this effort was met by the Mesopotamian expedition and the succeeding occupation of parts of Iran by British troops. These forces were withdrawn, but not until Iran had been denied representation of her claims at the Peace Conference (1919) and not until after the secret negotiation of a treaty with the Iranian ministry, creating a British protectorate over Iran. The treaty failed of ratification, and Iran turned toward Russia.

In October 1925, the Mejlis deposed the Kajar dynasty and provided for a constituent assembly to determine the form of government. The latter, on Dec. 13, 1925, elected as hereditary shah an Iranian soldier, Riza Khan. The Mejlis resumed its sessions in 1924 and ministries became responsible to it. In World War II Persia declared war on Germany and Japan, and became a member of the United Nations.

Iraq. During World War I, British and Indian armies conquered this territory, which was a part of the Ottoman empire. Baghdad was occupied on March 11, 1917. The Treaty of Sèvres required Turkey to recognize Iraq as an independent state under a "mandatory power." This mandate the League of Nations assigned to Great Britain. But the latter country gave notice of her abandonment of this responsibility and, in October 1922, concluded with Iraq a treaty of alliance and protection. This treaty was renewed in 1926, the king agreeing to be guided in his international and financial obligations by the advice of a British High Commissioner. A constituent assembly enacted an organic law in June 1924 providing for a limited monarchy and a responsible government, a Senate of 20 nominated elder statesmen and a Lower Chamber of 150 elected deputies. The king, proclaimed in 1921, was Prince Faisal, son of the King of Hejaz. He died in 1939, and was succeeded by his infant son, Faisal II, who assumed the throne May 3, 1953.

During the British military occupation and subsequently, railroads were built, port facilities were developed, and large reclamation projects by irrigation were proposed. In 1924 the "Mosul question," involving the frontier between Iraq and Turkey, was placed before the League of Nations, which submitted to the International Court of Justice the question of jurisdiction. Turkey declined to accept the jurisdiction of the court. The League awarded to Iraq most of the province of Mosul. Turkey, after refusing to accept the decision, came to an agreement with Great Britain on the matter in 1926.

Iraq declared war on the Axis powers, January 16, 1943. It is a member of the Arab League and of the United Nations.

Israel (Palestine). The Holy Land of the Jewish and Christian religions. It was for centuries a part of the Ottoman empire, but was conquered by British forces in 1917–18, Jerusalem being occupied on December 9, 1917. Following a period of military government, a civil administration was introduced under a British high commissioner.

By the Treaty of Sèvres, Turkey renounced her sovereignty over Palestine and in December 1920 the British "mandate" over the country was confirmed by the League of Nations. The country was to be opened to the establishment of a Jewish national home without prejudice to the rights of non-Jewish inhabitants.

The government was in the hands of a British high commissioner with an advisory council. Attempts to establish a permanent constitution met difficulties in quarrels between the Jewish and Arab population; the latter (about 70%) opposing further immigration and land sales to Jews; the former fearing for their safety under Arab control.

After World War II the British government continued to administer Palestine under its mandate from the League of Nations, but its position became increasingly difficult. In April 1947 Great Britain referred the whole matter to the United Nations. In November the General Assembly accepted a committee report providing for a partition of Palestine, and the British government announced its intention of withdrawing its forces. The British withdrew on May 14, 1948; an independent Zionist state, the Republic of Israel, was at once proclaimed, and recognized by the United States, Soviet Russia, and other nations. Armed conflicts with Egypt and other bordering Arab states ensued, in which Israel was generally successful. Joined United Nations, 1949.

Italy. Italy, once the center of the Western world's political authority under the Roman Empire and again the religious center of Western civilization in the religious union of the Roman Catholic Church, was for centuries broken into fragments and subjected to foreign domination. Her unity as a modern state was delayed until 1861, when the king of Sardinia was proclaimed "king of Italy" by the first Italian Parliament. The remainders of the provinces of Mantua and Venetia were added in 1866. In 1870 Rome was entered by Italian troops, the last remnant of the papal states was incorporated in the kingdom, and the "temporal power" of the pope was suppressed.

The Monarchy. Under the monarchy the Italian constitution was the fundamental law, *Statuto Fondamentale*, granted March 4, 1948, to the Kingdom of Sardinia. Around this nucleus Italy was united, and it was adopted as the constitution of the new kingdom. This constitution vested executive power in the sovereign, who was to exercise it through ministers responsible to him. Legislative power resided in the king and a two-chamber legislature.

Fascism. The term comes from the name of a party, the *Fascisti*, who, under the leadership of Benito Mussolini, seized the government on October 22, 1922. Their emblem was an axe in a bundle of rods (*fasci*) carried by the attendants of the Roman dictators. The king accepted Mussolini as prime minister, and the government was gradually trans-

formed. The original constitution was not repealed, but much was added.

The dominant feature of the government was the control by the Fascist party. No other was tolerated. It numbered about five per cent of the population. The Fascist Grand Council, named by the leader (*Il Duce*) might choose his successor. The prime minister and his cabinet issued decrees and executed them. The only other law-making body was the National Council of Corporations. The former parliament remained, but without power.

Allied Government and the Republic. With the fall of Mussolini the Fascist party was abolished. The king resumed his functions, which, after the taking of Rome, he delegated to Prince Humbert as lieutenant general of the kingdom. The Allied Military Government for Occupied Territory (AMG) followed the advance of the armies, and gradually transferred control to Humbert and his council of ministers, assisted after September 1945 by a Consultative National Assembly. By the end of the year his authority extended over nearly all Italy.

Meantime republican feeling was growing. A popular vote, June 2-3, 1946, showed that the north wished a republic and the south preferred to retain the monarchy, but the majority was for the republic. Victor Emmanuel had abdicated on May 9, and retired to Egypt, and King Humbert II and his family now left Italy. On June 22, 1946, a constituent convention met to draw up a constitution; December 22, 1947, it finished its work, and the new constitution came into force January 1, 1948.

The Constitution describes Italy as a "democratic republic founded on work." At the head of the government is a president, elected by a joint session of the two houses of parliament, to whom are added delegates from the "regions." He must receive a two-thirds majority, but after three ballots a majority may elect. His term is 7 years, and he must be 50 years old. He has power to dissolve parliament, except during the last 6 months of his term.

Parliament is made up of the Chamber of Deputies and the Senate. The deputies, one for each 80,000 inhabitants, are elected by direct popular vote, and serve 5 years. The senators are elected for 6 years from the regions, one for each 200,000 people, but at least 6 from each region. Besides these, the president, who is himself a senator for life, can appoint 5 life senators from men eminent in science or arts.

The Cabinet and prime minister can be forced out of office only by a direct vote of lack of confidence, not by a mere defeat of their measures.

Italy has the usual system of local and higher courts and courts of appeals. The constitution creates a Constitutional Court with power to pass upon the constitutionality of laws, decide cases between regions, and try impeachment cases.

Administratively, the country is divided into 19 regions, some of them, as Sicily and Sardinia, partly autonomous; each with a council and executive. The regions are subdivided into provinces.

Roman Catholicism is the state religion, but other religions are tolerated. Civil marriage is allowed, and divorces may be granted. The House of Savoy and its descendants are excluded. Titles of nobility are no longer recognized.

Relations with the Pope. — The occupation of the city of Rome by Italian troops in 1870 and the making of this city the capital of the Kingdom of Italy, suppressed the temporal powers of the pope. The papacy was unreconciled to this loss. Improved relations between the "Vatican" and "Quirinal," effected by the Fascist administration, led to the signing, on February 11, 1929, of 3 treaties whereby the Italian government recognized the full independent sovereignty of the pope over the City of the Vatican. (See *Vatican City.*)

Italia Irredenta.—The unification of Italy, 1861–70, did not succeed in uniting to the kingdom the entire Italian population subject to Austria. Considerable territory remained "unredeemed" (*Italia irredenta*). Italy entered the World War (1915) with the object of securing these territories under guarantees from the Allies, through the treaty signed at London in 1915 with Great Britain, France, and Russia.

The political situation was altered at the end of the war by the disintegration of the Austro-Hungarian Empire and by the demands of the kingdom of Yugoslavia. As a result Italy secured only some strategic points on the Dalmatian coast. By the treaty of 1947 Italy lost to Yugoslavia all its territory east of the Adriatic. Trieste, with its surrounding territory, was made a free port under the jurisdiction of the United Nations. Italy's frontier with France was "rectified," and the Dodecanese islands were ceded to Greece. Italy's frontier defenses were destroyed, her army limited to 250,000, with 250 planes, her navy to 67,500 tons. Italy was to pay $350,000,000 in reparations. Final disposition of the Italian colonies was deferred for one year.

Colonies.—Before World War II Italy had a considerable colonial empire in Africa. The first acquisitions, in 1885, were Eritrea, on the Red Sea, and Italian Somaliland, on the Indian Ocean. Italian Libya, on the Mediterranean Sea, was taken from Turkey by conquest in 1911. Italian Somaliland was enlarged by the cession of a part of Kenya by Great Britain in 1924. Ethiopia (Abyssinia), was conquered and annexed in 1936. Albania was annexed in April 1939. Ethiopia was liberated by the British in 1941. Albania had driven out the Germans and set up a provisional government by the end of 1944, and in 1946 proclaimed a republic. Eritrea was federated with Ethiopia in 1952.

Japan. According to Japanese records, Japan is an ancient monarchy, dating from the emperor Jimmu Tenno (B. C. 660). In the 16th century, when foreign intercourse began through the Dutch and the Portuguese, Japanese civilization had acquired its characteristic forms. Government was organized in a feudal system. The territory was divided among great lords, *daimyos*, possessing military retainers, *samurai*, and owing allegiance to the emperor at Kyoto, but virtually independent and frequently at war with one another. Actual central power was exercised in the emperor's name by a succession of rulers called the shoguns. By one of these, in the early part of the 17th century, foreign intercourse, which at first had been welcomed, was prohibited and Japan remained closed to the outside world until the arrival of the American naval mission under Commodore Perry in 1853.

The "opening" of Japan was followed by the overthrow of the "shogunate," the restoration of the emperor, and the introduction in 1868 of a new period of progress called the era of Meiji or enlightenment. Since that date, Japan's advance in modernization and in military power has been extraordinary. A constitutional movement followed upon the "restoration." The feudal daimyos surrendered their powers; experiment began with quasi representative institutions. A constitution was promulgated in 1889 and in 1890 the first Imperial Diet, or representative legislature, convened.

The Meiji Constitution. By the constitution the emperor was sovereign, of divine descent, his person sacred. He both governed and legislated. He was apt to be guided by a small body of councilors, the *Gen Ro*, elder statesmen, who had no constitutional status, but very great influence.

The Diet was composed of a House of Peers and a House of Representatives. The peerage was reorganized with European grades and titles. A law of 1925 diminished the number of peers in the upper branch, admitted a number of commoners, selected by the emperor. At the same time, universal manhood suffrage was introduced. The lower house was elected for four-year terms.

In theory, government was by a responsible ministry, but the Diet could not control the budget, the ministers of war and navy must be officers in service,

and the privy council, an elderly and conservative body, could effectively oppose the ministry. This central government showed German influence. The local government was rather on the French model, with prefectures, districts, and towns, governed by appointed officers, and controlled from above. Finally, the industrial revolution had created a group of influential families, the *Zaibatsu*, who controlled the economic life of Japan, and influenced its politics.

Foreign Control and the New Constitution. By the terms of the surrender of Japan, August 14, 1945, the emperor and the machinery of government remained, but under the absolute control of the Allied Supreme Commander, and subject to such changes as he should order. At once strong democratic tendencies, long suppressed, began to appear, the emperor renounced the myth of his divine origin and that of the nation, officers who had promoted the war were removed, the power of the *Zaibatsu* was attacked. The Shinto religion was disestablished.

On November 3, 1946, the emperor promulgated a new constitution, which had been framed by the Diet from drafts approved by the supreme commander. In spirit and language it was strongly suggestive of the Constitution of the United States. Sovereignty is declared to rest in the people, and all authority is derived from them. Japan renounced war and the maintenance of an armed force, for "the Japanese people are sincerely desirous of universal peace." The bill of rights is broad in its scope.

The emperor remains, but he performs only formal acts, with the approval of his ministers. The sole law making body is the bicameral diet. The House of Representatives is elected by universal suffrage for four years, unless sooner dissolved. The House of Councilors is elected for six years, one-half retiring every three years. Laws require the consent of both houses, but the lower house may overrule the upper by a two-thirds vote. The prime minister is chosen by the Diet. He and a majority of his colleagues must be members. The cabinet is responsible to the House of Representatives. If it loses their confidence it must resign, or dissolve the House and order new elections. The supreme judicial body is the Supreme Court. Judges of the supreme court are appointed by the cabinet and must, on their appointment and every ten years thereafter, receive popular approval. The independence of judges is guaranteed, but they may be impeached. The supreme court may pass on the constitutionality of a law. The Diet alone may levy taxes, and make appropriations.

Local public entities elect their own assemblies and officers and generally manage their own affairs. Amendments may be made by two-thirds of each house of the Diet, ratified by popular vote.

The Rise and Fall of the Empire.—With her modernization, Japan began a career of territorial expansion. From China she gained in 1895 (Treaty of Shimonoseki), Formosa and the Pescadores. From Russia the treaty of Portsmouth in 1905 yielded Port Arthur, the Russian-built Manchurian railroad, and the southern half of Sakhalin. Korea was annexed in 1910. A systematic penetration of Chinese and Russian territory was only partially checked by the Washington Conference (1921–22). Meantime Japan had entered World War I, and had secured as a "mandate" the former German Pacific islands lying north of the equator.

In 1931 Japan began an open policy of conquest (and perhaps opened World War II), by seizing Manchuria. In 1937 convenient "incidents" furnished the pretext for a real though undeclared war upon China. In the next four year Japanese armies had occupied (subject to guerilla warfare) the whole of eastern China. Farther south she took advantage of France's defeat in Europe to gain control of Indo-China.

After declaring war on the United States and Great Britain in December 1941, the Japanese advanced to Singapore and the Indian frontier on the mainland, and to the islands adjoining Australia. (See World War II.) It was proposed to organize all eastern Asia as a "co-prosperity sphere" under Japanese control. With her surrender in August 1945, Japan, in accordance with the Cairo declaration of December 1943, lost all her conquests since 1895 and was reduced to her original island territory. Following the ratification by the United States Senate of the treaty signed at San Francisco, September 8, 1951, by Japan, the United States, and 48 other countries, Japan regained her sovereignty April 28, 1952.

Jordan. The Hashemite Kingdom of Jordan, a constitutional monarchy, was formerly an Arab state in the British Palestine Mandate. It was known as Transjordan. Great Britain recognized it as a sovereign state in 1946, and Emir Abdullah was proclaimed King Abdullah Ibn Al-Hussein. He was assassinated in Jerusalem in 1951, and was succeeded by his son King Talal I. In 1952 King Talal was removed by the Jordan parliament because of his mental illness. His son was proclaimed King Hussein II under a regency. He ascended the throne on his eighteenth birthday, May 3, 1953.

By the constitution which came into effect in 1952 the cabinet is responsible to Parliament, which consists of two houses, a Chamber of 40 elected deputies, half from Jordan and half from Arab Palestine, and a Senate of 20 members nominated by the king.

Kashmir. A predominantly Moslem state on the frontier between India and Pakistan, the political status of which is in dispute between the two countries. Late in 1947, when its Hindu ruler acceded to India against the will of his rebellious Moslem subjects, some Moslem tribesmen from Pakistan went to the aid of the Moslems of Kashmir, and Nehru sent regular troops from India to support the Hindu ruler. On April 21, 1948, the U. N. Security Council voted to hold a plebescite in the area, and on August 20, 1953, India and Pakistan agreed to one, but up to mid-1956 the efforts of the U. N. to arrange a plebescite free from Indian military domination had not been successful.

Latvia. The Letts were subject to foreign rule from the 13th century to 1918, but they preserved their identity as a separate people and their national spirit was revived by the World War. After the Russian revolution in March 1917, they organized to work for independence. The movement was delayed by German invasion, but, in November 1918, Latvia was proclaimed a sovereign free state. Struggle with the bolsheviks followed; but, in February 1920, peace overtures were made and in August a treaty with the soviet republic recognized the complete independence of Latvia. The republic is formed out of former Russian territory and comprises Courland, 4 southern districts of Livonia, and 3 western districts of the government of Vitebsk.

The constitution was framed by a constituent assembly convened in 1920. In March 1922, Latvia joined Estonia, Finland, and Poland in a treaty of arbitration and mutual defense. On October 1, 1939, a treaty of "mutual assistance" with Russia gave that power virtual military control of the republic. The Communist party then came into power, and Latvia became a member of the Soviet Union, August 5, 1940.

Lebanon. A small independent republic at the easterly end of the Mediterranean, between Syria and Israel. Following World War I it was for twenty years administered by the French under a mandate from the League of Nations. In November 1941, with French consent, Lebanon declared its independence, and in December 1943 the Lebanese and Free French governments signed an agreement by which most of the powers formerly exercised by the French were transferred to Lebanon as of January 1, 1944. By December 1946 all foreign troops had left.

Parliament elects the president for a six-year term. He appoints his own cabinet, the members of

which are reponsible to parliament. Representation is on a religious basis, the forty-four seats in the House of Deputies being distributed among the various Christian and Moslem sects, according to the numerical strength of each. There are more Christians than Moslems in Lebanon. Women having certain educational qualifications have the franchise, and all eligible persons are compelled to vote.

Lebanon is a member of the Arab League and of the United Nations. See *Syria.*

Liberia. A Negro republic on the west coast of Africa, between the British colony of Sierra Leone and the French colony of the Ivory Coast, with about 350 miles of coast line on the South Atlantic. Its inland extent varies from about 75 to almost 200 miles. It was founded in 1822 by American and European colonization societies as a settlement to provide a permanent home for freed slaves. The educated and politically qualified element of the population lives along the coast. About 12,000 of these are descendants of American freedmen. The interior of the country is inhabited by uncivilized black tribes.

On July 26, 1847, the colony was organized as the free and independent republic of Liberia. The constitution was modeled on that of the United States, with a Congress, comprising a Senate, a House of Representatives, and a president, who, with the assistance of a cabinet of 7 "secretaries," exercises the executive power and is elected for 4 years. Electors must be of Negro blood and be owners of land. The official language is English. The coast is divided into "counties" named Bassa, Sino, Maryland, and Montserrado, administered by "superintendents."

Owing to the unorganized character of the interior, the territory was encroached upon by French penetration from Guinea and from the Ivory Coast and by British expansion from Sierra Leone; but boundaries, with some losses of territory to Liberia, were settled by the British agreement of 1911 and by a French agreement of 1910.

American Aid.—Because of financial difficulties and inability of the republic to meet its foreign indebtedness, largely British, aid of the United States was secured and obligations were refunded in 1912, by an international loan of $1,700,000 payable in New York City over a period of not fewer than 40 years. The customs administration and the rubber tax are confided to a receiver-general, who is also financial adviser to the government and is appointed by the United States. For the further security of the revenue, a frontier police was organized under American Army officers. Since 1912, Liberia occupies the position of a protectorate of the United States. In World War I Liberia broke off relations with Germany. In World War II Liberia granted the Allies the use of sea and air bases. In 1943 she agreed to the establishment of permanent American naval and air bases and declared war upon Germany. Development of the harbor of Monrovia, the capital of Liberia, named for President Monroe of the United States, was accomplished with American aid.

Libya. An independent federal kingdom on the Mediterranean coast of Africa, comprising the former Italian colony of Libya or Libia. For centuries it was under the rule of the Ottoman Empire, but following hostilities between Turkey and Italy in 1911, during which Tripoli was occupied by the Italians, the sovereignty of Italy over the country was recognized by the treaty of Ouchy in 1912.

Libya was the scene of bitter fighting during World War II. On the expulsion of the Italians and Germans in 1943, the administration of Libya was taken over by Britain and France, the British controlling the provinces of Tripolitania and Cyrenaica, the French that of the Fezzan. In 1949, the United Nations decided that Libya should become a sovereign country by 1952. A constitution was adopted, and, on December 24, 1951, King Idris I, who had been recognized in 1949 as Amir of Cyrenaica, proclaimed the country's independence.

The present constitution provides for a hereditary monarchy with a representative form of federal government made up of the three provinces of Cyrenaica, Tripolitania, and the Fezzan, each with its own elected legislative council and a governor named by the king. The two-chamber parliament of the central government consists of a senate of 24 members divided equally among the provinces, half of them being nominated by the king and the other half by the provincial councils. Members are elected for eight years, with half the membership elected every four years. The deputies in the house of representatives are elected on a population basis. The members of the supreme court are appointed by the king.

Liechtenstein. A small Alpine principality, lying between Austria and Switzerland. It has an area of 65 square miles and a population of approximately 11,000 people. The monarchy is hereditary in the male line. There is a diet of 15 members, elected by universal suffrage. Voting is direct and election is by proportional representation. An administrator for the state is appointed by the prince. There is a high court.

From 1867 to 1918, the principality was dependent on Austria, but, on November 7, 1918, the diet proclaimed the complete independence of the state. According to a treaty with Switzerland signed in 1920, that country assumed the administration of Liechtenstein's postal and telegraph systems and its diplomatic and consular representation abroad; and, by a treaty signed March 29, 1923, the principality was included in the Swiss customs union.

Lithuania. From the early part of the 13th century to the year 1569, Lithuania was an independent country. At the height of its history, its frontiers extended from the Baltic to the Black Sea. A personal union existed with Poland after 1386, and in 1569 Lithuania was compelled to unite with that country under one king and a common Parliament. In the partition of Poland, in the 18th century, Greater Lithuania was secured by Russia, and Lithuania Minor by Prussia. The policy of Russification was not successful, and in 1905 the czar acknowledged this fact by granting to the Lithuanians a national assembly.

In World War I, the country was occupied by the Germans in midsummer of 1915. In 1917, a conference of Lithuanian representatives met at Vilna and elected a state council, or *Taryba.* Independence was proclaimed on February 16, 1918. In November the Taryba promulgated a provisional constitution under which it became the Lithuanian Parliament. German evacuation was not completed until December 18. War with bolshevist Russia followed and was terminated by a treaty of July 12, 1920, whereby Russia recognized Lithuanian independence. On June 2, 1920, a second provisional constitution was promulgated, declaring the state of Lithuania to be a democratic republic.

Following a military *coup d'état* of December 1926, and the dissolution of the Diet in the following April, a reform constitution was proclaimed. The legislative power was vested in a single body, the *Seimas,* which embodied the sovereign power.

Memel, added to Lithuania under the Treaty of Versailles, was restored to Germany in March 1939. October 10, 1939, Lithuania signed a "mutual assistance" treaty with Russia, similar to those of Estonia and Latvia. Russia also agreed to restore Vilna to Lithuania. On October 27, Vilna was occupied by Lithuanian troops. The Communist party now gained control and, on August 3, 1940, Lithuania became a member of the Soviet Union.

Luxemburg. A grand duchy, which borders on France, Belgium, and Germany, and was given its present rank as a principality by the Congress of Vienna in 1815. It is a little smaller than the state of Rhode Island. By the Treaty of London (1867),

it was neutralized and its integrity and its independence were guaranteed. However, it was invaded and occupied by German armies at the opening of the World War (1914).

The monarchy is heritable by either male or female heir. The constitution of 1868 was modified in important respects in 1919. It was decreed by a constituent assembly elected in that year that sovereignty resides in the nation. Universal suffrage, a system of proportional representation, and the legislative referendum were introduced. The representative legislative power resides in a chamber of 55 deputies. A council of state, of 15 members, appointed by the prince, deliberates on proposed laws and administrative decisions and gives its counsel to the chamber or to the monarch.

The cabinet is chosen by the prince and consists of a minister of state, who is president of the government, and of the directors-general of finance and social welfare, of home affairs and justice; and of public works, trade, and industry.

In 1919, a popular referendum, taken to decide the political and economic future of the country, decided on continuance of the monarchy and on an economic union with France, which country declined this advantage in favor of Belgium.

Mexico (*La República Mejicana*). The Mexican national state is a federal republic, composed of 28 states, 2 territories, Baja California and Quintana Roo, and a federal district which embraces the capital, the City of Mexico. The federal republic is modeled on the government of the United States. Federalism was first attempted in 1824, soon after independence from Spain was established and at the end of the short rule of the emperor, Iturbide. Conflict between this principle and the opposed principles of monarchy and of "centralism" led for several decades to civil wars and political disturbances, finally ending in the triumph of republicanism and in the adoption of the liberal federal constitution of 1857.

This triumph was checked by the establishment in Mexico, through French intervention, of the empire under Maximilian, archduke of Austria (1864–67). Maximilian's downfall and execution were followed by the restoration of republican government and of the federal union under President Benito Juarez.

Constitution of 1917.—The constitution of 1857, however, was succeeded in 1917 by the so-called Constitution of Queretaro, promulgated February 5, 1917. This constitution reduced the term of the president to 4 years and embodies the "no re-election" provision. It also introduces several radical measures, notably the nationalization of all subsoil products, including petroleum, and authorizes the "expropriation" of private land estates, both native and foreign-owned (Article XXVII). This constitution also provides an elaborate labor code, designed to strengthen the rights and to protect the interests of industrial workers (Article CXXIII).

Article XXVII affected American property interests so adversely that the government of the United States, as well as other countries, refused to the Mexican government political and financial support. President Obregon, elected in 1920, was not accorded recognition by the United States until August 19, 1923, at which time an agreement was made that these provisions should not have retroactive effect.

In compliance with the federal principle, each of the Mexican states possesses its own constitution. There is a state legislature (*legislatura*, or *Congreso del Estado*), in every case of one chamber only. The members, who number from 9 to 18, according to the size of the state, are usually called deputies, or *diputados*. They are elected by districts, and an alternate or substitute deputy, *suplente*, is elected at the same time. The usual term of office is 4 years. A governor, *gobernador*, is chosen at intervals of 4 years.

"No re-election laws," making both president and state governors forever ineligible for a second term, were incorporated in federal and state constitutions in 1911.

The governor is the head of the state government and controls all its civil administration. A secretary of state, or *secretario del estado*, is appointed by him as are also the heads of all state institutions. These usually include a penitentiary, a state hospital, a state college, and some provision for state public schools, a public pawnshop, or *monte de piedad*, and, frequently, street railways, lighting plants, and other public utilities. The state capital overshadows the other towns and is the recognized social and political center of the state.

The towns or municipalities have elected governments, *ayuntamientos*, which conduct local affairs. Police and public security are controlled by state officers responsible to the governor. For police administration, each state is divided into districts (*distritos*, *cantones*, or *partidos*), wherein formerly a political head, or *jefe político*, oversaw the local administration and commanded the constabulary. The office of *jefe político*, which had been autocratically exercised under the long "Diaz régime" was largely suppressed during the revolution of 1910-11. The fixed inheritance of centralized authority, as well as the frequently disturbed conditions, have recommended a centralization of police administration and of government.

By the constitution, the national government is intrusted to a president and to a Congress, *congreso*, composed of a Senate and a House of Representatives. The Senate consists of 58 members, 2 from each state and 2 from the federal district elected for six years. The representatives are chosen by direct election for 2 years, in the proportion of one for each 100,000 inhabitants. The president is chosen by direct popular vote for a 6-year term, the earlier 4-year term having been extended. There is universal suffrage.

By a law of April 13, 1917, the national administration, responsible to the president, is organized into departments of foreign relations, finance (*hacienda*), interior (*gobernación*), war and navy, promotion (*fomento*), justice, public instruction, communication, and agriculture and labor.

Land Problem.—Throughout Mexican history, the existence of great landed estates has given Mexico a particularly difficult agrarian problem, which has largely inspired the social discontent and revolutionary movements of recent years. Mexican policy has decreed the supervision of landed estates and their distribution to peasants or to communities as commons (*ejidos*). For the achievement of this social transformation, there is a national agrarian commission of 9 members, with other commissions in the states and localities.

In accordance with the federal principle, each state possesses its own codes of law and its system of courts. As in the United States, there is, however, a federal judicial system, with a supreme court of 16 members at Mexico City. The jurisdiction of the national courts extends to all disputes to which foreigners are a party. Appeal to these courts from a state court exists under the so-called "law of protection," *ley de amparo*.

Mexico is a country of vast natural wealth, the exploitation of which, owing to the deficient economic organization and to the feeble resources of the Mexican people, has been largely in foreign hands. Recent policy is directed, as far as possible, toward the liquidation of foreign interests and possessions and toward the bringing of these resources under Mexican control. By ancient Spanish and Mexican law, the precious minerals were regarded as property of the state, to be extracted by private individuals on a percentage basis. This principle was not applied to petroleum when that mineral became an object of supreme economic interest, and, under the

Diaz government, the Mexican state granted proprietary rights to foreign oil companies in oil lands. The Constitution of Queretaro, with the revolutionary conceptions which it expressed, aimed at extinguishing foreign titles acquired under previous laws. This attempt brought Mexico into conflict with the foreign governments, particularly with the United States, whose nationals possessed important Mexican oil rights. The revolutionary movement which overthrew and succeeded the Diaz régime arrested Mexico's economic progress and produced unfortunate results in other spheres. Following the revolution of 1911, Mexico defaulted in the interest upon her public debt, thereby creating a problem which has been discussed by international bankers and the Mexican government several times.

Mexico prospered under the administration of Miguel Alemán, president from 1946 to 1952, and his successor Ruiz Cortines, inaugurated December 1, 1952. In January 1953 women were given the vote.

Monaco. A tiny independent principality, which, except for a small strip of Mediterranean coast, is entirely surrounded by French territory. The state is the private possession of the prince, and was governed autocratically until January 7, 1911, when a constitution, which creates a legislative council elected by universal suffrage, was granted.

Representation on a popular basis, in which women may participate, is also accorded to Monaco, La Condamine, and Monte Carlo, the three "communes" which comprise the principality. Public revenue and the income of the prince are derived almost entirely from the concessions to gambling establishments.

Morocco. An ancient empire or sultanate of northwestern Africa, now in great part under the protection and control of France. Until mitigated by French authority, the government was an absolute despotism. The sultan is also spiritual ruler and head of the Mohammedan religion in Morocco.

French penetration from Algeria began in 1904, occasioned in part by Moroccan disorders and by raids on French territory. It was twice challenged by the German emperor: in 1905, "first Morocco crisis," which led to the Conference of Algerciras, to which the United States sent a representative; and again in 1911, "Agadir incident." On both occasions, war between France and Germany was averted. After a convention, November 4, 1911, through which she received a section of the French Congo, Germany was satisfied to countenance French progress in Morocco.

In April 1912, the sultan at Fez accepted a French protectorate. A French resident-general, who is also minister of foreign affairs, directs the mixed French and Moroccan administration. The country is strongly garrisoned and the French commanding general fills the position of minister of war. The other heads of administration are "viziers" and, in addition to the "grand vizier," are viziers for justice, crown lands, pious foundations, instruction, and the president of the Shereefian high court.

In addition to the French power in Morocco, Spain holds a zone, called the "Riff," along the Mediterranean coast. The zone is garrisoned by Spanish troops and is administered, under the guidance of a Spanish high commissioner, by a "kalif," who is appointed by the sultan of Morocco from two nominees of the Spanish government. Tangier with its neighborhood is neutralized under control of the powers since 1925.

Nepal. An independent Hindu kingdom in the Himalayas between India and Tibet. Within its borders is the world's highest mountain, Mount Everest. With a puppet king on the throne, the country was for years ruled by its hereditary prime ministers, but their power was broken in 1951. Since then the country has been in the process of becoming a popular constitutional monarchy, in touch with the outside world. The coronation of the first free king in more than a century, King Mahendra, took place at the capital, Katmandu, in April 1956.

The dominant native race is that of the Gurkhas. They are first-class fighting men, and, during the years that Nepal was within the British sphere of influence and protection, they were profoundly loyal to the British Indian army in which they served in the World Wars.

Netherlands, The (Kingdom of the Netherlands). The Dutch nation arose in the 16th century by the revolt of the provinces of the "low countries" against Spain. In 1579, the provinces of Holland, Zealand, Utrecht, Gelderland, Groningen, Friesland, and Overyssel joined to form the "United Netherlands" under the prince of Orange as governor, or *stadthouder*. The remaining provinces were resubjected to Spanish authority and experienced a different fortune. In 1830, they united to form the present kingdom of Belgium.

In 1815, the Netherlands was reconstituted as a sovereign state and was raised by action of the "great powers" to the rank of a kingdom. The constitution was promulgated in 1814, was revised in 1815 after the addition of the Belgian provinces in 1840 after their secession, in 1848, in 1884, in 1887, in 1917, and in 1921. In 1917, an electoral reform act provided for universal suffrage (male and female) and for proportional representation.

The royal succession is the direct male line of descent from Prince William of Orange. In default of male heirs, the female heir becomes queen.

The legislative body is known as the "States General" and comprises a first chamber of 50 members elected by the provincial states for a term of 6 years, one-half retiring each 3 years, and of a second chamber of 100 members, chosen for 4 years by citizens of both sexes above 24 years of age, on a system of proportional representation. Voting is compulsory. Both men and women of the age of 25 are eligible for election to the States General. Initiation of laws is restricted to the government and to the second chamber, the first chamber having power only to approve or to reject but not to amend.

Government is conducted by the sovereign and by a council of ministers, one of whom is appointed president of the council. There is also a "state council," *Raad van State*, of 14 members, appointed by the sovereign. The sovereign presides over this council, which has consultative participation in both legislative and executive matters.

The Provinces.—The 11 provinces, of which the Netherlands now is composed, are North Brabant, Guelders, South Holland, North Holland, Zealand, Utrecht, Friesland, Overyssel, Groningen, Drenthe, and Limburg. They have a large autonomy and (subject to the veto of the sovereign) a local legislative power which is exercised through assemblies, "the provincial states," chosen for 4 years by the same electors as choose the national second chamber. These bodies meet twice annually, and in the intervals between sessions they are represented by permanent commissions, or "deputed states," of 6 (in Drenthe 4) members, who administer the affairs of the provinces and oversee the execution of the laws. A commissioner appointed by the sovereign presides over both the provincial states and the deputed states, and in the latter body has a deciding vote.

The Dutch "communes," or municipal corporations, number over 1100 and are governed by councils chosen by the same electors, residents in the commune, as choose the national second chamber. The by-laws of the councils are subject to the veto of the sovereign. The municipal budgets and all proposals to alienate municipal property must receive the approval of the provincial states.

A further central control is exercised through the mayor, or burgomaster, who is a state as well as a municipal officer. The police are under his authority, and he has a suspensive veto on resolutions of the council for 30 days' time, during which time the provincial states must be advised. The municipal executive power is intrusted to the mayor and to a commission of aldermen, *wethouders*, 2 to 4 in

number, elected by the council. This commission is a body analogous to the "college of echevins" of the Belgian commune. See *Belgium.*

Dutch civil and criminal law is based on the Roman law and reflects its principles. Trial by jury is unknown. There are a high court of the Netherlands (court of cassation), 5 courts of appeal, 19 district tribunals, and 62 cantonal courts. The cantonal courts deal with minor offenses and have one judge each. All judges, 3 in number for appeal and district courts and 5 for the high court, are appointed by the sovereign for life. They can be removed only by a decision of the high court.

Colonies.—Previous to World War II, the Netherlands possessed a vast colonial empire, the acquisition of which dated from the 17th century. But in 1953 its overseas territories included only Surinam or Dutch Guiana on the northeast coast of South America, the Netherlands Antilles in the Caribbean Sea, comprising two groups of three small islands each, about 500 miles apart, and Netherlands New Guinea in the Pacific Ocean.

Surinam is part of the United Kingdom of the Netherlands. In 1950 it acquired local self government. It is administered by a governor appointed by the sovereign in Europe, a ministry of seven ministers and a five-man advisory council, all appointed by the governor, and a legislative council elected by the people.

Similarly, the other Netherlands colony in America, the Netherlands Antilles, has local autonomy. It consists of the Windward Islands (Curaçao, Aruba, and Bonaire) and the Leeward Islands (St. Eustatius, Saba, and part of St. Martin). Each island has control of its own affairs, but in the common interest sends elective representatives to the *Staten.* The governor has charge of the colony's external affairs, while the executive power in general internal matters is vested in a council responsible to the legislature.

The population consists largely of Negroes, descendants of African slaves, with a considerable body of Hindus in Surinam, former contract or indentured laborers imported from India for the cultivation of the plantations.

Although Netherlands New Guinea was not included in the treaty of 1949 transferring the sovereignty of the Netherlands East Indies to the Republic of Indonesia, it was agreed that negotiations as to its status should be held within a year. Conferences have followed but the question has not yet been settled. Until a decision is reached, New Guinea continues to be a Netherlands colony. It is administered by a Dutch governor aided by a council of department heads. An elective assembly is contemplated as soon as it is feasible. The population is composed of pygmies in the mountains and tall people in the plains, the numerous tribes often differing from each other in language and customs.

The former Netherlands colonies of the Dutch East Indies, comprising all the important islands of the Malay Archipelago, with the exception of the Philippines, were, following World War II, recognized by the Netherlands government as the sovereign government of the Indonesian Republic, equal with the Netherlands in a Netherlands-Indonesian Union, with the queen of the Netherlands at its head, but the union was dissolved in 1954.

Norway. By the Conference of Vienna, 1814, Norway was united to Sweden under the sovereignty of the Swedish king. The union was personal in the monarch, each country retaining its own nationality, government, and laws. On June 7, 1905, Norway declared this union dissolved and an accord to this effect was signed with Sweden in October 1905. Public opinion in Norway, to a certain extent, inclined toward a republic; but reasons of policy appear to have prevailed over the naturally democratic instincts of the Norwegians, and, by a plebiscite, the throne was offered to Prince Carl of Denmark, who took the title of Haakon VII. The constitution of Norway is that which has existed since May 17, 1814, with a number of amendments. The executive power resides in the king, who acts through ministers responsible to the Norwegian Parliament. Before 1913, the king had a qualified veto over legislation. In that year it was made simply suspensive.

The national legislature, called the *Storthing,* is elected by universal suffrage of all Norwegians over 23 years of age. In 1907, women with special qualifications were admitted to the suffrage. In 1913, they received the suffrage on the same conditions as men, and, in 1915, they became eligible for appointment to ministerial positions. The election of the Storthing, which numbers 150 members, takes place every fourth year, is direct, and according to proportional representation. Upon assembling, each Storthing divides itself into two bodies, one called the Lagthing, composed of one-fourth of the membership. The remainder form the Odelsthing. These two bodies ordinarily act as separate houses; but, in the case of disagreement, they meet in a joint session and a final decision is reached by a majority of two-thirds of the voters. An amendment to the constitution in 1913 gave to ministers the right to sit in the Storthing, but without a vote.

For local government, the country is divided into 20 districts; 2 of them, the cities of Oslo and Bergen, are urban and 18 of them are rural counties, or *fylker.* The chief executive, or *fylkesmann,* is appointed by the crown. Rural communes, or *herreder,* are governed by elective councils, with a membership of from 12 to 48, while the administration is conducted by an administrative council chosen from among the representatives. In local government, women with property qualifications gained the vote and the right to representation in 1901. In 1910, their suffrage became that of the men.

Justice is administered by 101 district courts with 3 higher tribunals and a supreme court; criminal cases may be tried with or without a jury.

Dependencies. These include the Spitzbergen Archipelago, acquired in 1920, and Jan Mayen island in the Arctic Ocean; Bouvet and Peter I. islands, in the Antarctic; and a section of the Antarctic continent southeast of the Falkland islands, ownership of which was claimed in January 1939.

Panama. An independent republic since the declaration of its secession from the republic of Colombia on November 3, 1903. The territory embraces the narrow and irregular land connection between the continents of North and South America. This strip of land is frequently described as the isthmus of Darien. This locality was a separate jurisdiction under the long rule of Spain, and possessed importance by reason of the trade route between Porto Bello on the Caribbean Sea and Panama on the Pacific side. Vera Cruz and Porto Bello were the sole ports through which authorized commerce was conducted between Spain and the kingdoms of the New World. Freedom from Spain was achieved in 1821 by a bloodless revolt. Union was had with Colombia.

The Panama route attained revived importance in 1848, in connection with the gold mining and settlement in California. An American-built railroad across the isthmus from Colon to Panama was completed in 1855. In 1880, French capital, encouraged by the success which attended the building of the Suez canal, was moved to undertake the construction of the Panama canal. Work was actually begun in 1888; it continued until the company became insolvent and its affairs were liquidated in 1895.

The Spanish American war forced anew upon the attention of Americans the desirability of an American-built and owned interoceanic canal. A convention, known as the Hay-Herran Treaty, was negotiated between the United States and Colombia. It authorized the transfer of the French company's rights, modified and extended, to the government of the United States. This treaty was rejected by the Colombian Congress August 12, 1903, whereupon

the inhabitants of Panama, asserting their paramount interest in the construction of the canal, declared their independence of Colombia.

The government of Panama was almost immediately recognized by the United States and was placed under its protection. The canal was constructed by the United States government, under rights which were obtained by treaty with the republic of Panama under date of November 18, 1903. By this treaty the United States guaranteed and agreed to maintain the independence and internal order of the Panama republic. Panama received $10,000,000 as purchase price for the canal zone together with an annual payment of $250,000 for the rights ceded.

A new treaty was signed in 1936, under which the United States withdrew its guarantee of independence for Panama and abrogated its right of intervention, including the right of acquiring land by eminent domain powers. The annual $250,000 payment, lessened in value by devaluation of the dollar in 1933, was replaced in 1939 by one of $430,000.

The first constitution of the Republic was adopted February 13, 1904. It was replaced in 1946 by the present constitution, which provides for a legislature known as the National Assembly—*asemblea nacional*. This body is elected for 6 years on the basis of one member for every 20,000 inhabitants. It meets biennially.

The executive power is intrusted to a president, who is chosen by direct vote for a term of 6 years, and is ineligible to succeed himself. The assembly chooses also 3 successors to the president, who are called the first, second, and third "designates," *designados*. The republic is divided into 7 provinces, each under an elected governor.

The laws dating from the period of union with Colombia were replaced in 1917 by new civil and criminal codes. Under these codes, capital punishment is prohibited. Foreigners are prohibited from mingling in politics and may be ejected from the country for criticisms of public offices or institutions. The laws relating to mining, industry, and exploitation of land are favorable to foreign investment and enterprise.

Two international difficulties inherited by the republic have been settled only with the assistance of the United States. The republic of Colombia protested the independence of Panama and the instant assumption of protection over the country by the United States. Recognition by Colombia was refused until June 9, 1914, and was then made conditional upon the ratification by the United States of a treaty whereby the United States paid to Colombia the sum of $25,000,000. This treaty was ratified by the United States Senate April 20, 1921.

Panama's second difficulty was a boundary dispute with Costa Rica, involving a section of the province of Chiriqui. In 1880, King Alfonso XIII of Spain had been asked to make an arbitration between Colombia and Costa Rica. By reason of the death of this monarch, the arbitration was transferred, September 11, 1900, to President Loubet of France. The demarcation of the Loubet award had not been made when Panama became independent by revolution. In 1910, Costa Rica and Panama agreed to submit the interpretation of the Loubet award to the decision of the chief justice of the United States. This decision, rendered in 1914, was adverse to Panama, which refused assent. In February 1921, both republics sent armed forces into the disputed area. The United States intervened and Panama submitted under protest. After an unsuccessful attempt in 1938, the dispute was settled under President Arias in 1941.

Paraguay (*Republica del Paraguay*). The republic of Paraguay, like Bolivia, is an inland country, possessing no seaboard on the South American coast. The country was settled by Jesuit missionaries to the Indians. Paraguay was included within the Spanish viceroyalty of La Plata, organized in 1776, but, on the revolt of Argentina, Paraguay declared for separate independence, August 10, 1811. The revolutionary government was established under two "consuls," but it rapidly dissolved into a typical dictatorship which continued until 1870. Under the last period of dictatorship, Paraguay was involved in sanguinary struggles with Brazil, Argentina, and Uruguay, which were ruinous to the country in loss of life and territory.

The constitution promulgated November 25, 1870, completely reorganized the government. It remained nominally in force until 1936, when a military clique seized the government. A new constitution of strongly authoritarian tendency was sponsored by President Estigarribia and was adopted by plebiscite in August 1940.

By this constitution the executive power is entrusted to a president chosen for a term of five years by popular vote. He may be once re-elected; a vacancy is filled by the Assembly. The president is commander in chief of the army and navy and is chief administrator of the state. With the approval of the Council of State he may declare war, make peace, negotiate treaties, and admit or exclude papal rescripts. He has a cabinet of not less than five ministers, and all his measures must be countersigned by a responsible minister.

The Council of State includes the ministers, with the archbishop of Asuncion, the rector of the national university, and other members appointed by the president on a corporate basis.

The legislative power is vested in an Assembly, whose members are chosen by direct popular vote on the basis of one for each 25,000 inhabitants. They serve for five years. In some matters the Assembly may initiate legislation; in others, it acts on the recommendations of the executive. The president may veto any measure. The Assembly meets annually, but may be summoned in extraordinary session by the president. During the recess of the Assembly, the president and cabinet may issue decrees having the force of law. Suffrage extends to all citizens, including women.

At the head of the judicial system is a supreme court of three justices, appointed by the president and council. A tribunal of accounts deals with questions of administrative law. Below these are courts of appeal, civil and criminal, and local courts. These are appointed by the president with the approval of the supreme court.

The constitution contains no provision as to local government; but by law the country is divided into two sections, the eastern, "Oriente" (east of the Paraguay river), and the western, "Occidente" (west of the Paraguay river). Oriente is divided into 12 departments; Occidente is divided into three military districts. The state religion is declared to be Roman Catholic, but other faiths are tolerated.

The constitution provides that the state may control the economic life of the people, even to the extent of forced migrations of population. Private property is recognized, but its use may be regulated. The press is under a strict censorship.

For the settlement of boundary disputes of Paraguay, see *Brazil*, *Argentina*, and *Uruguay*.

Paraguay fought a three-year war in 1932-35 with Bolivia over possession of the territory known as the Gran Chaco, lying west of the Paraguay river. A treaty of peace in 1938 left Paraguay in control of most of the territory and the boundary was fixed, October 10, 1938.

Peru. The republic of Peru arose from the viceroyalty of Peru, which in the Spanish colonial period was considered the ranking kingdom of the New World. Here Spanish prestige and authority were more strongly entrenched than elsewhere, and it was not until 1821 that, by the combined assistance of the armies of Bolivar and of San Martín, with forces from Argentina and Chile, Spanish authority was overthrown.

Peru became an independent republic July 28, 1821. The present constitution of Peru went into effect on April 9, 1933. Political disturbances in 1936 led to a suspension of constitutional government, with Benavides as dictator until November 14, 1939, when a constitutional regime was restored, but with amendments which tended to increase the power of the executive.

The executive authority is in the president, elected for a five-year term. He is ineligible to succeed himself. The cabinet ministers, through whom the president discharges the executive functions, are selected by the president and hold office at his pleasure. They include the secretaries of interior, war, marine and aviation, public works, foreign affairs, justice and religion, finance and commerce, education, and labor, health and social welfare. The constitution provides that a cabinet member may participate in congressional debates and may not continue in office if either house expresses a loss of confidence.

Members of either house may accept posts in the cabinet, but with privileges as congressmen suspended during occupancy of the executive office. The disposition to limit the power of the president is indicated by the provision for a council of state of 7 members, appointed by the council of ministers with the approval of the Senate. The constitution does not determine the rôle of this council of state, but provides that laws shall determine the matters in which the government must hear the council and the cases in which the approbation of the council of state is necessary.

The legislative power is vested in a Congress, composed of a "corporate" Senate and a Chamber of Deputies. The organization of the Senate was postponed until 1945. Deputies are elected for six years, by the suffrage of literate males, voting being compulsory for those between 21 and 60; one-half retire every three years. Members of political parties of an international character are disqualified from office.

By the amendments of 1939 the president may veto bills; Congress may authorize the president to make laws by decree during the recess of Congress; the budget, when formally submitted, may go into force without congressional approval. In 1945 these amendments were abrogated, decreasing the power of the president. This action followed the election of President Bustamente Rivero by a Liberal coalition.

As regards interior or local administration, Peruvian public law has been much influenced by the example of the French republic. The country is divided into departments; the departments are divided into provinces, and the provinces into districts. The departments are administered by prefects, the provinces by subprefects, and the districts by "commissaries," *comisionados*, responsible to the national government. All of these officials have general powers of supervision and are in control of police administration.

The constitution contains a reform providing a certain decentralization of legislative power. Three regional legislatures are created; they are located in the north, in the center, and in the south of the republic. These bodies are composed of deputies, elected by the provinces within the region, who meet annually for legislating upon local affairs. Their legislation must be transmitted to the president for approval. If he disapproves, then he must submit the proposed laws to Congress. This provision may be considered to give to the regional legislatures the power to initiate laws for the nation.

Like many other recent constitutions, the constitution of Peru contains a number of clauses providing social legislation: the state alone may establish monopolies; a graduated income tax is imposed; disputes between labor and capital must be arbitrated; workmen must receive indemnities for industrial accidents; primary education is compulsory for all children over six years; the aborigines are placed under the protection of the state, which must promote their welfare. By provision of the constitution, foreigners have the same property rights and protection as Peruvian citizens, but are prohibited from acquiring, directly or indirectly, rights to lands, water, mines, or sources of fuel within 50 kilometers of the frontier. They may not receive special property concessions and are forbidden to resort to diplomatic aid for the support of their claims. Mining wealth is the property of the state, and possession and use alone are granted to the operator of a mineral claim.

At Lima, there is a supreme court, composed of 11 judges; superior courts sit at Lima and in 15 other judicial districts. As is frequent in the Spanish American republics, the constitution intrusts the appointment of supreme court judges to Congress rather than to the president; appointments are made from lists presented by the executive. For superior courts and minor courts, the government appoints from lists presented by the supreme and superior courts, respectively

War and Frontiers. The political history of Peru has been adversely affected by long-continued boundary disputes with neighboring republics. The frontiers of the old viceroyalty and of the other Spanish provinces were never clearly delimited. The result was that the later republics of Brazil, Colombia, Ecuador, Peru, and Bolivia each possessed an interior or "hinterland," which penetrated a vast area, partly mountainous and partly the forested headwaters of the tributaries of the Amazon, sparsely populated, and, until recent times, little valued or explored. This condition made dubious the boundaries of the old Spanish possessions and has involved South America in many conflicts.

A long controversy with Brazil over territorial claims was settled by treaty, September 8, 1909, and the boundary was finally demarcated in 1927. The dispute between Peru and Colombia dates from 1831 and involved some 300,000 square kilometers in the watershed of the Caqueta river. In 1922 a treaty was signed with Colombia for the delimitation of this boundary and six years later the question was supposed to be settled, but a new dispute arose when Peruvian civilians seized the Colombian town of Leticia, September 1, 1932. By the intervention of the League of Nations, which took over the administration of the territory for the time, this dispute was settled in negotiations at Rio de Janeiro, and an agreement was reached on September 27, 1935.

A similar controversy with Ecuador, of 90 years standing, involves some 100,000 square kilometers of land occupied by Peru and 400,000 held by Ecuador, lying on the headwaters of the Amazon, rich in timber, rubber, and perhaps gold. Three wars have been fought over the title to this territory.

The boundary dispute with Chile brought upon Peru in 1880 the most lamentable incident in her history, the "War of the Pacific," resulting in overwhelming defeat. The controversy affected Bolivia as well, and has been of direct or indirect concern to all of South America. The region in dispute was the sterile coast, a long, narrow strip of rainless territory, between the foot of the Andes and the Pacific shore, separating the inhabited portions of Bolivia, Chile, and Peru. This territory proved of great value by reason of the nitrate deposits in the desert of Atacama.

By the Treaty of Ancon, March 8, 1884, Chile enforced her claims to the province of Tarapaca and to the most valuable of these mineral resources. Chile continued to occupy Tacna and Arica, the two southern provinces of Peru, under the treaty stipulation that in 1894 a plebiscite should be held to determine the possession of these provinces, in accordance with the preferences of the inhabitants. Owing to failure to agree upon a method of procedure, the plebiscite was not held and, from the war of 1879–83, the Tacna-Arica problem remained a continuing heritage of animosity.

In 1928, however, diplomatic relations were resumed between Peru and Chile, and in 1929 an agree-

ment was announced whereby Peru receives the district and city of Tacna while Chile retains the port and adjacent territory of Arica.

Philippine Islands. The Republic of the Philippines (*Republica de Filipinas*) succeeding the Philippine Commonwealth, came into existence July 4, 1946, when the United States renounced all sovereign rights over the Philippine Islands. Under its constitution, adopted in 1936, and amended in 1940, legislative power is in the hands of an Assembly, consisting of 24 senators, elected at large for a term of 6 years, one-third retiring every four years; and a House of Representatives of 96 members, elected from districts for four years. Administration is in the hands of a president and a cabinet. The president is, with the vice president, elected by popular vote for a term of four years, and may be re-elected for one term. There is a supreme court and lower courts. Suffrage is extended to all men and women over 21 and literate. The United States has a 99-year lease of 23 military bases. The United States gives special tariff concessions. National resources belong to the Republic, but Americans may receive concessions.

Poland. After having been extinguished as an independent state by the "partitions" of 1772, 1793, and 1795, which divided the country among Russia, Prussia, and Austria, Poland was reunited and was raised again to the rank of an independent state by the World War. The independence of the country was proclaimed and a provisional constitution was declared in November 1918. Elections for a constituent assembly were held in January 1919, and the constitution was finally adopted March 17, 1921. In 1926, Pilsudski, hero of the war against Russia in 1920–21, made himself dictator. He retained the post of minister of war, exercising his power through the president of the republic.

Constitution of 1935.—A new constitution was adopted on July 8, 1935, which provided for a high degree of centralization under the personal authority of a president.

Poland since World War I.—Besides reuniting Poland, the Treaty of Versailles granted Poland a "corridor" to the Baltic Sea with economic rights in the port of Danzig. (See *Danzig.*) Warfare with Russia in 1920, concluded by the treaty of March 18, 1921, gained for Poland a strip of Russian territory east of the "ethnographic" frontier. The Lithuanian city of Vilna with surrounding territory was annexed to Poland March 24, 1922. This eastern frontier was recognized by the Allied Ambassadors Conference, March 14, 1923, which also recognized Poland's title to Eastern Galicia.

By the conditions of the Treaty of Versailles, a plebiscite was taken in Upper Silesia to determine the wishes of the inhabitants as to the incorporation of this territory into Poland or Germany. Following this plebiscite, the League of Nations, in October 1921, ceded a part of the region to Poland, but provided that for 15 years the disputed area was to remain under a mixed commission.

In August 1939, Germany proposed the annexation of Danzig to the Reich and demanded from Poland the cession of the border districts, largely German in population, which had been taken from Germany by the Treaty of Versailles, together with the Polish corridor, promising Poland access to the sea. Poland refused and the Germans invaded Poland. (See *World War II.*) Russian troops occupied the eastern provinces "to preserve order." Poland was divided between Russia and Germany on the general line of the Bug and San rivers. The population of the Russian part was largely White Russian and Ukrainian, and Russia incorporated them into the adjacent republics of the Soviet Union. Germany annexed Danzig and the border districts, and planned to set up in the remainder a Polish state under German protection. President Moscicki escaped, and set up a government-in-exile at London.

Russia, on reconquering Poland, set up a pro-Russian government at Warsaw. The two governments were united and recognized by the United States and Great Britain on the promise of "free elections" as soon as possible. The elections, held in January 1947, gave the government an overwhelming majority. Great Britain and the United States protested that the elections had been characterized by intimidation, violence, and terror on the part of the government, but without avail. The new Diet (Sejm) elected Boleslaw Bierut president, with a ministry controlled by the Communists and their allies. A new constitution was adopted in July 1952, and a few months later the president was replaced by a Council of State with fifteen members. This council is elected by the Sejm, which also elects the Council of Ministers. Local government is in the hands of People's Councils.

Portugal (*Republica Portuguesa*). Portugal, a recognized state since the 12th century, was a monarchy until 1910. Owing to a revolution in that year, the king fled from the country, and, on October 5, 1910, the republic was proclaimed under a provisional government. A republican constitution was adopted August 20, 1911. A radical revision of it was promulgated on May 28, 1932, and ratified by popular vote on March 19, 1933. The new constitution (*Estado Novo*) is intended to provide for a corporate state under a dictatorship. Legislative power is vested in a parliament of one chamber, called the National Assembly, but the members of this parliament are all of one party. It consists of 90 members elected for four years by the people and by trade corporations. The president is elected for seven years by direct vote. He must be at least 35 years of age. A privy council of ten men assists him and he appoints the ministers, who are responsible to him. Suffrage is granted to male citizens able to read and write or taxpayers, and to female citizens having at least a secondary school education. A Corporative Chamber, made up of appointed representatives of economic groups, considers and reports upon all bills before they are submitted to the Assembly.

The judicial system comprises a supreme court at Lisbon, three courts of appeal (*Tribunales de relacao*) at Lisbon, Coimbra, and Oporto, and courts of first instance in 157 judicial districts (*comarcas*) with 48 municipal courts.

Portuguese Colonization.—In the 15th century, Portugal led Europe in the field of exploration and colonization. Her fleets explored the coasts of Africa, established forts and depots of trade, and thence extended Portuguese colonial power to the Indian Ocean, Malaysia, China, and Formosa.

After a brief period of brilliant enterprise, decline set in; the Portuguese colonial possessions of today are mere vestiges of a once vast empire. They include the Cape Verde islands, Saint Thomas and Principe islands, Portuguese Guinea, Angola (Portuguese West Africa), and Mozambique (Portuguese East Africa); in India a few small settlements, the most important of which is Goa; in Melanesia a part of the island of Timor; and in South China the small colony of Macao. The Azores and Madeiras are treated as a part of the republic rather than as colonial possessions.

Since 1914 a measure of autonomy has been granted to Portuguese colonies. Each may establish its own code of laws. By the Colonial Act of 1930, embodied in the Constitution of 1933, each colony enjoys financial and administrative autonomy under a governor appointed by the president, but their budgets must be approved by the minister of colonies and they must not contract foreign loans. Natives are protected in their land ownership and against forced labor.

Since the peninsular campaigns of the Napoleonic wars, when England and Portugal were allied, British influence over Portugal has been strong. On March 9, 1916, Portugal entered World War I against Germany and supplied two divisions to the "western front". She permitted the United Nations to use the Azores in World War II.

Rumania. The independence of Rumania from Turkey was proclaimed by an assembly of representatives of the people at Bucharest, May 26, 1877. The territory comprised the two principalities of Wallachia and Moldavia, which had established their union in 1861 under the title of Rumania. The country's independence was confirmed by the Congress of Berlin, 1878.

The first constitution antedated the establishment of independence and was drafted by a constitutional assembly elected by universal suffrage in 1866. This constitution was revised in 1923, and again, in the direction of totalitarianism, in 1938. This constitution guaranteed liberty of conscience and assembly and freedom of the press. Legislative power was intrusted to a Senate and Chamber of Deputies. One half the Senate were chosen on a basis of occupation; the other half, appointed. Deputies were chosen by literate citizens 30 years of age, belonging to recognized professional associations.

In September 1940 King Carol abdicated, the constitution of 1938 was abolished, and Rumania was proclaimed a "National Legionary State," with the Fascist party ("Iron Guard") in control and General Antonescu as "Conducator," or Dictator.

When Russia entered Rumania in 1944, King Michael ousted Antonescu, and made terms with Russia. The next year Petru Groza, with a cabinet in which Communists held the chief places, became premier. Great Britain and the United States recognized the new government when it added some non-Communist members and promised to hold free elections. The elections of November 1946 were hardly free; Great Britain and the United States protested without effect. They resulted in favor of the National Democratic Front, the Communist-dominated bloc headed by Groza.

On December 30, 1947, King Michael abdicated under pressure and a "People's Republic" was proclaimed. Another election continued Groza and the Communists in power, and a draft constitution on Soviet lines was adopted. Most of Rumania's industries were at once nationalized, and the Rumanian economy was completely under Russian control.

Since the foundation of Rumania, its territory has been practically doubled in size, through a succession of acquisitions. In 1878, it gained the northern Dobrudja, and, in 1913, southern Dobrudja by the Treaty of Bucharest at the close of the second Balkan war.

Through participation with the Allies against the Central Powers in World War I, Rumania established claims, recognized by the treaties of Saint Germaine and Trianon, to Bukowina and Transylvania, which were relinquished by Austria and Hungary. She also received a part of the district of Banat. By an agreement of October 28, 1920, Great Britain, France, and Italy awarded also to Rumania the Russian territory of Bessarabia.

In the early part of 1920, the national councils in Transylvania, Bukowina, and Bessarabia were dissolved and these newly-acquired territories were subdivided into departments under prefects appointed by the government at Bucharest. While these new acquisitions have a large and predominant Rumanian population, their acquisition was greatly resented by the countries from which they were taken. The government of soviet Russia long refused to accede to the cession granted by the three powers, but accepted the situation by a treaty in 1933.

In 1940, under pressure, Rumania returned most of Transylvania to Hungary, and ceded Bessarabia and northern Bukowina to Russia, and southern Dobruja to Bulgaria. By the peace treaty of 1947 she regained Transylvania, but Russia and Bulgaria retained their ceded areas.

Russia. The vast territorial extent of Russia, amounting to one-seventh of the land surface of the globe, combines with the strength of the Russian people, more numerous than any other white nation, to make Russia one of the greatest political factors in the world. The Russian stock excels in physical vitality and in intellectual vigor, but was held for centuries in an oppressed state, illiterate and without freedom of opportunity.

Imperial Russia.—For centuries, and even within the present century, the government was despotic. The emperor, or czar, bore the title of "autocrat of all the Russias." Legislation was by imperial decree, or *ukaz.* The imperial power was administered by a great bureaucracy, established by Peter the Great and divided into a hierarchy of classes, at the top of which ministers and political competitors contended for the favor of the court and for position and power. Corruption and inefficiency, at times moderated by a strong-willed ruler or by the abilities of a talented minister, permeated the organization.

Abdication of Czar.—Constitutional progress was contending with bureaucracy and reaction when, in 1914, the conflict between Russian, German, and Austrian policies evoked the World War. The enormous losses of this struggle, the discrediting of the imperial power and of the bureaucracy, produced a revolution, and, on March 12, 1917, the czar abdicated. A provisional government was set up by the Duma, which strove to realize and carry forward the constitutional program inaugurated in 1905; to create "responsible government"; to invigorate the zemstvos and municipal organizations; to convoke a constituent assembly to revise the constitution; and to find within the limits of law a solution of the agrarian and social problems.

The provisional government was loyal to its allies, and sought to keep Russia in the war against the common enemy. Side by side with this constitutional movement, however, there rapidly developed a radical revolutionary movement which took advantage of the "soviets" or councils formed of soldiers within the army, and of industrial workers in the cities, to overthrow the provisional government.

Bolshevik Revolution.—In November 1917, the extreme "left" wing of the social democratic party, known as the Bolshevists, seized control of the government and announced that thereafter Russia would be governed as a socialist state. The army was disbanded. Councils of propertyless workers and returned soldiers seized power everywhere. Peasants took possession of the landed estates. Out of this chaos the leaders of the movement organized an autocratic government, based on a newly-recruited and well-led army and dedicated to public ownership of the means of production. Two years of military operations against counter-revolutionary forces preceded the re-establishment of settled government.

Constitution of 1920.—A government, federal in form, was established with the definite purpose and hope of adding to the union as new states such countries as should establish "dictatorships of the proletariat." It was known as the Union of Soviet Socialist Republics (U.S.S.R.) and consisted at first of five separate republics. These were later increased to nine.

A Supreme Council of the U.S.S.R. was set up to legislate for the country, representatives being chosen by local "soviets," or councils. Class enemies were disfranchised, including those employing others for profit and all monks and priests. Moreover, the basis of representation gave five times as much weight to each city voter as to a rural voter. Control of the machinery of government was assured through party discipline, the decisions of greatest importance usually being made first in party councils and later ratified by elective assemblies, both in the U.S.S.R. and in the constituent republics. A uniform system of secret courts and of espionage served also to make control absolute in the hands of the ruler.

Economic Planning.—In the case of Russia, control of the government was seized for the specific purpose of putting an end to the mixture of capitalism

and feudalism there existing and replacing it by a system of production for use rather than for private profit. After a period of trial and error, the picture which emerged was somewhat as follows·

A supreme economic council determines what probably can be produced by industries of national importance, taking into account both raw materials, labor, and demand, as well as national welfare. The task of production is then allotted among plants, which are operated by corporations owned by the government. Wages and prices are fixed with a view to having consumption balance production. Profit and loss are absorbed by the government. A somewhat similar pattern is followed for industries of regional or local importance, the smaller political divisions operating them at their own risk and for their own profit. These industries are integrated with national plans through control of credit.

Constitution of 1936. On the assumption that the Russian people had become accustomed to the new system and would continue to operate it, a democratic constitution was announced in 1936, based on universal, secret suffrage. It is a blend of the governmental systems of Great Britain and the United States.

Corresponding to a Congress there is a Supreme Council, consisting of two chambers—the Council of the Union and the Council of Nationalities. The Council of the Union is popularly elected, one deputy to each 300,000 of the population. The Council of Nationalities, like the United States Senate, is intended to give equal representation to separate states irrespective of their populations. Each state, or "union republic," sends ten deputies, each "autonomous republic" sends five, and each "autonomous province" sends two. The deputies to the Council of Nationalities are not directly elective, but are chosen by the legislatures of the federated republics. Both chambers have equal legislative rights. In case of failure to reach agreement on a bill after reconciliation efforts of an interchamber committee and resubmission to the chambers, the Supreme Council must be dissolved and a new election must be held. The term of office is four years.

The two chambers in joint session elect a presidium of 37 members, including a president. This body, corresponding to a cabinet of the British type, is the body which pilots legislation through the Supreme Council. The president resembles a prime minister rather than a president under the American system.

The chief executive body, known as the People's Commissars of the U.S.S.R., consists of eight members appointed by the Supreme Council. This body corresponds roughly to a cabinet of the American type, except that it is chosen by the legislature rather than by a popularly elected president. Economic planning is one of the functions of this body.

The supreme court justices are elected by the Supreme Council for four-year terms. Other judges are elected by the people for three-year terms.

Individual republics have similar forms of government. Federal law is paramount in all cases of conflict with authority.

Behind and parallel to the constitutional government is the organization of the Communist party, the real seat of power, whose supreme organ is the Soviet Union Party Congress. This body, made up of delegates from provincial congresses, elects the central executive committee, which in turn elects a secretariat of five members. One of these, the general secretary, is the real head of the party, and therefore the real ruler of the country. It was through this office that Stalin controlled the government. This Secretariat controls legislation and foreign policy, though the formal action is taken by the state administration, all of whose organs are headed and controlled by party members. Party discipline is rigorously enforced.

Property Rights. These are of three kinds—public, co-operative, and private. Means of industrial production and most property necessary to public services are owned by the government, either federal, state or local. Means of agricultural production and property used in providing certain services in common are owned by co-operatives. Individuals may own property provided it is not used to exploit the labor of others. Trading for profit is forbidden. Individual houses and lots, household equipment, and other personal property fall within the permissible limits of individual ownership.

Bill of Rights. Citizens are guaranteed the right of remunerative work, of reasonable leisure, of education, and of support and medical care when unable to work. Guaranteed also is freedom of conscience, of speech, of the press, of assembly, of street processions, and of organization. Unlawful search, seizure and arrest are forbidden. Women are given equal status with men. On all alike rest the duties of performing social obligations, safeguarding public property and serving in the armed forces of the republic. Asylum is provided for foreigners persecuted for defending workers' interests, for their scientific activity or for their struggle for national liberation.

The constitution may be amended by a two-thirds vote of both chambers of the Supreme Council.

Foreign Relations. At the beginning of the Soviet régime, the Bolshevists practically declared war upon all governments adhering to the capitalistic system. As an instrument of propaganda, the "Third International" was established at Moscow in the spring of 1919. Propagandists of Bolshevism were sent abroad through the countries of Europe, America, and Asia.

About 1928, this policy was reversed, the government taking the attitude that peace abroad was necessary for the development of a Socialist State in Russia. Russian influence was accordingly thrown on the side of peace.

In the summer of 1939 this policy was again suddenly reversed. The Soviet government, after negotiations with England and France, concluded a non-aggression treaty, which closely approached an alliance with Germany, August 23, 1938. For Russian foreign policies during the war, see *Finland*; *World War II*.

Russia became a member of the United Nations at its organization, and one of the five major powers. In the post-war years her efforts were directed to establish pro-Russian governments in the adjoining countries, and to support organized Communist parties in others. In the United Nations there was chronic disagreement in the Security Council. Russia put forward resolutions for peace and disarmament, and denounced the Marshall plan and the North Atlantic Defense Pact. These disagreements delayed the conclusion of peace treaties for Germany and Austria, and aroused suspicion in the West.

Santo Domingo (*República Domincana*). The Dominican Republic occupies the eastern two-thirds of the West Indian island of Haiti, or, as it was called by the Spaniards, Española—"Little Spain."

This island, discovered by Columbus in 1492, was the first seat of empire of Spain in the New World. That part of the island occupied by the Dominican Republic has remained Spanish in language and in culture; the western end of the island, however, was occupied about 1630 by French and English buccaneers, and, by the Treaty of Ryswick, 1697, was ceded to France. For the subsequent history of this colony, see *Haiti*.

In 1795 France acquired the entire island. In 1806 Spain regained the eastern end, and held it until 1821, when it secured its independence, with the assistance of Colombia, and a republic was proclaimed. It was held by Haiti from 1822 to 1844, when the Dominican Republic was established. The present constitution was adopted in 1942. The chief executive is a president, elected by direct popular

vote for a term of five years. The National Congress, also elected for five years, is composed of a Senate, one senator from each of the 19 provinces and one from the district of Santo Domingo; and a Chamber of Deputies, one for approximately each 60,000 of the population. Women were granted a vote in 1942.

During the history of the republic as an independent state, its political life was much disturbed and a large foreign debt accumulated. To avoid threatened intervention by European powers for the collection of this debt, President Roosevelt came to the assistance of the government in 1905, and, on February 8, 1907, a treaty with the United States was ratified, which placed the foreign indebtedness and the customs under American administration. The president of the United States appointed a receiver-general of Dominican customs. The debts were refunded by the issue of a new loan of $20,000,000. Under this administration, the republic received an assured income and the funded debt was rapidly reduced; but continuing political disorders compelled further American intervention, the establishment in 1916 of a military government by the United States, and in 1918 the issue of a new loan of more than $4,000,000 secured by a second lien on the customs revenue.

The American military intervention was terminated in 1924; the financial protectorate, including customs collection and administration of the public debt, was abolished April 1, 1941.

Saudi Arabia. A kingdom embracing almost the entire Arabian peninsula. It was formally established in 1926, when Ibn Saud, sultan of the Nejd, conquered Hejaz and joined these two mid-peninsular territories. Its boundaries were extended by later conquests to include Asir, on the Red Sea. Yemen became a protectorate in 1934.

Government takes the form of a feudal autocracy. Apart from the king, the agencies for ruling the land are confined to a council of ministers presided over by the king's son and local councils, all members being nominated or approved by the king.

Saudi Arabia is a member of the Arab League, formed in February 1945. It includes also Egypt, Iraq, Syria, Lebanon, Transjordania, and Yemen. The Palestinian Arabs are in sympathy. Its purpose is to promote co-operation, especially in matters of culture, trade, and communications, to prevent disputes among its members, and to prevent aggression. Its Council meets in Cairo semi-annually.

Siam. See *Thailand.*

Slovakia. The easternmost province of Czechoslovakia was an independent state under German protection from 1939 to 1945, when it was reunited to Bohemia and Moravia. Its southeastern section, Ruthenia, was ceded to Russia, June 29, 1945.

Spain (*España*). The kingdom of Spain was formed, in the latter part of the 15th century, by the union of a number of monarchies and by conquest of the southern part of the peninsula from the Moors. Under Charles V and Philip II, the ancient rights of these kingdoms and certain representative institutions which they possessed were suppressed and the basis for absolute monarchy was laid.

The modern constitutional history of Spain begins in 1808; it was followed by a period of civil conflict between liberal and reactionary forces, within which period Spain for a brief time, 1873-74, was a republic. The Bourbon family, under Alfonso XII, was restored at the beginning of 1875. This dynasty ruled until April 14, 1931, when King Alfonso XIII was driven from the throne. Spain was proclaimed a republic, a constituent Cortes was elected on June 28, and a new constitution was adopted on December 9 of the same year.

Republican Constitution.—The Constitution of 1931 provided for a democratic republic, with separation of church and state.

Legislative power was exercised by a single-chamber Cortes, its members elected by universal suffrage, on the basis of proportional representation for a four-year term. In case of a dissolution, at the expiration of the term, new elections must be held within sixty days. Laws might also be passed, on the petition of 15 per cent of the electors, by the initiative and referendum.

The president was elected for a six-year term. He could not succeed himself and might be dismissed by the Cortes. He was elected by the Cortes and an equal number of "compromisers," chosen by direct universal suffrage. He carried on the administration through a prime minister, appointed by himself, and a cabinet selected by the prime minister.

The judicial system consisted of a supreme tribunal, with subordinate appeal courts, provincial high courts, and courts of first instance. A special tribunal of constitutional guaranty dealt with the protection of individual rights and the constitutionality of laws.

Amendments to the constitution might be passed by the Cortes, which was then automatically dissolved. If ratified by the new Cortes, the amendments became a part of the constitution.

The Revolution.—In April 1936, a coalition of leftist parties, the Popular Front, in control of the Cortes, dismissed President Zamora, the first president of the republic, and elected Azana in his place. A revolt of the parties opposed to the Popular Front broke out on July 17, under the leadership of General Francisco Franco. A 3-year civil war followed. The Insurgents set up a government at Burgos, headed by a Junta; on October 1, they proclaimed a "Government of the Spanish State" with General Franco as "Chief of State," and put forward an organic law distinctly totalitarian in character. Neither party was entirely united in its views. Within the government party factions developed, and the more radical gained supremacy. The Carlists, the extremists among the insurgents, would have restored the old monarchical regime, but by April 1937 a single party, the *Falanga Espanola Tradicionalista*, was controlling the insurrection on Fascist lines. At the beginning of 1938 a civil government was proclaimed with General Franco as Prime Minister with dictatorial powers. The Civil War ended March 29, 1939, with the occupation of Madrid by the insurgent army. A program of reconstruction was initiated under a new cabinet with Franco as president of the Council of Ministers and the Grand Council of the Falangist party taking the place of the Cortes. The program includes labor laws and unions of the Fascist type; compulsory labor when necessary for the reconstruction measures; and the division of the large estates. The Franco government was recognized by Great Britain in February 1939 and by the United States in March of that year.

Colonies.—Of Spain's once vast colonial empire, there remain only small vestiges, all in Africa. The most important are the Rio de Oro, with its hinterland; and Spanish Guinea, including the island of Fernando Po and Continental Guinea, with a group of islands. Spanish Guinea is governed by a governor general, with district administrators. Spain also has a protectorate over a part of Morocco, where the Sultan's powers are exercised by a Khalifa, nominated by the Spanish government and controlled by a Spanish High Commissioner. The Canary islands, also a Spanish possession, are treated administratively as a part of Spain, as are the Balearic islands in the Mediterranean.

Sweden. For the union of Sweden and Norway between 1814 and 1905, see *Norway.*

Sweden has long been the seat of a constitutional system. The national representative legislative *Riksdag* came into existence in the 16th century. Between 1680 and 1718, however, during the period of Sweden's prominence as a military power, the monarch became well-nigh absolute. This was followed by a period of legislative dominance.

The present constitution was adopted in 1809. The amending process is simple. The passage of an amendment by the Riksdag in two successive sessions, with the approval of the monarch, is suffi-

cient to enact. Minor changes have been frequent.

The king has certain independent powers. He is commander in chief of the land and naval forces. In foreign affairs, including the declaration of war and the conclusion of peace, he must advise with ministers, but is responsible for the decision. The ministers, while nominally responsible to the Riksdag for all acts of government, have also a real responsibility to the king, who has a large influence in affairs of state.

Since World War I, the general progress in democracy has affected the Swedish constitutional system. Ministers have resigned as the result of their disagreement with the Riksdag, and, by a constitutional change, a foreign affairs committee of the Riksdag, with which the government consults on international affairs, is elected each year. The Riksdag is bicameral: the first chamber consists of 150 members elected for an 8-year term by the provincial assemblies and electors of six towns not represented in these assemblies; a second chamber of 230 members is elected for 4 years by direct vote of Swedish citizens. The suffrage extends to all citizens 23 years of age, not disqualified. Among disqualifications is failure to pay taxes for 3 years in succession. Suffrage in municipal elections was extended to women in 1909 and full parliamentary suffrage in 1919.

The kingdom is divided into 25 administrative provinces or counties, *län*, in which the administration is confided to a governor (in Stockholm) or prefect, or *landshofding*, appointed by the crown; but each province has a legislative assembly, *landsthing*, whose members are elected directly by voters on the principle of proportional representation. Absentee voting is permitted; a husband may carry his wife's sealed ballot to the polls, and a wife, that of her husband. Soldiers, seamen, fishermen, and employees of railroads, ports, customs, and pilot services may vote by post. There is an optional referendum or plebiscite which may be ordered on important matters if the government and the Riksdag concur in believing it advisable.

The supreme court of Sweden, *högsta domstolen*, has a constitutional status, while courts of appeal and district courts of first instance are organized by laws. The supreme court is authorized to render an interpretation of the law, if requested by the government. The important constitutional position of the king is again indicated by his right to attend the sessions of the supreme court and to cast two votes in all decisions. If the question is one of interpretation, his two votes may be recorded in his absence.

The society of Sweden is appreciably less democratic than that of Norway, and the ancient nobility, while no longer possessing privileges or political rights, continues to have a recognized social position.

In the 17th century, Sweden was a maritime and colonial power and acquired colonies in the New World, including an early settlement in Delaware. Several small possessions still remain. For the award of the Aland islands to Finland, see *Finland*.

Admitted to the United Nations in 1946, Sweden's Dag Hammarskjöld succeeded Trygve Lie as secretary of the United Nations in 1953.

Switzerland (The Swiss Confederation). Switzerland is the oldest republic of Europe and the first European state to adopt a federal form of government adapted from the American plan. This country is also the originator of several widely adopted democratic institutions, and is an example of how peoples of different race (French, German, and Italian), of different speech, and of different religious belief may form a completely harmonized nation. The unifying forces seem to have been the influence of an Alpine habitat and a common devotion to principles of freedom,—what has been nobly expressed as "the fusing power of free institutions."

The country is composed of states or "cantons." Alliances and unions between certain of these small states date from the 13th century; but it was not until 1848 that the existing union, under a true federal form of government, was achieved. This constitution was revised in 1874 and was added to by several later amendments. The central government is complete and adequate, and certain of its powers are exercised directly upon the people and upon the territory of the whole country. The cantons, however, are protected in free exercise of their local jurisdictions by the constitution. Sovereignty undoubtedly resides in the whole nation; the union is thus a federation and not a confederacy, as its official title might imply. In some respects, the Federal government's powers are more extensive than those of the United States, extending to operation of railroads, telegraph and telephone, as well as to customs, post offices, coinage, etc.

The national legislative power is conferred on the "Federal Assembly," or *Bundesversammlung*, *assemblee féderale*, which consists of two chambers. The upper house, like the American Senate, represents the separate states and is called the "Council of States," or *Standerat*, *conseil des états*; it is composed of 44 members, 2 from each canton. The mode of their election, their term of service, and their remuneration are left to the cantons. The more popular house, or "National Council," *Nationalrat*, *conseil national*, consists of about 190 deputies, chosen by direct vote, one for each 22,000 of the population. Members of the National Council are paid from the federal treasury. Their term is 4 years. Every male Swiss 20 years of age is entitled to vote unless excluded by legislation of his canton.

Referendum and Initiative.—Switzerland has made fuller experiment of direct or popular legislation than has any other country. There is a national "referendum" of federal legislation, (a) obligatory for all amendments to the constitution and (b) optional upon petition of 30,000 voters or upon the demand of 8 cantons on more important acts of legislation. Perhaps the most striking instance of the exercise of this right was the proposal to enter the League of Nations, which was submitted to the voters in May 1920. Admission was approved by a popular vote of 414,000 to 322,000. An initiative procedure for amendment of the constitution on petition of 50,000 voters was adopted in 1891.

Commission Executive.—Strong democratic prejudices prevented the makers of the Swiss constitution from intrusting the executive power to a single person like the American president. In place of a presidency or a ministry, there exists a commission of 7 members, who are chosen by the Federal Assembly for a 3-year term, and are usually re-elected if competent. This commission is called the "federal council," or *Bundesrat*, *conseil federale*. It is responsible to the Assembly for its conduct of affairs, and its dispositions may be overruled. Besides administering, it prepares legislative acts to be submitted to the Assembly. While each member is charged with the administration of a separate department,—political (foreign affairs), interior, justice and police, military, finance and customs, national economy, and posts and railways,—responsibility is collegiate and matters of importance are considered "in commission."

Each year the National Assembly designates one member of the federal council to serve as "Swiss president." He becomes thereby the representative of the state at home and abroad and oversees the conduct of the business of the executive commission. He is ineligible for re-election for a consecutive term. A vice president is elected at the same time as the president and, by custom, succeeds to the chief office.

While this institution of "commission executive" might be inapplicable to republics differently situated, its practice has commended itself to the Swiss nation and has found imitation in the constitutions of German states enacted since the World War.

There is a federal court, *Bundesgericht*. The judges and their alternates are appointed for a 6-year term by the Assembly. This court decides cases of conflict of jurisdiction between federal and cantonal authorities, cases between cantons, and private complaints based on violation of constitutional or treaty rights. It also has jurisdiction in certain cases between the federation and individuals.

Cantonal Government.—The 22 cantons differ interestingly in the form in which their democratic character is politically exhibited. Five are small mountain states and are genuine democracies. There is no representative legislature, but laws are enacted by a popular assembly, or *Landesgemeinde*, even meeting by custom in the open field.

The other cantons have local unicameral legislatures usually called the "grand council" or the "cantonal council." All but one of these cantons (Freiburg) has either the obligatory or optional referendum. In all cantons the executive power is intrusted to a commission of 5 or 7 members known as the "administrative council" or the "small council." At the head of each commission is a president, *Landamman*, and a vice president, *Statthalter*.

The larger cantons are divided into administrative districts or are organized in communes. Each canton has its own judicial system, comprising justices of the peace, district courts, and a superior court. There may be also special "courts of commerce" and "industrial courts" on which sit representatives of employers and workmen. Within the jurisdiction of the cantons are such matters as poor relief, public health, labor protection, agricultural improvement, primary schools, maintenance of religious worship, citizenship, and naturalization. Proportional representation is established in several of the larger cantons.

Switzerland is a country of guaranteed neutrality by action of the "great powers" in 1815, and neutrality as well as independence is enjoined by the Swiss constitution. This status does not limit the republic in taking measures to safeguard its security, and the Swiss, always a people of high military spirit, are completely organized in a citizen army. Military training is compulsory, beginning in schools and continuing through the most vigorous years of manhood. At the age of 20, all young men receive a period of from 65 to 90 days of intensive training, and for the 12 succeeding years remain in the "line" with repeated brief periods of training and annual inspection. Thence they pass into the reserve, or *Landwehr*, and, after 8 years, into the *Landsturm*. Rifle practice is a national sport.

Switzerland has for centuries extended asylum to political and religious exiles, and is the home of a number of international associations, including the Red Cross Society and the Postal Union. The seat of the League of Nations has been placed at Geneva.

Syria. A former province of the Turkish Empire situated north of Palestine. It was occupied by the Allies in the last months of the World War. By the Paris Conference, Syria was recognized as one of those communities of the Turkish Empire which had reached a stage of development where it could be "provisionally recognized as an independent nation" subject to the mandate of a protecting state.

France has long professed an interest in Syria and by one of the "secret treaties" accomplished during the World War, the "Sykes-Picot Treaty," had secured an agreement for its annexation. A general Syrian congress held at Damascus July 2, 1919, proclaimed a program of complete political independence, requested the assistance of the United States in financial and technical matters for 20 years, opposed the separation of Lebanon and Palestine from Syria, and demanded the annulment of the secret agreements. In March 1920, at another Damascus conference, the independence of Syria was proclaimed, and the Arab prince, Emir Feisal, was offered the kingship. France succeeded in suppressing this independent movement and at the Supreme Council conference of San Remo, April 25, 1920, was given a mandate over Syria. The territories of Damascus and Aleppo were united to form the Syrian republic. Under a constitution of 1930, it is governed by a unicameral legislature of 69 members elected for four-year terms. The legislature elects a president for five-year terms. Other divisions of the mandate included the republic of Lebanon as well as Latakia and Jebel Druse.

In 1941 the Free French took Syria and Lebanon from the Vichy forces, and their independence was recognized by the French National Committee of Liberation in December 1943.

Lebanon, the southwest portion of geographical Syria, has been recognized as an independent state since November 1941. Both Syria and Lebanon are members of the United Nations and of the Arab League.

Thailand (Siam). A monarchy of southeastern Asia. It is notable as being the sole remaining independent "native" state within the tropical zone.

Thailand was an unlimited autocracy until 1932. In that year, a revolutionary group seized the government and invited the king to rule as a constitutional monarch. A deliberative and legislative Assembly was provided, consisting of 70 members, of whom half are elective and half are nominated. After ten years, the whole body was to be elected by the people, in whom the supreme power is declared to rest. Suffrage is universal. Government is conducted by a state council, appointed by the king. For local administration the kingdom is divided into 70 provinces (*changwads*), each with a commissioner and a local legislature. In 1936, by denouncing existing treaties and negotiating new ones, Thailand removed the extraterritorial rights of foreign powers.

Turkey. The fortunes of World War I, in which Turkey allied herself with the Central Powers, brought the final reductions of the Ottoman empire,—the loss of Arabia, Syria, and Palestine, and the almost complete confinement of the Turkish state to Asia Minor.

By the Treaty of Sèvres, acceded to by the Turkish government at Istanbul but denounced by the nationalist government at Ankara, Istanbul was left nominally in Turkish possession, eastern and western Thrace were assured to Greece, the Dardanelles was placed under Allied control to be kept open to the free passage of shipping and to the navies of the world.

Most islands of the Ægean were assigned to Greece, though Italy secured possession of Rhodes. Turkey was not only limited to Anatolia, but her possession of Smyrna and the surrounding region of the Ionian coast was threatened by Greek occupation.

Nationalist Movement.—These losses, which were beyond those foreshadowed by the armistice of Mudros, October 30, 1918, aroused a powerful nationalist Turkish movement, headed by General Mustapha Kemal Pasha. During 1919 and 1920, a Turkish government with a capital at Ankara was created to resist the partitioning of Turkey "within the armistice limits." This government repudiated the Turkish authority at Istanbul, which had submitted to the Allies. War followed, the Allies intrusting Greece with the task of reducing the Turkish nationalists.

The conference of the Allied premiers at London, February 21, 1921, offered new terms to Turkey. These were rejected by the Greek government. The outcome of this war in 1922 was disastrous to Greece. It resulted in Turkish military occupation of Anatolia up to the Dardanelles and the Bosporus.

At the opening of 1923, a conference at Lausanne, Switzerland, followed, which resulted in treaties whereby Turkey secured recognition of rights to the Anatolian coast, the city of Istanbul and adjacent territory, and gained freedom from the "capitulations" which gave certain foreign nations

extraterritorial rights for their citizens in Turkey.

A new constitution was adopted April 23, 1924. Turkey was declared a republic. The sovereign power is vested in the Grand National Assembly, a single chamber elected for four years by all citizens, women as well as men, over 23 years of age. The president of the republic is elected for a four-year term by the Assembly from among its members. The president may veto a measure, but the veto may be overridden by a simple majority. A cabinet is appointed by the president but is responsible to the Assembly. In February 1937, the Assembly recognized the Republican People's party as the sole party. In the election of 1946, however, other parties and party candidates were allowed, resulting in the formation of a new cabinet. In 1947, fearing Russian pressure on the Dardanelles and in the northeast, Turkey accepted the United States' offer of a loan of $150,000,000 for strengthening her defenses. In 1951 Turkey entered the North Atlantic Treaty Organization.

Uruguay. The republic of Uruguay was formed from Banda Oriental, of the viceroyalty of La Plata, which territory was in controversy between Spain and Portugal for nearly two centuries. By the Treaty of San Ildefonso, October 1, 1777, it was finally ceded to Spain. On May 23, 1810, upon the declaration of independence, promulgated at Buenos Aires, Uruguay was declared a part of the united provinces of La Plata. This was followed by a revival of the Brazilian claims to the territory and a war resulted between Brazil and Argentina. It was ended by the treaty of August 27, 1828, both countries recognizing the independence of Uruguay.

The first constitution, adopted September 10, 1829, and promulgated July 18, 1830, provided a centralized form of republican government, which was replaced March 1, 1919, by the promulgation of a constitution adopted in 1918. This constitution had novel features designed to prevent the conversion of the presidency into a dictatorship. Borrowing an idea from the former government of Venice, the constitution divided executive power between a president elected by the people and an administrative council also elected by the people, but for different terms. The presidential term was four years, with no re-election until after eight years. The term of council members was six years, one-third of the memberships being renewable each two years.

This constitution was abandoned after a revolution in 1934 and was replaced by one allowing greater decisiveness in executive action. A president was elected for a four-year term by the legislature. His cabinet of nine ministers had to be chosen from members of the legislature, six from the party polling the largest number of votes in the presidential election and three from the party polling the second largest number. The president voted with the cabinet, but in case of a tie could also cast the deciding vote. By an amendment to the constitution, approved by the electorate in December 1951, the presidency was abolished and all executive power was vested in a nine-man bi-partisan National Council, which began to function March 1, 1952. The members of the council are chosen for a term of four years.

The legislature itself consists of two houses—a Senate of 30 members elected at large for four-year terms and a Chamber of Representatives, consisting of 99 members chosen by districts for four-year terms. The 30 seats in the Senate are divided equally between the two parties obtaining the highest number of votes, provided the two together poll an absolute majority. Otherwise, the seats are allotted by proportional representation.

The constitution provides for old age pensions, state care of mothers, free medical attention for the needy, workmen's accident insurance, a 48-hour week, and minimum wages for women and children. In addition, the constitution empowers the government to construct low-cost dwellings for workers. The right of labor to organize and strike is recognized. Suffrage is universal and compulsory, failure to vote being punishable by a fine. The church and state are separated.

Judiciary.—The judicial power is vested in a high court of justice of 5 judges, elected by the General Assembly; the president of the court is chosen annually by the other members. There are departmental courts in the departments and justices of the peace in the smaller judicial districts. The death penalty was abolished in 1907.

Secret balloting was introduced by a law of 1919. Autonomous local government is granted to the departments, each of which is governed by a council of from 3 to 7 members, elected for 3 years by direct popular vote. Departments impose and collect their own taxes, control their expenditures, and administer their own public service.

For Uruguay boundary disputes, see *Brazil*, *Argentina*, and *Paraguay*.

In the World War, Uruguay broke off diplomatic relations with Germany upon the torpedoing of a Uruguayan ship on October 17, 1917. Although no military or naval aid was furnished the Allies, other means of assistance were offered.

Vatican City. For a period of nearly 1000 years, the papacy or Holy See held temporal possessions, over which it exercised despotic political control. The process of unification of the Kingdom of Italy gradually absorbed these territories including Rome. The pope retired into the Vatican Palace, whence no pope ever issued down to 1929. A unilateral settlement with compensation made by the Kingdom of Italy was declined by the pope and his successors. By an accord of February 1929 the Italian government recognized the papacy as an independent state. The pope, who again becomes a political monarch, is chosen on the death of his predecessor, by the Sacred College of Cardinals, not more than 70 in number. Two-thirds majority is necessary for election.

Venezuela. Venezuela, together with the territory comprising the republics of Colombia and Ecuador, was freed from Spain by the revolutionary operations of Simon Bolivar, "the liberator," in 1821. In 1829, Venezuela seceded from the republic of Colombia and formed a separate republic to include the territory of the former "captaincy-general" of Venezuela. Its first constitution was proclaimed by a convention at Valencia, September 1830.

The present constitution was adopted July 5, 1947. The executive authority is vested in a president chosen by direct popular vote for a 4-year term. He must be a Venezuelan by birth and over 30 years of age and may not succeed himself. He exercises his powers in conjunction with cabinet members through whom he acts. Cabinet members are civilly and criminally liable for illegal acts, and their property and that of the president may be confiscated to compensate for misappropriation of public funds.

Legislature.—The legislative authority is vested in a Congress composed of a Senate and a Chamber of Deputies. The Senate has 40 members, two from each state, elected by the state legislatures for 4 years. The Senators must be Venezuelans by birth, over 40 years of age, and residents of their state. The Deputies are elected for 4-year terms by popular vote in the proportion of one for every 35,000 inhabitants, with one member more for an excess of 15,000. Each state has at least one deputy. The territories elect deputies when they have the minimum population fixed by law. Deputies must be Venezuelans by birth, resident, and over 25 years of age. One-half of each house retire every two years. The elective bodies, state legislatures and municipal councils, are chosen by men and women over 18. Congress may ratify treaties and appoint special committees of investigation. It meets annually on April 19 for a session of 70 days.

Judiciary.—Judicial authority is vested in a supreme court, *corte federal y de casación*, and in other tribunals established by law. Congress elects the 7 judges of the supreme court for a term of 5

years. This court takes cognizance of accusations against the president and other high officials. It has jurisdiction over claims against the nation, over cases relating to foreign agents in Venezuela, or over cases arising out of contracts made by the president or involving conflicts between laws, state or federal. It may also declare laws unconstitutional.

The Federal Union.—Venezuela is composed of 20 states, 2 territories, and a federal district. They are autonomous, politically equal, and retain all sovereign powers not delegated to the Federal government by the constitution. Each state has a president, a legislative assembly and a system of courts. The federal district and the territories are administered by the president through appointed governors. The federal government may levy export as well as import duties and tax the products of agriculture, stock-raising, and fisheries, but 20 per cent of the governmental income is handed over to the states. The federal government controls election laws; it has a degree of control over sanitation and transportation. Liberty of thought is guaranteed, but communism and anarchism are forbidden.

By amendments made in 1945 literate women may vote for municipal councils; the lower house is to be elected by direct vote. The president is given a veto like our own, but a veto for constitutional reasons must be submitted to the supreme court. Congress may give the president extraordinary powers.

In 1948, a military junta seized the government. The leader, Lieutenant Colonel Chalbaud, became president. Assassinated in 1950, he was succeeded by Dr. G. Suarez Flamerich. In December 1952, an election to choose a new congress and write a new constitution was held. When it became apparent from the early returns that the government was losing the election, the army proclaimed junta director Marcos Pérez Jiménez provisional president and he was sworn into office in January 1953.

For the settlement of the boundary dispute with Brazil, see *Brazil.* A boundary dispute with Colombia, after arbitration by the king of Spain had failed, brought the two countries to the verge of war, but the difference was adjusted by arbitration by the Swiss government in 1922.

A long boundary dispute with England over the frontier between Venezuela and Guiana resulted in Venezuela's appeal to the United States. President Cleveland's affirmation in 1895 of the bearing of the Monroe Doctrine upon the question secured an agreement by arbitration. By this award, England received the major portion of the disputed territory; but Venezuela was given clear title to a valuable region at the mouth of the Orinoco.

Yemen. This ancient Arab kingdom is on the Red Sea south of Saudi Arabia, near the southwesterly end of the Arabian peninsula. It is largely mountainous. The altitude of the capital, Sana, a walled city with eight gates, is 7260 feet. In 1948, the ruler, Imam Yahya, and two of his sons were assassinated, and Abdullah el Wazir proclaimed himself king. Less than a month later, Yahya's sons defeated the usurper, and Ahmad, the heir apparent, succeeded to the throne. The 1934 treaty between Yemen and Saudi Arabia provides for co-operation between the two countries in Arabian and foreign affairs. Yemen has been a member of the United Nations since 1947.

With an area of 75,000 square miles and an estimated population of 5,000,000, Yemen is perhaps best known for its Mocha coffee.

Yugoslavia. This state was established at the end of World War I by the addition to Serbia of the former Austrian provinces of Slovenia, Croatia, Bosnia-Herzegovina, and Dalmatia, and its union with Montenegro. To these were later added four small areas on the western frontier of Bulgaria and lands taken from Hungary. Its formation was proclaimed in December 1918, under the name of the Kingdom of the Serbs, Croats, and Slovenes. In October 1929 its name was changed to the Kingdom of Yugoslavia. A constitutional assembly, elected in 1920, adopted a constitution for the united kingdom. Although a strong party wished a federal organization, it was strongly centralized. The king had very large powers. The legislative power was vested in him, in conjunction with the Chamber of Deputies and the Senate, one-half the Senate appointed by the king.

The enlarged South Slav state thus formed was weakened internally by local and racial feeling and religious differences. These contributed to the dismemberment of the country after the German invasion. Quarrels between the Royal Yugoslav government and the Russian-supported "Partisans" resulted in an agreement for the formation of a provisional government, headed and controlled by Marshal Tito (Jozip Brozovich). Elections were held for a constituent assembly, which on November 29, 1945, abolished the monarchy and proclaimed a federal republic.

The Federal People's Republic of Yugoslavia consists of the People's Republics of Serbia, Macedonia, Croatia, Bosnia-Herzegovina, Slovenia, and Montenegro, with the autonomous province of Voyvodina and the autonomous region of Kosovo-Metchiya (both included in Serbia). This seems to be an attempt to avoid the conflicts of race and religion which wrecked the old Yugoslav kingdom.

The constitution of the Federal Republic was proclaimed January 31, 1946, by the Presidium. It closely resembles that of Soviet Russia. It declares that all authority is derived from the people. The means of production are primarily in the hands of the Republic. Private property (and inheritance) is recognized, but it must be used within the "planned economy" of the state. "Land belongs to those who till it," and large estates, including those of the church, have been confiscated, and divided among small holders. Church and state are separated; education is a state monopoly. Women are on an equal footing with men, and social security is extended.

The law making body is the People's Assembly, consisting of the Federal Council and the Council of Nationalities, elected for a four-year term. The former contains one delegate for each 50,000 people; the latter, thirty from each republic, with smaller numbers from the autonomous districts. Both houses must agree in passing a law. Suffrage is extended to all citizens above the age of 18.

The executive body is the Presidium, a council of 37 members on the Russian model. Government is carried on by the ministries, some of which act directly upon the people, while others act through the corresponding ministries of the several republics.

Each Republic has its own constitution, modeled on that of the Federal Republic. All powers not delegated to the Federal Republic are reserved to the individual republics—but the list of delegations is very comprehensive. Local government is administered by people's committees and executive committees in districts and towns. The supreme courts of the Federal Republics are elected by the People's Assemblies. The Presidium may overrule the Federal courts and passes on the constitutionality of laws.

Yugoslavia's foreign relations were significant in the years following the war. Great Britain and the United States protested that the Yugoslav constitution and practice violated the pledges of freedom of speech and religion made at Yalta. Sharp exchanges of notes followed the shooting down of American planes. By the peace treaty with Italy, Yugoslavia gained most of Venezia Giulia and Istria, with Zara and Fiume, but Trieste was internationalized. Yugoslav claims of territory in Carinthia delayed the conclusion of a peace treaty with Austria. In 1948 Marshal Tito was denounced by the Cominform for nationalistic heresy, and relations with Russia became strained. In 1953, the Yugoslav parliament, pursuant to the revised Constitution, formally named Marshal Tito president of the People's Republic of Yugoslavia.

POLITICAL TERMS AND INSTITUTIONS

THE study of the governments of the world today is facilitated by the scientific definition of political ideas and by increasingly accurate descriptions of forms of political organization. An acquaintance with these general conceptions and facts is necessary to comprehension of any nation's history and government. This dictionary presents, with brief and authoritative treatment, a large number of the most important of such institutions and terms. They are discussed in respect to their general forms and meanings and also with regard to particular developments and usages in different countries. Significant features of American political life are given especial attention.

This section therefore has a threefold value. It supplies a convenient reference dictionary of political terms. Further, it supplements the articles upon the history and the governments of the world, adding more complete treatment of special topics than could be given in those articles. Finally, it furnishes a valuable means for comparative study of political ideas and practices prevailing in different countries.

Absolutism. A form of government in which the supreme power of the state is vested in a person who rules unlimited by constitutional laws.

Admiralty (*ăd'mĭ-răl-tĭ*). The branch of the law which treats of civil and criminal cases arising on the high seas. In the United States, admiralty jurisdiction is vested by the Constitution in Federal courts.

In England, admiralty denotes that department of the government which has jurisdiction over the naval forces of the empire and over all merchant vessels flying the British flag.

Air Zone. Air space above the territory and waters of belligerents. In international law, air zone is regarded as a field for military combat.

Alderman. A member of a municipal body, either popularly elected or "co-opted," that is, added by choice of the municipal council.

Allegiance. Obligation of obedience and loyalty on the part of a citizen toward his country. An alien is under obligation of temporary and partial allegiance to a country in which he is a resident, and thereby is bound to obey its laws and answer the summons of its duly constituted authorities. The term is also used broadly to designate the relation of loyalty and support which one has assumed toward any institution, party, movement, or leader.

Ambassador. See *Diplomatic Representation.*

American's Creed. See *Creed, The American's.*

Amnesty (*ăm'nĕs-tĭ*). An act of government granting exemption from criminal prosecution and punishment. It often extends to a class or group. It differs from pardon in being granted before rather than after conviction.

Anarchism. A social doctrine which advocates the abolition of all governmental authority, to the end that the individual may be free to realize his desires and aspirations without legal restraint.

Appropriation. Restriction to a specific purpose of money voted by a legislative body. In England traces can be found as early as the Fourteenth century, but it did not become the established practice until the Seventeenth. In the United States it is prescribed by the Constitution (Art. I, sec. 9). Historically it has been an important means of controlling the executive.

Arbitration. A method of settling disputes between nations by referring the matters in question to an arbitral authority for decision. Sometimes this authority is an individual, as the head of a state; at other times it is a board, a court, or a special arbitral tribunal. International practice of arbitration has been much advocated in America.

Among important arbitrations to which the United States has been a party are the Geneva Award, 1872, which settled American claims upon Great Britain; the Venezuela Boundary Dispute of 1897; and the Bering Sea Arbitration of 1893. The United States has treaties providing for arbitration with many states. See *Hague Tribunal.*

Arbitration of Industrial Disputes. Continued struggle between employers and employees in the development of modern industry has occasioned repeated resort to arbitration to settle labor disputes and to terminate deadlocks, injurious not only to those concerned but to the public as well. Many states have established public boards of industrial arbitration without providing for compulsory resort to them.

In New Zealand, and later in New South Wales and in West Australia, laws have been passed compelling submission of industrial disputes to arbitration and providing state arbitral machinery.

In the state of Kansas, a compulsory arbitration act was passed in 1920, and a court of arbitration was created. This legislation was upheld by the state courts; but, in June 1923, the United States supreme court decided that the power accorded this court to fix wages is in conflict with the 14th amendment and is therefore unconstitutional.

Aristocracy. A term used by the Greek philosopher, Aristotle, to denote government by the best qualified. He recognized the tendency of such a form to degenerate into government by the corrupt or the wealthy, to which debased type he applied the name "oligarchy." Aristotle contrasted aristocracy with "monarchy" on the one hand and with "democracy" on the other, and since his time these have remained fundamental political conceptions.

The term "aristocracy" is applied also to the nobility and gentry of states with monarchical institutions, and so, by analogy, to those people who assume superior qualities or social standing.

Army of the United States. See *National Defense.*

Attainder. The extinction, by an act of a legislative body, of all civil rights of a person, and his sentence to death, without hearing or other judicial process. The Parliament of England passed many such acts, particularly during the 15th and 16th centuries. Bills of attainder are expressly prohibited by the Constitution of the United States and by most of the state constitutions.

Bills of "pains and penalties" of the British Parliament resembled bills of attainder, but they imposed lesser punishment than death.

Autocracy. A form of government in which political power is absolute and unlimited. This form of monarchy reached its greatest pretensions in Europe in the 18th century. It generally disappeared in the 19th century. Among the great European powers, Russia was the last to adhere to it, and the title of "Autocrat of all the Russias" was held by the czar until the abdication of 1917.

Ballot. See *Voting.*

Belligerency (*bĕ-lĭj'ĕr-ĕn-sĭ*). The status whereby regularly organized fighting forces become entitled to the protection of the laws and usages of war. The Hague Convention of 1899, which codified international rules of warfare, provided that troops, to be entitled to these privileges, must be part of the military organization of a recognized "belligerent"; must be commanded by properly commissioned officers; must wear distinctive uniform; must carry arms openly and not be guilty themselves of conduct contrary to the usages of war among civilized nations. Among recognized rights of belligerents are: the right of surrender and of capture rather than death upon the field; trial by court-martial before execution, and humane treatment as prisoners of war.

Belligerency is an official recognition withheld from mere rebels or insurgents, who may be treated without regard to the laws and usages of nations.

Bicameral (*bī-kăm'ĕr-ăl*) **System.** That form of legislature which consists of two separate chambers or houses, the concurrence of both ordinarily being essential to the enactment of legislation. A one-chamber legislature is known as a *unicameral* system. The bicameral system is found in the United States in both Federal and all state governments, with the exception of Nebraska. More than half the national legislatures in Europe are bicameral, the remainder being unicameral. In state, provincial, and local government, single chambers are the rule in Mexico and Canada.

The bicameral system is traced to the influence of the English bicameral Parliament, which, for reasons that were accidental rather than deliberate, early organized into a House of Lords and a House of Commons.

In the American state, the bicameral Congress harmonized the conflicting purposes of the framers of the Constitution, the Senate representing the states, with equal representation, and the House of Representatives, the nation, on the basis of population.

Elsewhere than in federal government, the two-chamber legislature is usually justified merely as a check upon hasty, ill-considered legislation.

Bill of Rights. An English act of Parliament of 1689, entitled "an act declaring the rights and liberties of the subject, and settling the succession to the crown." After reciting the abdication of James II and the vacancy of the crown, the act declares the ancient rights and liberties of Englishmen: (1) that it is illegal for the king to attempt to suspend laws without the consent of Parliament; (2) that levies of taxes without grant of Parliament are illegal;

(3) that subjects have the right freely to petition the king; (4) that the raising or keeping of a standing army within the kingdom in time of peace, unless it be with the consent of Parliament, is against the law; (5) that Protestant subjects may bear arms suitable for their defense and as allowed by law; (6) that the elections of members of Parliament shall be free; (7) that freedom of speech and debate or of proceedings in Parliament shall not be impeached or questioned outside of Parliament; (8) that excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted; (9) that a person accused of crime shall be entitled to a trial by impartial jurors; (10) that grants of the fines and forfeitures of accused persons before conviction are illegal; and (11) that Parliament shall be frequently convened.

These so-called "rights of Englishmen" expressed in definite form those limitations upon the royal prerogative to which Englishmen believed they were entitled under the customs and common law of the realm. Next to Magna Charta, the Bill of Rights of 1689 is regarded as the most important constitutional document in English history. The accession of William and Mary was made dependent upon its recognition. From this fundamental statement, similar bills have been framed in the course of constitutional development in many countries.

The American colonists held to the principle of these limitations upon the power of the crown, and their revolution rested in part upon the alleged violation of them. The first ten amendments of the Federal Constitution constitute the so-called "American bill of rights," several repeating the language of the English law. (See *Constitution of the United States.*) Similar constitutional guarantees have been incorporated in the constitutions of every American state.

In 1789, the French National Assembly adopted the famous "Declaration of the Rights of Man and of the Citizen" which, more theoretical than its English predecessor, has enjoyed scarcely less influence in the progress of revolution against autocratic government.

Bloc. A French word, meaning "mass" or "group," somewhat recently introduced into political parlance, to mean an association of legislative members or of political workers of different parties, formed to support a certain measure or ministry.

One of the most famous of such combinations was the so-called "Blue-Black bloc," a union of Conservatives (blues) and Clericals (blacks) in the German Reichstag, especially between 1894 and 1907, in which latter year a new bloc was created, that of the Conservatives and the Liberals.

The term has been introduced into American politics through the union of members of Congress pursuing certain agrarian policies in what is called the "agricultural bloc."

Blockade. The closing or blocking of entrance to the ports of a belligerent country by hostile naval forces to shut out neutral commerce and to prevent the entrance of supplies or re-enforcements. A blockade, to be valid in international law, must be officially declared by a belligerent against the ports of another belligerent; must be officially called to the attention of neutral powers; and must be effective.

During World War I, the British, by their naval control, practiced a blockade upon German ports by proclamation rather than by the close patrol of war vessels. This system was extended to ships bound for the ports of neutral countries contiguous to the central European powers, or with which they were able to maintain communication.

Bolshevism (*bŏl'shĕ-vĭz'm*). A term derived from the Russian *bolshestvo,* meaning "majority"; hence bolshevik, plural, bolsheviki. Bolshevism is the radical extreme of Marxian socialism. It accepts the doctrine of Karl Marx, that an irreconcilable antagonism exists between the propertied class, or bourgeois, and the propertyless workers, or proletariat. It invites as inevitable and necessary the "class war," the object of which is the destruction of all classes except the proletariat, in whose interest and by whom future society will be organized with a view to production for use rather than for private profit.

Bolshevists differ from more moderate socialists by the literal interpretation they give to Marx's phrases. By the "class war," they mean actual warfare. They repudiate peaceful measures, especially parliamentary action, and advocate and employ violence for the immediate and complete attainment of the "revolution." They hold the political achievements of the last century and a half—political freedom, representative government, etc.—to be deceptive and illusory "bourgeois triumphs" inimical to the proletariat, since they have strengthened and extended the power of the propertied class.

The philosophy of Karl Marx, which was essentially "determinist," taught that the evolution of capitalistic society into communism is inevitable, through the process of the rich becoming richer and fewer in number, while the poor become poorer and more numerous. This irresistible development would go on until the overwhelming mass of mankind would be reduced to the class of proletarians, when capitalism would be "mature" and incapable of resisting its "capture" by the propertyless.

Envisioned as steps in the process were the organization of workers into unions, teaching them to act in concert, and periodic social distress arising from economic depressions. The Marxian analysis of capitalism held that the urge for profitable markets would precipitate "imperialist" wars, and that the resulting disorganization would lend opportunities for the proletariat to seize power. With each nation refashioned on a socialist pattern, Marx held, a world federation of co-operating republics would be possible.

Bolshevist Policy in Russia. The collapse of Russia in 1917 afforded the Bolshevists an opportunity to seize the power of the state, to destroy the opposition ("counter-revolutionists"), and to establish a communistic society on a gigantic, national scale. (See *Russia.*) The form of government set up to replace the constitutional and representative system was that of "soviets" (committees of propertyless workmen and soldiers) to which soviets or councils all power was attributed. (See *Soviet.*) All property was seized; all trading or commerce was penalized; all persons became the operatives or fellow laborers of the soviet state, which assigned to each individual or to his group its definite task and fixed the output or production required. An elaborate system of accounting and of control of industry was created. Severe penalties were visited upon recalcitrant bodies of laborers and upon peasant communities which failed to deliver the required production to the Soviet state.

The plan came near to being wrecked by the refusal of peasants to part with their produce. For a time the government compromised with a system of private profit. Then in 1927 began a ruthless effort to collectivize farming. State farms and co-operative farms were organized, many of them of enormous size, and the most improved types of machinery were used to work them. Private property was permitted to the extent of allowing each farmer to own enough land and animals to supply his own needs.

Other compromises with a rigorous communism were made by permitting different pay for different types of work and allowing individuals to accumulate property as long as this was not accomplished by using the labor of others to make profit. Five-year plans of national development were undertaken and carried through with a success that made Russia a rival of other great industrial states. The nation continued to advance economically throughout the great depression which plagued the rest of the world in the years following 1929.

Relation to Other Nations. The attitude of the Bolshevists at first was to expect a world-revolution within a short time. To bring this about they organized the "Third International" at Moscow in March 1919. Briefly successful Bolshevist revolutions were effected in several German states and in Hungary. These movements were ruthlessly suppressed. Definitely anti-Communist governments were set up in Italy and later in Germany. Meanwhile the attitude of Bolshevists toward the world revolution was modified. Aggressive propaganda was gradually discarded and peace abroad was cultivated. Instead of struggling for revolution directly, the government proposed to demonstrate in Russia the advantages of organizing economic life not for private profit but for public welfare.

This policy was changed in 1939, when Soviet Russia, in alliance with Germany, absorbed the Baltic states. After World War II the expansion continued, with the reappearance of the Comintern as the Cominform, and the capture by the Communists (the term now used) of the governments of countries bordering on Russia in Europe and Asia, and the organization of Communist parties, directed from Moscow, in other countries.

Bonus. Money paid in addition to a stated compensation. A bonus system, while common in private employment, is rare in public service and usually is adopted only when a sudden rise in prices recommends a temporary increase of government pay.

In the United States the term was used after World War I to describe payments by the national and state governments to former soldiers, as "adjusted compensation." Under the national measure, passed in 1924, over President Coolidge's veto, about four billion dollars was paid. After World War II most states granted bonuses to veterans.

Boodle. Money used in bribing public officials or in improperly influencing elections. The term also signifies plunder, or wealth improperly secured by officials through abuse of public office. It is said that the word "boodle" is derived from a Dutch colonial term meaning estate or inheritance.

Boss System. A term used in the United States to describe the method by which professional politicians, or "bosses," control nominations and elections to public office, and secretly direct the policy and conduct of government, particularly in states and municipalities.

The boss exercises power through a well organized "machine" of partisan workers who seek petty public office in exchange for services at primaries and elections. He frequently controls the candidates, whom his machinery elects, in their exercise of office. Thus the boss system has been aptly termed "invisible government."

The boss system has had its greatest development in the United States where frequency of elections and the number of elective officials overtax the interest of the average citizen.

Direct primaries, the initiative, the referendum, and the recall have been tried as methods of taking from the professional politician his pernicious power.

Bounty. A grant of land or money by the government to private individuals to reward services or encourage activities deemed of public benefit.

After the Civil War, large bounties in public land were given to the transcontinental railway companies to encourage the rapid extension of their lines and to hasten the development of the West.

Bounties frequently take the form of subsidies to owners of private merchant vessels, a flourishing merchant marine being regarded as a needed naval auxiliary in time of war.

Valuable bounties of land or money have often been given to induce enlistment in the military forces of a country, or to reward military service in time of war.

Brainwashing. The compulsory substitution of one body of political principles by another body through indoctrination or oppression, especially mental torture.

Budget. A detailed statement of the estimated expenditures and revenues for the ensuing fiscal period, submitted to the legislature by an officer responsible for the financial administration of the government. In England, where the budget system has been most completely developed, the chancellor of the exchequer prepares the budget showing the receipts from every source and the expenditures of each department for the year then expiring, together with estimated expenditures for the coming year, and a scheme of taxation for meeting such expenditures.

In the United States, satisfactory budget systems have come much later. American legislatures were long reluctant to let the executive branch of the government propose how moneys should be raised and spent. In 1921, Congress enacted a budget law whereby a director of the budget prepares, under the direction of the president, a budget for submission to Congress. California, New York, and many other states have entrusted similar powers to their governors. In 1933-34, the United States began the practice of dividing the budget into two parts, one showing estimates of current expenditures and income, the other, of sums chargeable to capital or other extraordinary outlays.

Absence of a budget results in waste, duplication of expense, and extravagance in appropriations. From the same cause follows lack of businesslike correlation between the raising and expending of revenues, and the absence of a definite responsibility for the financial administration of the government. See *Logrolling*.

Bureaucracy (*bū-rŏ'krà-sĭ*). Government by an elaborate system of administrative departments and officials, the lower functionaries subordinate in all matters to the higher. A bureaucracy generally tends to become unwieldy and laborious in its operation, through the absence of discretion in any but the higher officials. This produces "red tape" or over-systematization. Bureaucracy may exhibit also a tendency to disregard individual rights and to engage in arbitrary acts, but its most frequently charged defects are its rigidity, conservatism, and spirit of routine.

Cabinet Government. The form of government such as that of Great Britain, which is composed of a group of ministers, collectively called the "cabinet." Usually members of the cabinet are chosen from the leaders of the majority party of the Parliament or legislative body, and they are collectively responsible to that majority for the general policies and conduct of the government. As a rule, each member is the head of an administrative department.

Under systems of parliamentary government, the cabinet retains office only so long as it commands the support of the legislature.

Where there is more than one chamber in the national legislature, the dominant chamber, as the House of Commons in England or the Chamber of Deputies in France, is the one upon whose support the cabinet rests. Upon an adverse vote of that chamber on a material matter, the cabinet resigns. See page 1432a.

Cabinet government, which is called also "parliamentary" or "responsible" government, differs fundamentally from "presidential" government as found in the United States. Here the president is the actual executive head. The cabinet is responsible, not to Congress, but to him. The president is responsible to the nation for his policies and his administration. Members of his cabinet are merely his advisers and subordinates. See page 1404a.

Throughout Europe and in the British "dominions," cabinet government, responsible to a Parliament, has become nearly universal, but, almost without exception, the republics of the western hemisphere have followed the example of the United States, choosing their executives for a fixed term and making them independent of congressional direction.

Campaign, Political. Organized effort by a political party or group to secure the election of a particular candidate or list of candidates to political office. In the United States, formerly, the political campaign was marked by spectacular parades, campaign songs and slogans, immense gatherings of enthusiastic throngs, and by other devices calculated to arouse partisan interest and enthusiasm. More recently, however, political campaigns have been carried on principally by printed appeals, particularly through the medium of the daily newspaper.

In most American states, "direct primaries" or nominations by "primary elections" have taken the place of local and state nominating conventions. This has reduced party influence in political campaigns and has made them largely personal. It has at the same time doubled the effort necessary to secure election, as a candidate must compete at the polls twice, once for the nomination of his party and again for election to office. This system necessitates a large appeal to voters through the mails, by the circulation of personal appeals and "campaign literature," and has had the result of introducing a large element of expense not previously known.

Caucus. A meeting or conference of members of a political party or group to determine upon the candidate or policy to be supported in an election or other political contest. The term is American and is said to be derived from the Indian "kaw-kaw-was," meaning to counsel or confer.

A person entering a caucus is usually held to be honorably bound to accept the decision of the caucus, even though it be adverse to himself or to his views. He may, however, refuse to "caucus" with other members of his party or affiliation, thereby preserving independence of action and choice.

Census. An official enumeration of the population of a country, sometimes including also a tabulation of its industries and resources. In the Western world, the census is of Roman origin. In the time of Augustus, it was extended to the whole empire. The modern system, directed by the government, originated in Sweden in the 17th century. It was then adopted by France. No census was taken in Great Britain until 1800. Modern census-taking, however, may be considered to have originated in the United States. The Constitution provides that a national census shall be taken every ten years. The original purpose was to provide a basis for the periodical reapportionment of members of the House of Representatives, but the scope of the census has been extended to include the securing of data upon racial, religious, social, and economic conditions.

Charter. A grant from a sovereign or other superior authority to an individual, a company, or a territorial division, authorizing the exercise of certain functions or the enjoyment of certain privileges. In England, the crown often granted special charters to authorize individuals to exercise powers of government. Thus charters were granted to the proprietors who established colonies in America. Other colonies received direct charters from the crown empowering the people of the colonies to organize colonial governments. Similar "chartered companies" were created for extending British rule in Africa.

In the United States, charters may be granted for the creation of either public corporations or private corporations. The charter of a public or municipal corporation is today generally in the form of an act of the legislature, pursuant to which the corporation is organized, and which prescribes its form of organization and the powers which it may exercise. As a result, in England and America, municipalities have only such powers as are specifically enumerated in their charters or are bestowed by general laws. Incorporation is extensively used in the United States to create departments of government to carry on specific enterprises, the government owning all the stock. Examples are the Port Authority of New York and the Tennessee Valley Authority.

In the case of private corporations, it was the practice until about 1860 for legislatures to pass special acts for each private corporation created, and an act constituted the charter of the company in precisely the same manner as in the case of the public or municipal corporation. However, with the growth of the corporate form of business organization, the need of a special enactment for each private corporation burdened legislatures with private bills and led to political abuses. As a result, constitutional or legislative provisions were adopted in nearly all states, providing for the organization of private corporations under general incorporation laws.

Child Labor Legislation. See *Social Legislation.*

Chinese Exclusion. See *Immigration Legislation.*

Citizenship. The relation of an individual to his state, by which he owes obedience and loyalty, and in turn receives protection. The term as now used does not necessarily include the possession of political rights. Thus minors and women are citizens regardless of their right to vote.

In the United States, there is generally a dual citizenship: that of the nation and that of the particular state of which one is a resident. By express provision of the 14th amendment, as well as by the common law, any person born in the United States, of American parentage or of alien parents temporarily resident in the United States and therefore subject to its jurisdiction, is a citizen of the United States. Persons born of American parents on the high seas, or while such parents are temporarily resident abroad, are also citizens by birth. Children of diplomatic representatives of the United States, temporarily resident in a foreign land, are likewise citizens.

Citizenship in two different countries at the same time is technically possible and frequently occurs. Thus the laws of some countries provide that a citizen by birth ever continues to be a citizen of that country and cannot divest himself of allegiance. If such an individual becomes naturalized in another country, both his native country and the country of naturalization may then claim from him the duties of citizenship. Whether he is to be regarded as a citizen of one country or of the other may depend upon whether the question arises within the territory of the old citizenship or the new. See *Naturalization.*

City Government. Frequently spoken of as "municipal government." Legally, a city is an agent created by government for a definite local area, primarily for the satisfaction of local needs. In European countries generally, outside of Great Britain, and in some non-European countries, city government is also the agent of the state for the local administration of national affairs, and the chief executive of the city is responsible not only to the city government for the conduct of its interests, but also to the national government, whose agent he is. See *France.*

Municipal Authority. In Europe, city governments seldom enjoy autonomy or complete "home rule" but are subjected to supervision from higher branches of administration. This supervision usually applies to such matters as approval of municipal budgets, the granting of franchises and particularly to the exercise of the police power wherein the city is regarded as an agent of the state, discharging state functions. In Great Britain, and to an even larger degree in the United States, city governments are autonomous, free to vote moneys, incur indebtedness, grant public franchises, and engage in municipal undertakings without superior administrative sanction or direction. It is a fundamental principle, however, of British and also of American law that a city government has no inherent or "implied powers" but can legally undertake only those activities enumerated in its charter or sanctioned by general laws. (See *Charter.*) In Great Britain, city government powers are altered or enlarged by acts of Parliament in what are called "private bills."

In Great Britain and in the United States, the courts may be invoked to restrain a city government from undertaking activities not specifically granted by law. In the countries of continental Europe, the range of the activities of municipalities is not exactly fixed by law; but a city, subject to superior administrative approval, is presumed to be competent to assume any undertaking for the better satisfaction of local needs.

In the United States and likewise in Great Britain, city government is usually confined to urban areas where the population is sufficiently dense to require that service which cities are organized to supply. The public needs of rural regions are taken care of by county government, the jurisdiction of which extends also over the cities. This leads to a certain duplication of public service within American cities, and, in a few instances, notably San Francisco, California, it has led to the creation of a special combined "city and county government." In continental Europe, usually all national territory is embraced within the jurisdiction of "city governments" as is the case with the communes of France and Belgium. The same principle applies in Spanish America, where a "municipio" is the center of government not only for an urban community but for an extensive rural community surrounding the city or town.

State Control. In the United States, originally, state legislatures possessed complete power over city governments and could alter their charters at any time or subject them to special laws and administration. Abuse of this legislative power led to constitutional limitations upon state legislatures, forbidding them to pass special laws affecting municipalities. Furthermore, in a number of American states the freeholders or citizens of a city are permitted to frame and to adopt a special charter embodying their own choice of the principles of municipal government, and this charter, when ratified by the legislature, becomes the legal basis of city government.

City Planning. The orderly laying out of a city into industrial, mercantile, and residential sections, and the organization of its streets, parks, and public buildings, so as to obtain the maximum of beauty, health, and convenience, and to provide for adequate and orderly development. Washington, D. C., is an excellent example of the construction of a city in accordance with a spacious and artistic municipal plan.

Certain European cities, as Paris and Vienna, are examples of the highest order of city planning, carried out at great expense, with the demolition of ancient walls and buildings to make way for spacious boulevards, radiating streets, public parks, and buildings.

The American plan of laying out a city in squares, with streets at right angles, the so-called "checkerboard plan," seems to have originated with the laying out of Philadelphia by William Penn. The plan has certain defects. One is that it requires all traffic to proceed by two sides of a triangle rather than by a direct line. Many cities have therefore introduced radial avenues, converging at important points of the city. Another difficulty is that the rectangular plan gives little opportunity for the favorable location of public buildings where such imposing monuments may appear in a long vista. American cities generally have grown up through the inadequate planning of private individuals, and incalculable loss has resulted from the persistence of narrow and inadequate streets, from improperly located quarters, and from the destruction of elements of natural beauty. To repair these mistakes, many hundreds of cities have drawn up schemes for city and regional planning. The requirements of motor and air travel are usually given a large share of attention. See *Zoning Ordinances.*

Spain and all American countries of Spanish inheritance exhibit a type of city planning derived directly from Roman cities. The center of city life is one or more squares or "plazas" on which front churches, public buildings, markets, and schools. From these plazas, streets radiate at right angles. The influence of this type of planning may be seen in many cities founded by Spanish colonists in the western United States.

Civic Center. The more important buildings of a municipality grouped together within an area conveniently accessible from all parts of the city form a civic center. By such grouping, an impressive architectural scheme is made possible and the transaction of public business is facilitated. See *City Planning.*

Civil Rights and Liberties. Civil rights are those explicitly conferred upon the citizens, subjects, or residents of a state by positive law, the enjoyment of such rights being secured by action of the state itself. They differ from so-called "natural rights," a much disputed body of so-called rights and privileges supposed to be ordained for man's enjoyment by divine law or by natural law or deducible by reason. So-called natural rights are purely theoretical and have no support or sanction except in the conscience and good will of individuals. While they form a large field for philosophical or ethical discussion, they have an interest for the political scientist mainly because of their influence upon revolutionary or reform movements, or after their principles are adopted in positive laws.

Growth of Modern Rights. As a matter of fact, civil rights as they exist in the Western world have been defined mainly by actual struggles of governed peoples for greater freedom against arbitrary authority, and they represent practical achievements in this direction. (See *Bill of Rights.*) The original home of most civil rights recognized in modern law was England; thence these liberties were carried to America by English colonists and there received an expansion and an emphasis through the American Revolution. From the United States these ideas were carried to France and there, by the French Revolution, were restated in the form in which they have been communicated to most peoples of the world. The American conception of civil rights may be found summarized in the amendments to the Constitution, articles I to IX inclusive, and articles XIII and XIV. To these may be added article XIX, which confers upon both sexes the political right to vote.

Political rights, which are usually enjoyed only by citizens, may be distinguished from civil rights, which it is the ideal of modern jurisprudence to bestow uniformly upon all residents within the sovereignty of a state. Political rights include, among others, voting in public elections, holding office, service in the armed forces, service upon juries, etc. By way of punishment, a citizen may be deprived of political rights without affecting his title to civil rights.

Civil Liberty in America. The United States has undoubtedly given a wider legal protection, particularly to the rights of property, than has any other country of the world. The Constitution, furthermore, has made these rights inviolable, not only by executive officers, but even by Congress or by legislatures. This condition has come

about through the supremacy of constitutional law over national or state legislation and through the practice of the courts, and particularly of the supreme court of the United States, in refusing to enforce statutes judged to be at variance with the Constitution. A vast body of judicial decisions defining and protecting civil rights has been developed by the courts of the United States and of the states.

Civil Service. This term includes, in its broadest sense, all positions under the government, Federal, state, and municipal, outside of the army and navy. Commonly, however, it is limited to administrative or executive positions, particularly to those that are appointed and are protected by legal safeguards against demotion or dismissal.

Beginning with the inauguration of President Jackson in 1829, for many decades the public service in the United States suffered from the carrying out of certain so-called "democratic" theories of government. The first of these was that public administration was not an expert function, but could be fitly discharged by any citizen, even though inexperienced and untrained. The second was the theory of "rotation in office," which demanded the frequent transfer of public position from one individual to another, on the theory that the right to hold office should be enjoyed by the largest possible number of citizens. It was further supposed that continuous employment led to neglect, indifference, and discourtesy on the part of public officials.

Civil Service Reform. These generally accepted political views, to which was added also the theory of "spoils" (See *Spoils System.*), long deprived American government of an efficient body of public servants and resulted in a loss of efficiency and in the corruption of politics. An office-seeking class grew up, whose purpose was to control politics, national and state, for the purpose of securing office and using its power for private advantage. This experience, while discreditable to American politics, nevertheless prevented the development in this country of an overbearing or autocratic official class. (See *Bureaucracy.*) After the Civil War, active effort was begun to secure "civil service reform," or the placing of employment under the national government upon a "merit basis," open to all candidates, irrespective of party or religious affiliation. This movement was emphasized by the deplorable assassination in 1881 of President Garfield by a disappointed office seeker.

The act of 1883 grouped Federal employees into three classes: (1) classified or competitive; (2) unclassified; (3) excepted and noncompetitive. The classified or competitive positions were to be filled by examinations under the direction of a "civil service commission" of three members appointed by the president with the approval of the Senate. Preference was given to persons "honorably discharged from military or naval service by reason of disability, wounds, or sickness incurred in the line of duty." Furthermore, a person holding a position in the competitive or classified civil service could not be dismissed without first being notified of the charges against him and given an opportunity to reply in writing. Since the enactment of this law, the class of competitive positions has steadily increased, and the proportion of unclassified and noncompetitive positions has diminished. Statutes similar to the act of Congress have been adopted in certain states, and similar provisions have been made by numerous cities.

Classified. Confidential government information which for reasons of national security cannot be divulged except to authorized persons.

Closure (*klō'zhûr*) **Rule.** A method used in parliamentary bodies to close debate upon a bill or proposal, by moving "the previous question." The motion is made "that the question be now put"; and, in the event that this motion carries, the matter under discussion is immediately put to vote, without further debate. The term has its origin in the *clôture* (*klō'tür'*) of the French Parliament.

In the British House of Commons, a modified form of the closure was adopted in 1882. The United States Senate is one of the few great legislative bodies which long refused to incorporate the closure in its rules of procedure. A minority in that body, by occupying the floor in continuous discussion and maneuvering, was, and still is, able to delay the passage of a bill until the emergency disappears, or the session comes to a close. This procedure is called "filibustering." In March 1917, the Senate adopted a closure rule, which somewhat controls filibustering. On the other hand, the absence of the closure rule prevents the majority from imposing a "gag rule" on the minority and permits a freedom of debate.

Coalition. An alliance of persons, parties, or states. The term coalition has been used repeatedly in European history to designate a league of states for offensive or defensive purposes.

Its more common use at the present time refers to the union of parties and to a government built upon such a coalition. The necessity for "coalition governments" arises in many countries through the fact that in their legislatures there are a number of parties or groups, and no one party possesses sufficient strength to form a government that will command the support of a majority of the legislature; hence an alliance or coalition of party elements is indispensable to the formation of a government.

During the World Wars, in order to present a united front for the prosecution of the war and to utilize, without distinction of party, the best statesmanship available, in most of the belligerent countries a party truce was declared and a coalition government was formed.

Cold War. A conflict between nations which does not involve the use of armed forces in combat, but is conducted by means of political and economic pressure and propaganda; a war of nerves.

Collectivism. A theory of economic and social organization in which all "productive capital" would belong to the community, and the share of each individual would be determined by the value or social utility of his contribution to the social income. Collectivism is practically synonymous with the generally accepted concept of socialism. See *Socialism* and *Bolshevism.*

Commission Government. A type of administration widely used in Great Britain and in America, whereby executive and sometimes legislative and judicial or quasi judicial functions are intrusted to a number of individuals forming a board or "college." The theory of commission government is that responsibility for all decisions and directive action rests in the group, not in any one individual, and that all members of the group are officials with expert knowledge, presumably giving their entire time to the service of the office. In these respects, commissions differ from boards, which, in the United States, are frequently used as the legal governing bodies of institutions and are composed of laymen managing the public business through an executive appointed by and responsible to the board. Where, as frequently happens, a commission is given an ordinance or legislative power or the power of judicial review, such government represents an abandonment of the popular theory of "separation of powers."

Well-known types of commission government in England are the admiralty lords, who administer the British navy, and formerly the lords of the treasury, although this commission has now become obsolete and its functions are exclusively exercised by another official, the chancellor of the exchequer. In the United States, the Interstate Commerce Commission, the Civil Service Commission, and public utility commissions in several states represent commission government. One of the most notable instances was the Philippine commission of 1900-1907, which was vested, first by the president and subsequently by Congress, with the powers of governing and legislating for the Philippine Islands. In 1901, following the flood which destroyed the city of Galveston, Texas, the government of that municipality was intrusted to a commission of five citizens. The success of this experiment led to the general adoption in the United States of the so-called "commission plan of city government." See *Commission Form of Government*, page 1418c.

At times, in British and in American practice, an executive office ordinarily consigned to a single minister or public official may be intrusted to a group, in which case the office is said to be "placed in commission." Such a body created for one single purpose, either temporary or permanent, is in English practice described as an "*ad hoc* commission."

Common Law. The body of rules, principles, and forms of judicial proceedings which, while not enacted in statutes, have been immemorially recognized and enforced by the courts of England and by the courts of those countries which inherited their systems of jurisprudence from England. Thus it is distinguished from "statute law" or enactments of Parliament or state legislatures.

The common law is frequently used to mean English law, as distinguished from Roman or "civil law," which was revived and put into force on the continent of Europe at the beginning of the Renaissance period. In England, by reason of the king's courts, the common law at that time was making such progress as successfully to hold the field against the Roman law revival.

In some American states, only those principles and rules of the common law which were recognized before the 4th year of James I, when Virginia was settled, are regarded as having been carried over to this country; but in most states the common law, together with certain fundamental statutes, as it existed at the time of the American Revolution, is regarded as forming a part of the law of such states.

Communism (*kŏm'ū-nĭz'm*). A system of social and economic organization in which property is owned by the state or group, to be shared in common or to be distributed among members of the community equally or in proportion to their respective needs. In communism, there is practically a complete abolition of the notion of private property; the property of each is truly the property of all. Thus communism goes much further than either collectivism or socialism, which proposes to bring all "productive capital," such as land, factories, mines, and railways, under public ownership. See *Bolshevism.*

Communism as thus described has been tried by small communities in Europe and America, but with little permanent success. The term has now become appropriated to the Bolshevist Marxian Socialism as developed in Soviet Russia by Lenin, Trotsky, and Stalin, and the political parties affiliated with it in other countries. See *Bolshevism.*

Concert of Powers. An understanding between the major European states for the enforcement of treaty provisions, for the maintenance of peace, for the control of minor states and peoples within the European system, and for the solution of Near Eastern problems. The concert may be said to have arisen about 1828. The "Great Powers" whose agreement gave force to its decisions were, at the time of its origin, Great Britain, France, Russia, Austria, and Prussia.

The concert was broken in 1854 by the Crimean war, and again in 1871. The most imposing exhibition of the concert was the Congress of Berlin of 1878, which composed the affairs of the Balkans and the Ottoman empire, reaffirming the sovereignty of Turkey in European possessions. Its arrangements gave Europe peace for an entire generation, and were not broken until 1908, when Austria-Hungary annexed Bosnia and Herzegovina. The concert was destroyed by the outbreak of World War I in 1914.

Congressional Record. The Constitution, Article I, Section 5, states, "Each house shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may, in their judgment, require secrecy." The proceedings of the House and Senate are published daily when Congress is in session in the *Congressional Record,* which each member is permitted to send free to fifty persons.

Conscription. The compulsory enrollment of citizens or inhabitants of a country for filling its military forces. Also called "the draft" or "compulsory military service."

While compulsory military service is of ancient date, the French Revolution initiated the plan of commanding the entire man power of the nation for national defense. The National Assembly in 1792 decreed the *levée en masse.* While this hurried assembling of untrained men proved ineffective, it led to the practice of vast drafts upon the able-bodied men of the nation for the Napoleonic wars.

European Systems. The system of compulsory training of all able-bodied young men originated in Prussia, after the overwhelming defeat of that country by Napoleon in 1806. Napoleon limited the standing army of Prussia to a force numerically ineffective. Prussia met this condition by the brief but thorough training of this limited number of men and by their prompt retirement into a reserve, which could be "mobilized" or called to the colors at any crisis and would thereby many times augment the limited standing army. Out of this incident have come the modern systems of compulsory training which, before the World Wars, had been adopted by most European countries and Japan.

In Germany, the system was carried out in the most thorough way. Theoretically, all men were trained for appropriate duty in time of war and were classified into several categories: those undergoing active training; those in a first reserve, to be immediately mobilized on the threat of war, each man joining an assigned battalion or other unit; a *landswehr,* or second reserve, of older and less active men; and finally a *landsturm,* composed of men in middle life no longer judged capable of front line duty, but serviceable for duty on lines of communication, for garrison duty, and for home guards. Great Britain had at times practiced unsystematic "impressment" of men for the army and navy, depending generally on voluntary enlistment. World War I forced her to the Conscription act of 1916. Peacetime conscription was begun in May 1939, and there was rigorous conscription in World War II.

American Conscription. The United States has three times resorted to conscription and involuntary enlistment. During the Civil War, the Northern states, in 1862, the Southern states earlier, adopted compulsory enlistment. On the entrance of the United States into World War I in April 1917, a selective draft act was passed by Congress which required the enrollment for military duty of all men between 21 and 31, the act being subsequently extended to include all men between 18 and 45. From these a selective draft was made for active service. September 16, 1940, the Selective Training and Service Act authorized the first peacetime draft in American history. It provided for the induction of males between 21 and 36 to be trained for one year for national defense in the Western hemisphere. By later enactment the time and area of service were extended. Men from 20 (later 18) to 65 were required to register, and men up to 45 were liable to induction, except certain officials and clergymen. But men in certain key industries, men with dependents, or physically disabled, might be deferred. Provision was made for conscientious objectors. The selection was made by local boards on the basis of a lottery conducted after the first registration, and contested cases might be taken to appeal boards. Provision was made for dependents of men inducted. In June 1948 the Selective Service act was revived.

Conservation. The term applied to the policy of government regulation of the use and development of the natural resources of the country so as to prevent their rapid and wasteful exhaustion by private ownership. Conservation further aims to provide a systematic development of such resources in the interests of the general public and for the benefit of later generations. See *Public Lands Policy.*

Constitution. A constitution is a fundamental or "organic law," upon which the government of a nation rests. To be theoretically complete, a constitution should provide a structure of government; an enumeration of civil rights and liberties (See *Civil Rights and Liberties.*); and a provision for its own amendment. The amending provision has special significance, since it may be assumed to disclose the sovereign power within the state; for that power which is above the constitution, and which may alter or repeal it, may fairly be regarded as the "legal sovereign."

The modern practice of adopting "written" or "rigid" constitutions as a basis for national or state government is of American origin and is one of the political achievements of this country which has been generally borrowed the world over. The earliest constitutions of this typical form were those adopted by the American states, when, by the Declaration of Independence in 1776, they ceased to be colonies of Great Britain. These were followed in 1789 by the Constitution of the United States. (See *Constitution of the U. S.,* page 1395.) Nearly every government in the world today rests upon a written constitution, either granted by a monarch or framed by a national convention.

Great Britain has what is called an "unwritten constitution," in that a large part of it is not in written or statute form, but is a matter of practice. Furthermore, the various statutes underlying the government of the realm have never been codified or unified in a single document; also, it is a fundamental principle of the English constitution that it can be changed in any respect by a simple act of Parliament. In this sense, no act of Parliament is more fundamental or organic than any other. (See page 1432d.) This character gives to the British constitution a flexibility not possessed by that of the United States.

The period of active constitution-making in Europe began with the French Revolution, when numerous constitutions were devised, many of them on highly theoretical lines, and a number successively put into operation. From Europe, the revolutionary movement passed back to the Spanish colonies of America, where an active process of constitution-making arose, greatly influenced by the constitutional forms of the United States.

Following the revolution of 1848, European countries generally attained constitutions or fundamental laws limiting monarchical power and increasing the political participation of the people. A new and extremely active period of constitution-making followed the end of World War I in 1918, when many new states came into existence and when older constitutions were subjected to radical revision.

Consul. A representative of a government in a foreign country, particularly for commercial purposes and for the aid and protection of its citizens abroad. The duties of a consul include the making of reports on commercial conditions in the country to which he is assigned, various services in connection with the landing of vessels at foreign ports, the relief and protection of citizens of his country in times of distress or disturbance, and other duties, even including those of a diplomatic character in the absence of an ambassador or a minister.

For the judicial functions exercised by consuls, see *Extraterritoriality.*

Contraband. Primarily, articles sent from a neutral to a belligerent country in time of war for military and naval use. Under generally recognized laws of war, such merchandise may be seized and confiscated if taken upon the high seas or within enemy territory. Ordinarily, confiscation follows the judgment of a prize court, in which the neutral owner may have the right to appear and to defend his title and interest. Formerly, the list of articles generally recognized as contraband was limited, and embraced mainly arms and military supplies. World War I, however, so completely engaged the entire resources of the belligerent nations that it led to a great expansion of the list of contraband goods. At present it would be difficult to say what is not contraband in time of war.

Convention, Political. A gathering of party adherents or delegates for the purpose of selecting candidates for public office, for declaring their body of political principles or "platform," and for organizing party administration.

Political conventions were a relatively late development of American democracy. In the early decades of the Union, candidates were nominated in various ways, a caucus of members of the same party in Congress usually choosing the national candidates. After 1832, the national political convention became the accepted method of nominating candidates for president and vice president.

In the states, it was formerly the universal practice to hold not only state conventions for nominating candidates

for state offices, but county conventions and local primaries. The place of these conventions in American political life has been greatly reduced in recent years by primary election laws. The national party convention, however, meeting once in four years, shortly preceding the presidential election, continues to be a political institution of first importance, although almost entirely unrecognized by Federal laws. Each party, by its own rules, determines how delegates shall be chosen and how the business of the conventions shall be conducted. Election as a delegate to a national convention is an eagerly sought distinction, and, preceding and during the days of their meeting, such conventions overshadow other matters of national interest. The greater part of the time during which a national convention meets is usually devoted to the nomination of, and the successive ballotings for, candidates for the presidency and the vice presidency. This is accomplished by a majority vote of all delegates present. The Democratic party adopted this rule in 1936 after having, since the party's origin in 1832, required a two-thirds vote for nomination.

Besides nominating its presidential candidates, the convention adopts a party platform and, before adjournment, chooses the national committee, made up of one representative from the party organization in each state. The national committee has great power over the organization in the period between conventions and can usually influence in a measure the proceedings of the following convention.

Corporate State. A term applied to such governments as those established by the Fascists in Italy and the Nazi party in Germany. Totalitarian is sometimes used as a synonym. The idea behind the word is that the nation consists of one class, or body (Latin *corpus*, "body"), and not two classes, the workers and exploiters, as the Marxian Socialists contend. Implied in the word also is the absence of political parties, all those except the ruling one being suppressed.

Corrupt Practices Legislation. The extension of the democratic franchise has induced nearly all countries to adopt laws safeguarding voting at primaries and elections. In the United States, these laws frequently prohibit contributions by corporations to political campaign funds. Other laws limit the expenditures of the candidates.

Court Martial. See *Military Law*.

Creed, The American's. Written by William Tyler Page, Clerk of the U. S. House of Representatives, in 1917, and adopted and promulgated by the Government's Committee on Publication. Accepted by the House of Representatives, on behalf of the American people, April 3, 1918.

"I believe in the United States of America, as a government of the people, by the people, for the people; whose just powers are derived from the consent of the governed; a democracy in a republic; a sovereign Nation of many sovereign States; a perfect union, one and inseparable, established upon those principles of freedom, equality, justice and humanity for which American patriots sacrificed their lives and fortunes.

"I therefore believe it is my duty to my country to love it; to support its Constitution; to obey its laws; to respect its flag; and to defend it against all enemies."

De Facto Government. A government which is actually exercising governing power in a particular territory, irrespective of its legal authority. *De facto* government is distinguished from *de jure* government, the latter being a government which exists by legal right or by international recognition.

Democracy. Democracy signifies popular government. It has been happily defined in Lincoln's phrase, "government of the people, by the people, and for the people." It is distinguished from monarchy, in which the head of the state is a king or prince, and from aristocracy, or government by a privileged or superior group.

None of these words is used with entire consistency or exactness in political writings. By democracy is sometimes meant direct popular government rather than government by chosen representatives, and a distinction is then drawn between a democracy and a republic. At the present day, republics generally are democracies, and so are numerous countries having the form of monarchies.

The word democracy is used also to indicate not only a government which is immediately or ultimately controlled by popular opinion or by the majority of the people, but also one in which society is distinguished by an absence of privileged and aristocratic classes. The theory of democracy rests upon an assertion of the worth of the ordinary man and woman and upon a confidence in the good judgment and moral rectitude of common people; upon the belief that if unwise or wrong action prevails for a time, in the long run the common sense of the bulk of society will recognize and correct the evil. Democracy further rests upon the conviction that the interests of all classes are better served when they are politically controlled by all classes rather than by a single class, even though it be superior in intelligence. Democracy is likewise of value for its educative effect, intelligence and prudence being developed by the sense of responsibility and by sharing political control.

Diplomatic Representation. Diplomacy is the art and the practice of international negotiation. In the early history of Europe, such negotiations were intrusted to special heralds, ambassadors, or missions. The system of keeping diplomatic representatives resident in the important countries with which they had friendly relations was first practiced by the Italian city-states and particularly by Venice.

Such representatives are of different ranks; by the Treaty of Aix la Chapelle, 1818, they were classified in the following four grades: (1) ambassadors, including papal legates and *nuncios*; (2) envoys extraordinary and ministers accredited directly to the sovereign; (3) ministers resident; (4) chargés d'affaires. The first three grades are accredited to the head of the state; the fourth, to the minister having charge of foreign relations. Consuls, when charged with a diplomatic mission, rank with the chargés d'affaires.

Embassies. "Embassies" are established between nations whose mutual interests are of the highest importance; elsewhere the diplomatic office is usually a "legation."

In 1949 the United States had embassies to 51 countries. These states, also maintaining embassies at Washington, were as follows; Afghanistan, Argentina, Australia, Belgium, Bolivia, Brazil, Burma, Canada, Ceylon, Chile, China, Colombia, Costa Rica, Cuba, Czechoslovakia, Denmark, the Dominican Republic, Ecuador, Egypt, France, Great Britain, Greece, Guatemala, Haiti, Honduras, India, Iran, Iraq, Israel, Italy, Mexico, the Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Panama, Paraguay, Peru, the Philippine Republic, Poland, Portugal, Russia, Salvador, Siam (Thai), Spain, Sweden, Turkey, Uruguay, Venezuela, and Yugoslavia. Ministers were accredited to Austria, Bulgaria, Eire, Ethiopia, Finland, Hungary, Iceland, Lebanon, Liberia, Luxembourg, Nepal, Rumania, Saudi Arabia, South Africa, Switzerland, Syria, and Yemen. The legations in Estonia, Latvia, and Lithuania were closed, as were others in enemy and occupied countries. In some cases we were represented by missions, or political advisors of the military commanders. In Korea we had a special representative; in Liechtenstein, Morocco, and Palestine, consuls-general.

The terms "embassy" and "legation" are used also for the residence or buildings of the minister and the staff. The official residence of an ambassador is known as an "embassy;" that of a minister, as a "legation." It is customary for countries to own such buildings and to equip them for permanent occupancy and for the hospitality that is inseparable from effective representation abroad.

Diplomatic Credentials and Privileges. A diplomatic agent is usually accompanied by an official suite which may include counselors, secretaries, attachés from the army or navy, commercial attachés, interpreters, etc. A diplomatic representative carries a recommendation called a "letter of credence" and also, usually, a "letter of instructions" conferring full powers for the closing and the signing of a treaty, and a special passport. On arrival in the country to which he is accredited, he is accorded an official reception by the head of the state, if he is ranking in one of the first three classifications, and by the foreign minister if he is a chargé d'affaires.

A diplomatic representative is accorded certain immunities and privileges which extend to the members of the household and suite. These include inviolability of his person and residence,—an assault committed upon him is an injury to his nation and must be correspondingly compensated for (See *Extraterritoriality.*);—exemption from local jurisdiction; and exemption from the payment of taxes upon his personal property or official residence. From the immunity of a diplomatic representative has arisen the "right of asylum" or of taking shelter in a legation.

It is a general principle that a diplomatic representative must be acceptable to the state to which he is sent, or, if his conduct becomes objectionable, that he may be sent home. This is usually done by the formality of furnishing passports. (See *Persona Non Grata.*) Diplomatic relationship is always terminated on the outbreak of war, and it may also be broken off as a protest threatening war.

The act of accrediting a diplomatic representative to a government is equivalent to recognition of that government, so that, where recognition is withheld, countries intrust the preservation of their interests to a representative of lower grade than an ambassador or minister or to a personal representative. See *Personal Representative.*

Direct Legislation. A term used to describe the enactment of law by popular vote rather than by representative legislative bodies. Direct legislation has been frequently practiced by local communities, from the Greek cities down to New England town meetings. In certain of the Swiss cantons, it still exists in the form of popular meetings for legislative enactments. It was in Switzerland also that the modern method of direct legislation by organized balloting arose. Thence, in the form of the popular proposal of laws (initiative) and the popular ratification or rejection of laws

(referendum), the institutions of direct legislation have spread to other countries and particularly to the United States.

In another form, however, direct legislation in America is older than in Switzerland, that is, in the direct vote of the people upon constitutional or organic laws, which originated in Massachusetts in 1780.

Due Process of Law. The Federal Constitution, in both the 5th and 14th amendments, and all state constitutions, contain provisions protecting the individual against the deprivation of "life, liberty, or property without due process of law."

The due process clause of the 5th amendment operates as a limitation upon the action of the Federal government only. But the similar provision, which was added to the Constitution by the 14th amendment in 1869, expressly protects every American citizen against the unlawful infringement of his life, liberty, or property by the action of any state. The latter provision of the Federal Constitution, although originally intended as a means of safeguarding the independent status of the Negro, has been construed by the courts as operating to the benefit of every citizen of the United States whatever his race or color. This clause has been the basis upon which the supreme court of the United States has declared unconstitutional numerous acts of state legislatures, particularly laws limiting freedom of contract.

Fundamentally, due process of law is merely that judicial procedure "which hears before it condemns, which proceeds upon inquiry, and renders judgment only after trial." As developed by the courts, however, the phrase has come to have a broader significance. It appears to signify the protection under the law of every individual against arbitrary and unreasonable acts of the executive and legislative branches of the government.

Elder Statesman. A retired statesman who because of his experience in public affairs is sometimes called upon to give unofficial advice on current issues, especially to government officials.

Electors, Presidential. The framers of the Constitution of the United States believed that the direct popular election of the president was both impractical and undesirable. They therefore provided for an indirect election of the president and the vice president by special electors, who were intended to be a select body of individuals possessing a broader acquaintance with men and a better understanding of national issues than the ordinary voter. The Constitution provides that each state shall appoint "in such manner as the legislature thereof may direct" a number of electors equal to the state's quota of senators and representatives in Congress.

The electors chosen in the manner provided by each state legislature were thereafter to meet in their respective states and to cast their ballots for two persons. Since the adoption of the 12th amendment, in 1804, each elector is required to designate his choice for president and for vice president. Electors meet in each state on the first Monday after the second Wednesday in December to cast their ballots. The vote thus taken is transmitted to the president of the Senate, who, on January 6 in the presence of both houses of Congress, opens the certificates and counts the ballots from all states.

The choice of the president and the vice president by electors as thus provided has become a mere form. Since 1800, the electors have exercised no individual judgment, but have followed the dictates of the parties to which they have belonged. Electors are expected, as a matter of course, to cast their ballots for the regular party nominees although they are not legally required to do so. A vote for a particular elector is in effect a vote for the party's nominees. In some states, however, the names of the party nominees with or without electors' names appear on the ballot.

Embargo. An order or act of a country, prohibiting vessels or merchandise from leaving its ports. The purpose of an embargo, ordinarily, is to injure another country by depriving it of its usual commerce. Where the embargo applies only to the vessels or goods of a country's own citizens, it is a "civil embargo." Where the prohibition applies also to the vessels of a foreign state against whom the embargo is particularly directed, it is a "hostile embargo." Where the embargo applies to the vessels and goods of all nations found within the ports of a country, it is an "international embargo."

Eminent Domain. The pre-eminent right of the sovereign to all of the property within its jurisdiction, by virtue of which it may appropriate any of such property, howsoever owned, to public uses. A limitation upon this right, fixed or implied in all constitutional governments and expressly incorporated in the Constitution of the United States and in the constitutions of all of the states, is that private property shall not be taken for public use without compensation.

Among the public uses for which the power of eminent domain is most frequently exercised are the creation of streets, parks, forts, docks, and public buildings. The right may be delegated by the state to public service corporations, such as railroads, telephone and telegraph companies, or corporations serving the public with water, gas, electricity, and similar utilities, which are regarded as quasi governmental functions.

Expatriation. See *Naturalization.*

Export Tax. The Constitution of the United States (Article I, Section 9) provides that "no tax or duty shall be laid upon articles exported from any state." This limitation upon the Federal government does not deprive it of the power of declaring an embargo or of otherwise regulating exports, nor does it deprive Congress of the power of imposing a tax on income derived from exports. Trade between the United States and its insular possessions, such as the Philippines, the Hawaiian islands, and Puerto Rico, has been held not to be foreign commerce; but a tax laid by Congress upon such trade is not prohibited by this section of the Constitution.

The Constitution (Article I, Section 10) also prohibits the states from levying any duties on exports or imports, except such as are necessary for the execution of its inspection laws, and then only subject to the control of Congress. The effect of this provision has been to deter the states entirely from such legislation and to maintain complete free trade between states of the Union.

Ex Post Facto Law. Retroactive legislation which makes punishable an act which was lawful when committed or imposes for an unlawful act a more severe punishment than was provided by law at the time the act was committed, or otherwise retroactively affects, to his material disadvantage, the position of one accused of a crime.

The Constitution of the United States forbids both the Federal government and the governments of the states from passing any *ex post facto* legislation.

Extradition. The surrender of a fugitive from justice by one country or state to the authorities of another. Nearly all civilized countries have entered into treaties with one another providing for the extradition of persons who have committed specified crimes in one country and have then fled to another. Common limitations in these treaties are that the duty of a nation to surrender such a fugitive shall not extend to its own citizens and that persons extradited shall be tried only for the crime specified in the request for extradition. A further limitation which the United States has inserted in its treaties is that it shall not be compelled to give up persons charged with political offenses.

Extradition between nations is effected by a request of the state or foreign office of one nation upon the state or foreign office of the other. The Constitution of the United States contains an express provision requiring every state to extradite, upon demand of another state, any fugitive from justice. (Article IV, Section 2). In extradition among the states of the Union, there are no limitations with respect to the character of the crime or the citizenship of the person whose extradition may be sought. A requisition signed by the governor of the state from which the accused has fled is addressed to the governor of the state in which the accused is found, and, if honored by the latter, the person is surrendered. Not infrequently, however, a governor refuses to surrender an alleged fugitive from justice, on the ground that he will not receive a fair trial in the state where he is indicted. And, although the Constitution is mandatory with respect to delivering up offenders to sister states, the supreme court has refused to compel the extradition of a fugitive whose surrender a governor has denied.

Extraterritoriality (*ĕks'trà-tĕr'ĭ-tō'rĭ-ăl'ĭ-tĭ*). An immunity from its general jurisdiction granted by a state to the representatives or subjects of another state within its own territory. Such immunity extends, by the practices of international law, to sovereigns sojourning in an official capacity in a foreign country. The sovereign and his retinue are exempted from civil and criminal jurisdiction and from police and administrative regulations, as well as from the payment of taxes and from the performance of other duties imposed upon ordinary residents. A similar exemption is accorded by all nations to the diplomatic representatives of other states accredited to them. (See *Diplomatic Representation.*) Any foreign army within the territorial limits of a state, with that state's permission, is free from its jurisdiction, and, when a foreign vessel of war, without inconvenience to a state, enters or remains within its maritime jurisdiction, the vessel and the crew are ordinarily accorded an immunity from local jurisdiction.

Extraterritoriality may have, furthermore, a much wider scope. It was customary for European nations, in negotiating treaties of commerce with Oriental countries and in arranging for the residence of their citizens within these countries, to obtain for their citizens rights of extraterritoriality. By these treaties, foreign citizens are triable, not by the courts of the country in which they reside and travel, but by courts of their own government, usually of a consular character.

In Japan, the right of consular jurisdiction, with other privileges for American citizens, was obtained in the

treaty negotiated by Commodore Perry in 1858. This action was followed by similar concessions to other Western nations. Following the reorganization of Japan, that country zealously sought the abolition of these extraterritorial rights, which were properly considered prejudicial to her sovereignty, and, after the modernization of her courts and codes of law, extraterritoriality was relinquished by all foreign states from July 1899. Similar rights existed in China, where the United States in 1906 created the "United States Court of China," with jurisdiction over its own nationals. Great Britain had a similar court, established in 1865. In 1943 these countries relinquished their extraterritorial rights by treaties, and Sweden and Belgium took similar action.

Favored Nation Clause. A provision found in treaties between practically all modern countries. It assures to the citizens of a foreign state all such privileges within the territory of another state as may at any time be accorded to the citizens of the "most favored nation."

Favorite Son. A person who is politically popular in a particular locality, large or small. Local candidates who have the backing of their state delegations at presidential nominating conventions are known as favorite sons. The vote for them is usually complimentary, but there is always the hope that in case of a deadlock the favorite son will be chosen.

Federalism. A system of government wherein the political powers of the state are constitutionally distributed between the national government and the local governments of member units which are called "states," "provinces," "cantons," etc. Federal government is distinguished from "unitary" or "centralized" government. In centralized government, the whole authority is vested in the central or national structure; local governments have no constitutional independence or autonomy, but are vested with functions by act of the central government itself and are subordinate to the central government.

The term federal refers to the government, not to the "state." It is politically incorrect to speak of a "federal state," or of a "divided sovereignty" in the state, since sovereignty, by its philosophical conception, is divisible.

A federal government or a "federation" differs from a "confederacy" or a "confederation" in that it is actually the government of a sovereign state, whereas a confederation is a union of states in which sovereignty or state independence resides in the member states themselves. The one is a "perfect union;" the other, a league. In a confederation, the member states reserve the power of withdrawing from the union, and their consent must be implied or assumed to actions taken by the confederate government. A federal government is an "indissoluble union" which can be disrupted only by successful rebellion or revolution. The authority of the government in a federation is direct upon the citizens of all member units, and allegiance is primarily to the federal union and secondarily to the member units.

The United States of America is the first federation in the modern sense. Its success is attested by its long history and by the development of other federations, largely inspired by the American Union. See *Argentina, Australia, Brazil, Canada, Mexico, Switzerland, Union of South Africa, Venezuela.*

A federal government usually arises out of the union of previously independent states or governments and the creation of a new national government through this union. The act of union preserves as separate local governments the unit members of which have merged. Usually the powers bestowed upon the federal government are specified and enumerated, all others being reserved to the states or provinces. In the case of the Canadian federation, however, the reverse principle holds, where the provinces have enumerated powers.

The federal principle has been applied also in countries having elements with strong local attachments and presenting differences of type. The chief example is Russia, where autonomy was granted to diverse regions, yet without sacrificing central authority over national policies.

Fellow Traveler. Originally a person who, though not actually a member of the Communist party, was in sympathy with its principles and willing to co-operate with it.

Filibuster. One who engages in an unlawful military expedition into a foreign country. The word is derived from the Spanish *filibustero* which, besides connoting a "freebooter," is used also as a term of contempt for a seditious plotter.

In parliamentary slang, "filibuster" is used to designate measures employed to prolong debate and to prevent a vote. See *Closure Rule.*

Franchise Tax. A tax either upon the privilege or franchise granted by a state to a corporation empowering it to act as a legal body, or upon a special franchise granted to a public-service corporation permitting the use of the public streets or other public places for the business of the corporation.

States cannot impose a tax upon the general franchise of a corporation created by the Federal government. Nor can any state impose upon a corporation, organized under the laws of another state, a tax which is calculated upon the entire capital stock of the corporation, the courts holding that this constitutes an attempt to tax property not within the jurisdiction of the state.

Franking Privilege. A privilege possessed by members of Congress, as well as by members of other branches of the Federal government, of sending official mail free of charge.

Free City. The early states of the Mediterranean and Ægean seas were "city-states." Political life was confined to the urban community; the surrounding land, usually of limited extent, was subordinate and tributary to the city. Such were the ancient Greek states, and such in the beginning was Rome. The development of medieval commerce and manufacture again brought the city to the front, and the Italian cities, such as Venice, Florence, and Genoa, became free and independent states. In the north, the Flemish and Baltic cities, and also those of the Rhineland, attained comparable freedom of government, although nominally each was under the sovereignty of some greater political authority.

These free cities frequently leagued together in a confederacy or "hanse," for mutual protection and defense of commercial rights. The most famous of these associations was the Baltic or Teutonic Hanse, under the head of Lubeck. The development of nationalities broke up these leagues and brought the free cities under national authority. Three,—Lübeck, Bremen, and Hamburg,—retained their freedom as members of the second German Empire. The Treaty of Versailles created two free cities, Danzig and Fiume. Fiume was absorbed by Italy in 1924; Danzig by Germany in 1939. In January 1937, Hamburg became "Hansa City, Hamburg," and Lübeck was annexed to Prussia. See *Hanseatic League* and *Venice and the Hanse.*

Freedom of Contract. Political and economic thought at the close of the 18th century and at the beginning of the 19th century favored the complete freedom of the individual, both to employ labor and to accept employment, without interference from the state or coercive influence of other individuals. Economic teaching held that attempts on the part of public authority to limit industrial or commercial competition interfered with the law of supply and demand and violated fundamental personal rights.

Changed industrial relations and the sufferings and abuses arising from unrestrained competition have revealed the necessity of considerable limitation of the so-called right to freedom of contract. This right, although specifically protected by the United States Constitution, has always been regarded as subject to the "police power"—the regulation or limitation of actions in the interest of the public health, safety, and morals. Much of the social legislation of the 20th century, limiting hours of labor, prescribing working conditions, and fixing minimum wages, has met with the objection that it infringes freedom of contract. In most instances, such legislation has been upheld by the supreme court of the United States as within the police power of the states or the commerce power of the nation.

The conception of the police power has undergone marked extension, and the once unchallenged right to sell one's labor in the dearest market or to hire at wages and terms that take no care for the safety, health, or comfort of the employed has been greatly abridged. Freedom of contract between employer and employed has further been restricted by the growth of labor unions and by the practice of collective bargaining. See *Social Legislation.*

Freedom of Religion. The first amendment to the United States Constitution and similar provisions in state constitutions guarantee freedom of worship as a fundamental right. This right, however, does not permit the individual to engage in practices which are regarded as inimical to the health, morals, or safety of the state.

Thus bigamy may be made a crime and may be punished as such, even though plural marriage be a tenet of a particular faith. A person is not excused from compulsory military service because his religious faith forbids bearing arms. A state may make it a crime for a parent to refuse to obtain medical attention for a child because of religious conviction that bodily ills can be cured only by religion.

Freedom of Speech. Freedom of speech and of the press was one of the established rights of Englishmen; it was transported to America by English colonists and is protected by the United States Constitution.

This right in ordinary times extends to the free criticism of the government itself, and even to advocacy of revolution. Justice Holmes, in the case of *Abrams* vs. *United States*, said:

"We should be eternally vigilant against attempts to check the expression of opinions that we loathe and believe to be fraught with death, unless they so imminently threaten immediate interference with the lawful and pressing

purposes of the law that immediate check is required to save the country."

Picketing and use of handbills in labor disputes have been protected by the supreme court as an exercise of the right of free speech.

The right, however, is not without limitation. Criticism that unduly hinders the government in the performance of its proper functions has been held by the same jurist to be illegal and punishable. "The question in every case is whether the words used are used in such circumstances and are of such a nature as to create a clear and present danger that they will bring about the substantive evils that Congress has a right to prevent. It is a question of proximity and degree. When a nation is at war, many things that might be said in time of peace are such a hindrance to its effort that their utterance will not be endured so long as men fight, and that no court could regard them as protected by any constitutional right." (*Schenck* vs. *United States*).

The historical origin of this guarantee was as one of the moral and legal weapons used in the fight against absolute monarchy. Subsequent events have shown that the right can be maintained only when the existing social and political order is firmly established and felt to be in no danger. For this reason transition stages between contrasting regimes are marked by the suppression of this right.

Free Port. An area at a gateway of foreign trade which a government permits to remain outside tariff walls. Goods may be brought there from abroad without payment of duty, this being levied only when the commodities pass from the free port to other parts of the country.

Advantages include the possibility of avoiding tariff payments in processing materials brought from abroad into commodities to be sold abroad. Free ports make possible also displays of foreign merchandise for inspection of importers, without payment of tariff duty.

The United States Congress in 1933 authorized the establishment of free ports. The first to be set up was in Staten Island at New York, N. Y., where an area of 78 acres is devoted to the purpose.

Free Trade. See *Tariff*.

Functional Representation. A plan for representation in political bodies, based upon occupational or class groups rather than upon territorial units or electoral districts. Functional representation is an old institution, and parliamentary development sprang from the assembling of representatives of the different classes of medieval society. These representatives at first sat in separate bodies and deliberated and voted apart. Constitutional development in western Europe, however, has tended to draw these classes together into single chambers and to obliterate occupational divisions.

In the United States, parties have been composed of people of all walks of life. Neighborhood interests and local and sectional attachments have been the potent influences in stirring people to political activity.

As government has become more and more closely associated with economic controls, however, voters have tended to divide according to their economic interests. This explains the rise of labor parties, Socialist parties, agricultural blocs, and similar political groups that speak for economic classes. The tendency has increased in democratic countries since World War I, but actual elections continue on a local basis, with few exceptions.

The most extreme form of functional representation was found in Fascist Italy, where 22 separate councils combined in the National Council of Corporations each represented workers and employers in one division of industry. Legislation by this body, however, related mainly to industrial questions.

Fusion. A coalition or combination of political parties or groups for the purpose of defeating another party or group; e.g., of Republicans and independent Democrats in New York City against Tammany Hall or of Republicans and Democrats against socialist candidates.

Geopolitics. The application of the study of geographical influences to the determination of political objectives. Based on the geographic studies of Ratzel in Germany and Mackinder in England, it was applied in its German form *Geopolitik* by Haushofer to justify German expansion and to indicate the political and military strategy dictated by geography. It teaches that space and the contents of space determine everything. A central idea is that of the "Heartland" (eastern Europe) and the advantage over maritime empires given its possessors by improvements in air and land transportation.

Gerrymander (*gĕr'ĭ-măn'dēr*). A form of political sharp practice, whereby electoral districts are so laid out that the party in power will possess a majority of votes in as many of them as possible.

The practice has produced districts of very eccentric appearance, one of which, attributed to Governor Gerry of Massachusetts in 1812, being likened to a salamander, was wittily dubbed a "gerrymander"; hence the name.

Government Ownership. This term is usually applied in America to the acquisition and operation, by a state or municipality, of public utilities, such as railroads, street railways or bus lines, telephone and telegraph systems, and gas, water, and electric companies.

The impetus toward public acquisition of such properties usually comes from the belief that companies having a monopoly interest in them are charging excessive rates. Public control of rates is frequently difficult because involving long and expensive litigation. Commissions set up to regulate rates are often felt to adopt a neutral attitude instead of being spokesmen for consumers. In many cases also there is the added fact that the local company is controlled and managed by a holding company subject to the authority of a different state.

A new influence toward public ownership of power properties was introduced in 1933, when the Tennessee Valley Authority was set up as a government corporation. Its policy is to sell power to municipalities owning their own distribution systems and to take measures insuring efficient operation of those systems. Such projects were declared "yardsticks" of power costs. The government lent money at low rates also to many local authorities to build or purchase their own facilities for generation and distribution of power. See *Municipal Ownership*.

Habeas Corpus, Writ of. In English and in American law, a writ issued by a court of justice, commanding the person to whom the writ is directed to bring before the court the body of a person detained or in custody. Failure to appear with the person of a prisoner places an officer in "contempt of court" and makes him liable to the summary imposition, by the court, of fine or other punishment. The court, once the prisoner is brought into its presence, determines whether he is being legally held and may, after due examination, set him at liberty, release him upon bail, or recommit him to prison.

The writ of habeas corpus is an ancient one in English law, antedating Magna Charta. It had the constant support of Parliament against efforts of English kings to set it aside, and was strengthened by repeated legislative acts. It was brought to America by English colonists.

The Constitution of the United States (Article I, Section IX, Par. 2) provides that "the privilege of the writ of habeas corpus shall not be suspended unless, when in cases of rebellion or invasion, the public safety may require it." The weight of learned opinion holds that the suspension of the right must be accomplished by act of Congress; but President Lincoln, during the Civil War, by executive action suspended the privilege over extensive territory. His act was subsequently ratified by Congress. See *Habeas Corpus Act*.

The constitutions of all American states contain provisions safeguarding the privilege of habeas corpus, analogous to the provision of the Federal Constitution. A state court cannot issue a habeas corpus for the discharge of a person held in the custody of the Federal government. Four states—Mass., N. H., R. I., and S. C.—provide in their constitutions that the privilege of the writ may be suspended by the state legislature. (See *Martial Law*.) The writ of habeas corpus has been carried wherever the common law has been established.

Hague Peace Conferences. Two international conferences of modern states have been held that are known by the place of their assembly, the city of The Hague, which is the capital of the Netherlands. The first was proposed by Czar Nicholas II of Russia, and met in 1899 on the invitation of the czar and the queen of the Netherlands. In a circular note of August 12, 1898, issued by the Russian government, the objects of the conference were suggested to be "the maintenance of general peace and a possible reduction of excessive armaments." Twenty-seven states took part in this conference.

Results of First Conference. The deliberations of this conference resulted in three "conventions," three "declarations," and six "resolutions." The first convention was for "pacific settlement of international disputes." This provided for a permanent court of arbitration at The Hague, a permanent administrative council, made up of the diplomatic representatives of the signatory powers to The Hague, and an international bureau, acting under the direction of this council. The second convention dealt provisionally with the laws and customs of warfare on land. The third convention sought to adapt maritime warfare to the principles expressed in the Geneva Convention of August 24, 1864. The declarations sought to prohibit, for a period of five years, the use of projectiles or explosives discharged from balloons; the use of asphyxiating or poisonous gases; and the use of expanding or "dumdum" bullets in warfare.

The second conference was first proposed by President Roosevelt in 1904, but his proposal was withdrawn in order to allow the czar of Russia the privilege of calling the second conference as he had called the first. This met from June 15 to October 18, 1907. The following states, to the number of 44, were represented: Argentine Republic, Austria-

Hungary, Belgium, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Cuba, Denmark, Dominican Republic, Ecuador, France, Germany, Great Britain, Greece, Guatemala, Haiti, Iran, Italy, Japan, Luxemburg, Mexico, Montenegro, Netherlands, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Rumania, Russia, Salvador, Serbia, Siam, Spain, Sweden, Switzerland, Turkey, United States, Uruguay, Venezuela. It will be observed that, with the exception of two Central American states, Costa Rica and Honduras, the two African states of Ethiopia and Liberia, and the Central Asian monarchy of Afghanistan, the representation included practically all states then recognized as independent. Delegates from Korea, which by the Treaty of Portsmouth had recently passed under the control of Japan, failed to secure seats.

Acts of the Second Conference. This conference adopted a series of conventions, the first providing means for the peaceful settlement of international disputes and altering in certain respects the measures proposed by the first conference. The second limited the employment of force for the recovery of duties due from the citizens of one country to the citizens of another, and the third defined the procedure for the opening of hostilities in the event of war; and ten conventions which in a measure modified the laws of war on land and at sea. These conventions and declarations were only in part ratified by the participating nations, different countries excepting from the ratification of different measures.

Inasmuch as it was not contemplated that they would become effective between belligerents unless all belligerents were ratifying parties, the rules which sought to regularize the conditions of war and to mitigate its severities were completely disregarded in the World War. This was particularly noticeable in the case of the conventions forbidding bombardment of unfortified towns by naval forces, the laying of automatic submarine contact mines, the discharge of explosives from air vessels, the use of poisonous gases, and the respect for private property in warfare.

However, the war department of the United States, following this conference, revised its regulations governing the conduct of its armies in the field so as to include the provisions of the Hague Conference, thereby presumably making incumbent upon the officers and men of its own forces compliance with many of these principles. The extreme measures followed by all belligerents in the World War and the development of a public opinion that the severities of warfare cannot be softened without a prolongation of the struggle have probably rendered inapplicable the measures of the Hague Conference in this field.

Hague Tribunal. A standing court of arbitration created by the first Hague Peace Conference. Such a tribunal was proposed at the conference by the representative of the British government. The government of the United States had also specifically instructed its delegates to labor for such a court. In a convention signed at this conference, the nations agreed "to use their best efforts to ensure the pacific settlement of international differences" and, with this object in view, to undertake the organization of a "permanent court of arbitration." By the plan then devised, each signatory state nominates four jurists for a six-year period. These jurists constitute a panel, from which judges may be selected to sit in arbitration.

The first case to be tried before this tribunal was one submitted by the United States and Mexico for the adjustment of a contention that followed the settlement of the Mexican war and was known as the "Pious Fund of the Californias." The award was made October 14, 1902, and was accepted by both governments. Three other awards were made by the Hague Tribunal, before the meeting of the second Hague Conference in 1907. This latter conference made some changes in the organization of the court and provided an alternative procedure called "arbitration by summary procedure." Between 1907 and 1914, twelve cases were submitted to the Hague Tribunal.

The agreements establishing the Hague Tribunal and the system of arbitration thereunder are still in force, at least between nations that have not been at war, and the Permanent Court of Arbitration continues to have a separate existence from the International Court of Justice, also located at The Hague, which in 1945 superseded the World Court which was set up by the League of Nations after World War I.

Home Rule. Local self-government or the administration of home or local affairs in a part of a state by the people of that section. In British history, the phrase refers particularly to autonomous government for Ireland. In American politics, it is used mainly to express municipal autonomy, granted either by placing constitutional limitations upon state legislatures in favor of municipal governments or by a system of authorizing the citizens of a municipality to frame their own charter of government.

Immigration Legislation. Laws designed to exclude, limit, or select immigrants entering one country from a foreign country.

The power of a state to deny admission of a foreigner to its territory is an undoubted right under international law, and has been exercised in all times. Complete exclusion of foreigners and denial of free intercourse with foreign nations has, however, been treated as an act of unfriendly or hostile character, and against it nations have applied forceful methods. In this manner the foreign exclusion policy imposed upon China by the Manchu Dynasty was broken through by European nations, even at the cost of war; and in 1854 the United States, by a naval demonstration under Commodore Perry, coerced the government of Japan into abandoning its policy of nonintercourse with foreigners, which had been in force for nearly 250 years. In 1904 the British sent an armed mission into the "forbidden land" of Tibet and compelled the government at Lassa to modify its exclusion policy.

These instances, however, in no way affect the political principle that a state possesses unlimited power, except as modified by treaty, to decide what classes of foreigners shall become immigrants and settlers. Serious diplomatic difficulties, however, may arise, as, for example, between the United States and Japan, when immigration legislation is not uniform with respect to all races and nations.

Immigration to America. The extraordinary migrations of peoples from Europe and Asia to the Americas, Australasia, and Africa during the last hundred years, not as colonists but as immigrants to countries already politically established, is one of the noticeable and far-reaching phenomena of the present economic age. The United States, as the country which has received these immigrants in greatest numbers, has experienced the greatest perplexity over the problems they create.

Immigration into the United States has passed through several phases. Previously to 1880 the immigration was almost exclusively from peoples of northern Europe, whence the original settlers of the United States had come. After that date, immigration from northern Europe declined, and that from southern Europe and from Russia rapidly increased. This so-called "new immigration" produced a change in the American attitude toward unlimited immigration. Until World War I, the immigration laws were designed only to exclude certain undesirable classes, including feeble-minded, insane, epileptics, sufferers from certain contagious or loathsome diseases, paupers, criminals, prostitutes, polygamists, anarchists, and those convicted of, or admitting, crimes or misdemeanors "involving moral turpitude." The importation of labor under contract was also forbidden. See *Displaced Persons*.

Restriction of Asiatic Immigration. In addition, Asiatic immigration had been restricted, first, by the Chinese Exclusion act of 1882, re-enacted in 1892 and in 1902, whereby all immigration from China, except students, merchants, and a few other classes, was forbidden. In December 1943, the exclusion law was repealed, and Chinese were placed on the same footing as other immigrants. After 1900, when Japanese immigration into California became notable, an exclusion league was organized in that state and agitation was commenced to secure legislation forbidding the admission of Japanese. In 1907, when an immigration bill restricting the admission of Japanese and Korean laborers was introduced into Congress, the president secured in its place Congressional authority to suspend Japanese and Korean labor immigration coming from our insular possessions or from Canada or from Mexico. An agreement was made between the president of the United States and the government of Japan—the so-called "gentlemen's agreement"—whereby the latter government undertook to limit, by the refusal of passports, the entrance of laborers into the United States.

General Limitation of Immigration. In 1924 the United States Congress passed an act which reduced annual immigration to 2% of the number of foreign residents in 1890. A minimum of 100 is accorded each country, excepting those affected by Asiatic exclusion legislation. Previously excluded classes are barred, including illiterates over the age of 16, with certain exceptions. The law further makes the principal American consular officer in each country a "quota control officer," with power to assure the eligibility of applicants, exclusion and deportation after arrival being thus largely avoided. Preferences within the quota are made, in favor of members of families already resident, and of those skilled in agriculture. The law did not apply to immigration from countries of the western hemisphere, nor did it alter the previously existing regulation of immigration from China or Japan.

In Australia and in New Zealand, legislation against the admission of Oriental peoples has been more drastic than in the United States, and includes even subjects of the British Empire, if natives of Asia. In Canada, restrictive immigration laws against Asiatic populations have been checked only by the influence of the British government. A "gentlemen's agreement," like that between the United States and Japan, restricts the movement of Japanese into Canada.

Impeachment. A form of criminal procedure, involving charges and trial, by a legislative body against those in high office. Impeachment differs from attainder in being a judicial, not a legislative, measure. It originated in England through the bringing of charges by the House of Commons against oppressive acts of officials of the crown. The House of Lords, as the highest judicial body of England, judged the complaints pressed by the Commons. The right of the Commons to impeach whomsoever it will, has been recognized, though the practice has fallen into disuse in Great Britain for more than a century, the system of responsibility of ministers to the House of Commons having made impeachment unnecessary.

The earliest instances are the impeachment of Lord Latimer in 1376 and of Pole, earl of Suffolk, in 1386. The last British impeachments were those of Warren Hastings, 1788–1795, and Lord Melville, 1806.

The institution of impeachment was adopted by the framers of the United States Constitution, which provides that the president, the vice president, and all civil officers of the United States shall be removed from office "on impeachment for and conviction of treason, bribery, and other high crimes and misdemeanors." The penalty upon conviction, however, is confined to removal from office and to disqualification to hold any office of honor, profit, or trust under the United States.

Impeachment charges are brought by the House of Representatives and are tried by the Senate. If the president of the United States is impeached, the chief justice of the United States supreme court presides at the trial; otherwise, the vice president presides. A two-thirds vote of the Senate is necessary for conviction. There have been nine cases of impeachment of Federal officials and three convictions. The most famous impeachment trial was that of President Johnson in 1868, which failed of conviction by one vote.

Members of Congress are not subject to impeachment, but they may be expelled from either chamber by a two-thirds vote of its members. Impeachment of state officials is provided for in most state constitutions, the procedure being modeled upon the Federal system. In 1913 a governor of New York was impeached and was convicted on the charge of misappropriating campaign funds. In this case, the crime was committed before election to office.

Outside of Great Britain and the United States, impeachment is provided for by the constitutions of many countries which have based the institution upon British and American experience.

Inauguration Day. The day when a chief executive of a nation, state, or city assumes office.

The Continental Congress, upon the ratification of the Constitution of the United States in 1788, provided that states should choose presidential electors on the first Wednesday in January 1789; that these should choose the first president and the first vice president on the first Wednesday in February; and that the new Congress should assemble in New York on the first Wednesday in March. The first Wednesday in March was the 4th, and, although President Washington was not inaugurated until April 30, the date March 4th, following a presidential election, continued to be inauguration day until changed in 1933 by the 20th Amendment to January 20th.

Industrial Court. See *Arbitration of Industrial Disputes.*

Initiative of Laws. A procedure whereby proposals of law may originate in the petition of private citizens. This measure is frequently associated with another procedure, the referendum of laws, but, as stated elsewhere, it differs from the referendum in being a radical device.

Before the adoption of the popular initiative, projects of law came from two recognized sources: (1) In countries having parliamentary or cabinet governments, they usually are initiated by ministers; and in the United States, where presidential government exists, they may originate in "executive measures" recommended to the attention of Congress by the president or to state legislatures by governors. (2) Measures arise in the legislatures themselves, either by the action of single members or by the work of committees or commissions. Under the operation of the popular initiative, a project of law may be originated by anyone, and, a sufficient number of petitioners in behalf of the measure having been obtained, the proposal goes either to the legislature under an obligation to pass upon it, or directly to the popular judgment as expressed in a general election. The second practice is the one common in the United States.

Among the objections to the popular initiative are the following: It affords opportunity for the proposal of eccentric legislation. It frequently encumbers the electoral ballot with an undue number of complicated and doubtful measures which confuse and embarrass the electoral mind. Where there is indifference or inertia of the voters, it may lead to the enactment of laws by minorities of the voting population. As a procedure, it affords no opportunity for the improvement of a bill by discussion preceding enactment, a most important parliamentary step in the proper shaping of legislation. In American states, where the practice exists of recognizing the popular enactment as superior to the legislative will, it imposes additional impediments upon legislatures and tends to bring into doubt and confusion the constitutional laws of the state.

The popular initiative was adopted by the American people from the example of Switzerland and exists by constitutional provision in 19 American states. See *Referendum and Initiative of Laws.*

Injunction, Writ of. The name for a judicial process under English law, whereby a party is "enjoined" or commanded by the court to refrain from doing some particular thing described in the writ. While injunction is properly a restraining order, it may be used to prevent persons from interrupting the normal continuance of things, as the flow of water or the movement of trains.

In the United States, the writ is issued both by Federal and by state courts. It has been issued at the instance of the president, to prevent organized obstruction of interstate commerce and, particularly, of the movement and delivery of mail. It has been used frequently in recent years to prevent labor unions and other organizations, when on strike, from interfering with the property and interests of employers. Leaders of such organizations, disobeying the writ, have been arrested by order of the court and have been severely punished for contempt of court. Laws attacked as unconstitutional have frequently been enjoined from enforcement by lower courts so as to be nullified in their effect until ruled on by the supreme court.

A rising tide of criticism against the use of writs of injunction has resulted in two types of restrictions in their use by Federal courts. In 1932, an act was passed by Congress forbidding issuance of injunctions in labor disputes except under carefully defined conditions, such as actual evidence of prospective damage. In 1937, Congress forbade injunctions against the Government on the ground of a law's unconstitutionality unless issued by a three-judge court, one member being a justice of the circuit court of appeals. Direct and expeditious appeal to the supreme court was provided when such an injunction was issued.

International Labor Organization. A permanent body, set up in 1919 under the Treaty of Versailles, which represents the chief nations and which exists to promote the adoption of labor legislation. Recommendations, requiring a two-thirds vote for adoption, take the form chiefly of draft conventions. Delegates of member nations are required to bring the proposed conventions, or treaties, before bodies of their own countries competent to conclude treaties. If ratified, the treaties become binding between the ratifying nations.

Delegates from each nation number four, all appointed by the government. Two represent the government, one represents employers, and one speaks for organized labor. Member nations of the League of Nations automatically are members of the body and other nations may join. The United States, by action of Congress in 1935, became affiliated as the 62nd member. Delegates convene yearly for decisions on agenda prepared by the International Labor Office, a committee of 32 delegates of the Organization. Limitation of work hours and measures for the protection of women and children from exploitation have been among the conventions ratified by many nations.

Interstate Commerce. The Constitution of the United States empowers the Federal government to regulate commerce "with foreign nations and among the several states." It also forbids states to impose specified burdens on the commerce of other states. These provisions, as interpreted by the supreme court, are the foundation of Congressional power to rule economic activities in the United States.

The court has interpreted commerce to include interstate transportation and communication. It has also extended the definition of commerce to mean all that directly affects commerce between states, thereby enlarging Federal authority to cover many intra-state railroad rates, business practices, and price fixing that impede the interstate shipment of goods.

For many years Congress was unable to regulate manufacture and production generally, these processes being held to be wholly intra-state. By the Jones and Laughlin decision on April 11, 1937, however, the supreme court ruled that practices which threatened to interrupt production destined for interstate commerce were subject to federal control.

Intervention. The interference by one state in the affairs of another sovereign state by force or by the threat of force. Even when hostilities are avoided, intervention can with difficulty be distinguished from an act of war, since it is the coercion by one nation of the will of another by acts of violence or by menace of violence. Except where a right of intervention has been conceded by one state to another during the existence of certain crises, as is the case with certain Latin-American countries and the United

States, it is difficult to find "legal" justification for the numerous acts of intervention with which the history of states is filled. Justification must be based upon political or moral grounds, among which the most important are: to ward off imminent danger to the intervening state or to its citizens; to end a condition of violence, anarchy, or oppression, repellent to the instincts of humanity; to preserve a balance of power and to prevent the aggrandizement of the influence of a rival state. This last ground of intervention in the past has been the frequent occasion of European wars.

Modern instances of intervention, on one or another of the above grounds, are the allied intervention in China, 1900, to rescue, from the Boxers, legations and nationals under siege; the intervention of the United States to end Spanish rule and warfare in Cuba in 1898; American intervention in Cuba in 1906 in compliance with the terms of the Platt amendment (See *Cuba*); and further American interventions in Santo Domingo, Haiti, Nicaragua, Panama, and Mexico.

Intervention in the past has been so frequently employed upon trivial and unjustifiable pretexts that a doctrine of "nonintervention" has developed, particularly associated with the name of the English Liberal, Richard Cobden, 1804–1865. Cobden's political platform was "free trade and no intervention." Noninterventionists hold that the sanctity of a state is so great and the right of a people to settle their internal affairs so sacred that intervention can never be justified on any grounds whatever, and that for one state to employ force against another to end revolution, misrule, or violations of the rights of its own nationals, is without possible moral justification.

Such extreme views are at the basis of the "anti-imperialistic" movement in the United States, which found political expression in the platform of the Democratic party in 1900, when imperialism was declared to be the "paramount issue." The recent trend of American policy has been to avoid intervention. The Platt amendment was abrogated in 1934. The purpose in part was to establish confidence, throughout the New World, in the pacific intentions of the United States and so to pave the way toward international agreements for the restriction of warfare.

It is difficult at times to distinguish intervention from an undeclared war. The operations which led to Japan's taking of Manchuria from China in 1931 and Italy's conquest of Ethiopia in 1935-36 began as drastic forms of intervention. In neither case was there a declaration of war.

Lobbying. The practice of importuning legislators for the passage or defeat of pending legislation. Many large well-organized groups of the population which hope to obtain benefits, or fear disadvantages, from legislation maintain "contact men" or "legislative departments" for the purpose of influencing legislation.

Among the methods used are:

1. Cultivating members of Congress or state legislatures.

2. Observing and reporting to voters the action of individual legislators on the object sought by the lobby, the purpose being to add to, or detract from, the legislator's popular support. Legislators may or may not be questioned on their attitude in this process.

3. Creating an impression in the minds of the legislators that there is a large popular demand for the measures advocated. This may take the form of having large numbers of letters and telegrams sent to legislators, urging enactment of the measures. In other cases, "marches" on the capitol are organized.

The practice has been abused and has frequently been made the means of bribery and of corruption. To protect themselves, legislatures have enacted antilobby measures, such as prohibiting the presence of lobbyists on the floor of legislative halls, or in their anterooms. The Public Utility act of 1935 requires that all persons seeking to influence legislation on public utilities must register and report monthly on the interests for whom they are acting, the amount of money received for the purpose, and the manner in which it was spent.

Properly controlled, the practice of lobbying may be legitimate and may even prove an assistance to a legislature struggling with a mass of proposed legislation. The preferred procedure for advocates or opponents of bills is to appear before committees of the legislature and in open session to state their case and disclose the groups for whom they are speaking.

The term is derived from the word lobby, meaning a cloakroom or antechamber, wherein the so-called lobbyist is supposed to exert important influence upon the members of the legislature.

Logrolling. A system of bargaining among members of a legislative body, whereby one member, by giving his support to other members' measures, obtains the support of others for a measure in which he or his constituency is interested. Logrolling has been carried to its highest point in American legislatures, facilitated, as it is, by the practice of allowing members to introduce bills without limit. Logrolling is connected especially with "pork barrel" legislation, or with bills appropriating moneys for local improvements and for interests without reference to state or national policy. See *Pork Barrel.*

Majority. A number greater than half of a total number. In deliberative bodies or elections, a number greater than half the votes cast, or, in another sense, the excess of that greater number over the remainder of the total. The term "majority" is sometimes loosely used to designate the number of votes received by a candidate, or by one of several candidates, in excess of the vote of his nearest competitor; but this relation is properly termed a "plurality."

An "absolute majority" means, in common usage, the number greater than half of all voting, or of all present whether or not voting, or of those entitled to vote.

Marine Corps. Marines, or, as they are sometimes popularly called, "soldiers of the sea," are a military organization serving under the navy department. In the United States, they constitute a distinct corps under the secretary of the navy. Originally they were introduced into the British navy to enforce discipline over the sailors. Their employment, however, has been continued for other reasons. Marines are favored in the United States navy because of their extreme serviceability for guard duty and ceremonies aboard ships, for the defense of naval property ashore, and as landing parties from war vessels for the protection of life and property in foreign countries in times of disturbance.

They have been used especially by the United States government in foreign intervention. Forming a part of the navy and transported aboard warships, they exceed all other land forces in mobility, while their frequent employment for police or protective duty makes their use on foreign soil less likely to be misconstrued as an act of war than would the landing of elements of a regular army. Marines are equipped, drilled, and tactically employed as infantry. When with elements of the United States army, they are under the command of the ranking officer, whether army or marine.

Martial (*mär'shăl*) **Law.** Martial law must be distinguished from "military law" and "military government." While the statement is often made that "martial law has been declared" in some city or district in the United States, this does not mean the substitution of military for civil authority, which, under the American system of constitutional guarantees, cannot take place except during an actual state of war. The phrase does not correspond to what is elsewhere called "suspending constitutional guarantees" or "declaring a state of siege." In these latter cases, civil government is actually suspended, and civil authority gives place to military.

In the United States the activity of troops, either state or national, in time of civil disturbance, means no more than that the military forces have been called into action to uphold the authority of the president or of the governor of the state and to enforce his orders. Government remains civil, but acts through military organization because the ordinary administration is unable to cope with the situation. The employment of troops is not to wage war but to keep peace. In preserving life and property, troops may resist violence, even to the point of taking life, but their responsibility in such cases is not different from that of civil officers. Arrests may be made, but as measures of precaution, not for the infliction of punishment by military courts.

Undoubtedly, a state of domestic insurrection may be so serious as to justify strong measures by troops, but the authority for their employment remains with the civil head. Civil courts are not superseded nor is civil law abrogated unless action to suspend the guarantees of civil liberty is taken by Congress, or by the legislature of a state, as is permitted in a few state constitutions.

Mayor. The chief executive of a British or an American city, corresponding to the French "maire" or the German "burgomaster." See *France* and *Germany.*

In addition to administrative powers, the mayor in certain countries possesses the authority of a local magistrate; and in continental states generally he has a legislative or "ordinance" power. Outside of British and American states, he is almost invariably an agent of the national government as well as the head of municipal administration.

In Great Britain, the mayor is the presiding officer of the city council and possesses no greater legislative authority than any member. He is the official representative of the municipality and as such occupies a position of high honorary and social distinction. In the United States, under the older and more customary form of municipal government, the mayor has a veto over the legislation of the council and may have extraordinary power in budget matters. See *City Government.*

Merit System. The appointment of persons to positions in the civil service of the city, state, or nation for reasons of fitness shown in competitive examinations, rather than as a means of payment for political services to the party in power.

Military Government. Government, in either domestic or foreign territory, under army or navy commanders.

Under the constitutional system of the United States, military government is set up by order of the president as commander in chief of the army and navy of the United States. The president may prescribe such administration for domestic territory in rebellion, for foreign territory occupied in time of war by the forces of the United States, or for territory recently acquired by conquest or treaty. The president may also set up military government within or over foreign territory in which the United States has intervened, with army or navy force.

Subject to the president's authority, such government may employ the widest types of administration, may pass laws, and may create courts. While normally resorted to in time of war or during hostilities, such government may continue after peace has been secured and is legal until altered by act of Congress.

Over territory outside of the Union, such government is not limited by the prohibitions of the Constitution. Trial by jury need not be established. In such a case, to use a popular expression, "the Constitution does not follow the flag."

In the cases of Guam and American Samoa, Congress has never legislated, and government continues to be exercised by naval officers under the authority of the president.

Military Law. Military law must be distinguished from martial law. As this term is used in England and in America, it means those laws and regulations which apply to soldiers and sailors, assure the discipline of armies and fleets, and are enforced not by civil courts, but by military tribunals, or "courts-martial."

In the United States, on the outbreak of the Revolutionary War, the Continental Congress issued a series of rules modeled upon English regulations, which were reissued September 30, 1776, and have been frequently revised. This code is known as the "Articles of War." They prescribe a series of offenses and infractions of discipline to which military officers and men are subject and which may be visited by various penalties, including death for certain offenses in time of war. A person becomes subject to military law upon accepting an appointment or commission or upon enlisting in, or being called or drafted into, the army or navy. He is ordinarily free from this jurisdiction upon discharge or upon the termination of his commission or appointment.

Liability to military law in no way lessens the liability of a soldier or sailor to the civil and the criminal law of the nation or state. It simply subjects him to a double jurisdiction, one as a citizen, the other as a soldier or sailor. Being thus subject, he may be tried twice and punished twice, that is, by both civil and military authority, without constitutionally being placed twice in jeopardy for the same offense.

Military law is usually enforced through military courts or "courts-martial." These consist of boards of officers, convened, by order of the president or a military commander, for the trial of such cases as may be submitted to them. The sentences of these courts have no effect until they are approved by the authority convening the court, or by the president of the United States.

A "summary court" consists of a single officer for the trial of minor infractions of soldierly behavior, punishment being limited to penalties not greater than one month's confinement or detention, loss of two-thirds of one month's pay, or both.

A "general court-martial" consists of a board of officers, not less than five in number, of rank appropriate to the rank of the accused, if an officer. It possesses jurisdiction over every offense triable under the Articles of War, and has power to impose a sentence of dishonorable dismissal, or of death.

Modus Vivendi (*mō'dŭs vī-vĕn'dī*). A temporary arrangement between the governments of two countries, pending the settlement of relations by a formal treaty.

Monarchy. That form of government in which, actually or theoretically, political authority is vested in a single ruler who represents the sovereign power of the state. The head of a monarchy bears the title of "king," "prince," or, in certain cases, "emperor," or the equivalent of these words in the language of the country.

Monarchy is intimately connected with the principles of "divine right" and those of "legitimacy," the latter theory maintaining that royal power can be derived only by legitimate succession from a previous ruler through blood or recognized connection. In the legitimist conception, there is at a given time only one person in the world lawfully entitled to any given throne, and the right of this person cannot be affected or taken away by Parliament, popular will, or revolution.

Legitimate monarchy is to be distinguished from the "imperialist" conception, in which a Cæsar or a Napoleon rises to a position of monarchical authority by military triumphs and by the devotion of the people or of the army. In this institution, the right to rule is derived from the unprecedented services of an individual to the nation, rather than from legitimate succession or through the claim of divine ordination.

There may further be distinguished the seizure of supreme power by a civil or a military leader and its maintenance by the ruthless suppression of opponents. Such were the "tyrants" of the Greek city-states, the "despots" of Italian cities, and the "dictators" of Spanish America.

Limitation of Monarchy. While, in theory, monarchy is an absolute power of government, practically all monarchies tend to become, or have become, limited or constitutional. In the first place, monarchies are usually limited by the presence of a nobility who may contend with the king, as the English nobles did with King John at Runnymede. Corporations arise, such as the medieval towns, which secure concessions of rights, subsequently to be tenaciously defended against royal prerogative. The religious power or organization enters, usually supporting the pretensions of the monarchy, but frequently opposing it in defense of its own sacred position.

In Europe, monarchy attained its highest pretensions in the 18th century, when the "benevolent despots" of France, Spain, Austria, Prussia, and Russia claimed and nearly succeeded in exercising unlimited power. In England, these same claims had been defeated in the 17th century by the English revolution and by the strength of the British aristocracy. These circumstances gave rise to British constitutional monarchy. The French Revolution largely destroyed popular support of unlimited monarchy and brought into force the conception of government resting upon popular will. Throughout the 19th century, however, monarchy played a leading part in European governments. It rose again in esteem, partly through the success of the British system of parliamentary government and the exercise of all crown powers by ministers responsible to a representative body, and partly through the achievements of monarchical government in unifying Italy and Germany. After 1871, for an entire generation, republican government in Europe appeared to make little progress except in France and in Switzerland.

World War I swept away many monarchical governments, and republicanism appeared dominant; but economic and political unrest produced in many countries dictatorships hardly to be distinguished from monarchy in fact. In 1949, the monarchical governments of Europe were Great Britain, Greece, Belgium, Norway, Sweden, Denmark, the Netherlands, Luxembourg, Monaco, and Liechtenstein.

Monopoly. This is the right, or the power, so to dominate the market for a commodity that a higher price may be exacted than would prevail under free competition.

Since the monopolies granted by kings under royal charters, the leading forms have been: patent rights; local franchises for public utility companies; and more or less informal combinations of producers. The first two forms are provided for by law as being in the public interest. The third is a defense that has arisen more or less spontaneously against destructive competition. Opinion differs regarding its advantages to the public.

Trust. This term is used popularly to describe industrial combinations, whether they operate through private agreements, mergers, acquisition of competing concerns by a holding company, influence over policy by investment banks, interlocking directorates, or numerous other devices. Their power lies partly in their ability to supply a large proportion of the market and to make it difficult for new producers to obtain credit or materials so as to enter the market. The advantage to their sponsors lies in the ability to prevent demoralization of prices through competition, production normally being cut when demand falls off. Their danger from the consumers' viewpoint is that they have the power to increase prices above a reasonable level. A more recent criticism is that, by holding up some prices when others, lacking such support, are being readjusted to lower levels in a depression, they choke off demand in certain fields and so prevent a speedy return of the idle to employment.

From a social viewpoint, benefits of "trusts," or concentration of control in industry, include low cost production through large buying power, and economies in selling, financing, standardization, and management. Dangers include lack of flexibility, possibilities of withholding from buyers the benefits of economies brought about, and the concentration of power in hands not responsive to considerations of public interest.

Anti-trust Laws. The Sherman act of 1890, the first of these statutes in the United States, prohibited all combinations in restraint of interstate and foreign trade. The supreme court interpreted this law to prohibit "unreasonable" restraint of trade and made the illegality of a combination depend on the proportion of the industry it represented.

The Clayton act of 1914 legalized certain activities of trade associations outlawed under the earlier act and

forbade acquisition of the shares of one company by another if a tendency toward monopoly resulted. Acquisition of assets, however, was not forbidden. A federal trade commission was established in the same year to investigate and prosecute unfair competition.

These laws did not prevent concentration of industrial control from marching steadily on. The government temporarily changed its attitude in 1933 and permitted combinations in the form of "codes" under the National Recovery Act, industries being required in return to increase wage rates and abstain from opposing the organization of employees. After the supreme court declared this act unconstitutional, administrative policy returned to a stricter enforcement of antitrust laws.

Monroe Doctrine. An important declaration of policy made by President Monroe in a message to Congress, December 2, 1823, in which the president declared "that the American continents, by the free and independent condition which they have assumed and maintained, are henceforth not to be considered as subjects for future colonization by any European powers." The message called attention to what the president considered to be the difference between the political system of the monarchies of Europe and that of America, and stated that any attempt on the part of these European monarchies to extend their system to any portion of the western hemisphere would be regarded as dangerous to the peace and safety of the United States.

The doctrine, at the time, accomplished its purpose of warning the Holy Alliance, composed of European powers, from intervening to overthrow the independence of the newly arisen Spanish American republics, and it has since been repeatedly appealed to by successive presidents, though not until 1896 was it formally noticed by Congress. Following the "Venezuela incident" of that year, in which the American government interfered to stop what it regarded as encroachments of the British government upon territorial rights of Venezuela, the policy was overwhelmingly endorsed by the American nation and by both the great political parties.

The Monroe Doctrine is not, as is sometimes supposed, a principle of international law. It is in fact directly opposed to a fundamental principle of international law; namely, that a state may dispose of its own territory to another state without hindrance, for the Monroe Doctrine would probably be invoked to prevent the cession of an American possession by a weak state to a stronger one. The Monroe Doctrine is simply an American policy, never directly admitted by European nations until it found mention, though not a satisfactory mention, in the Covenant of the League of Nations. As a policy, it accorded with a deep, though undefined, American resolution to liquidate the possessions of European states in the New World and to prevent the political issues of the Western continents from being determined at the capitals of Europe.

Under some presidents, this policy has approximated the claim of a protectorate over Latin-American countries and as such was deeply resented. Under Franklin D. Roosevelt's administration a new turn was given to it. In multilateral trade treaties negotiated in 1936-37 at Buenos Aires, he sought to make the Doctrine a policy of all American states, pledged to oppose aggression from outside and to minimize conflicts among themselves by prompt consultation when threats to peace arose.

Mugwump. A celebrated political cartoon picturing the independent voter as having his mug on one side of the fence and his wump on the other.

Municipal Ownership. The civic possession of certain properties, as streets, bridges, ferries, parks, and sewage systems, is well-nigh indispensable to urban life. Only in rare instances, and then to the prejudice of city life, are such necessities as these privately owned. In most cities, water supply is now municipally owned. Other public utilities, such as street railways and lighting systems, are either privately or municipally owned. In Europe, they are generally the property of the city and are operated by its employees. In the United States, more frequently, they are privately owned, but are controlled, with respect to service and rates, by their franchises, by ordinances of the city government, or by state public utility commissions.

The question of private ownership and operation of public utilities in cities has been one of the most important and the most perplexing problems of American government. A franchise for such a utility carries with it the creation of a virtual monopoly privilege and the right of eminent domain; it also presents, if unrestrained, the opportunity for maintaining extortionate rates for service. As such, it is a privilege that has been eagerly sought, bitterly contested for, and frequently corruptly acquired. See *Government Ownership.*

In the United States, municipal governments do not generally engage in several kinds of services, such as public pawnshops, municipal orchestras, opera houses, etc., which are common in Europe. In America, great attention has been given to parks and to public playgrounds. The scope of municipally owned activities can hardly be settled by any theoretical principles. In each country and in each community, it is a matter for practical decision.

National Convention. Since 1832, in the United States, candidates for president and vice president have been nominated at national conventions especially convened for that purpose once in four years.

The national convention is not the creature of the law. It is an extra-legal party meeting, and its membership, machinery, and procedure are determined by party rules.

The rules of the Democratic and Republican parties provide for the selection of two delegates from each congressional district, and for four delegates at large from each state. An amendment to the rules of the Republican party, which was passed in 1916, limits full representation in the national convention to those congressional districts having a Republican enrollment of at least 7500 voters. To the Republican party convention, delegates are chosen in the same manner as that in which congressmen are nominated in the several districts. The Democratic party leaves the method of selecting delegates to the party organization of each state.

Convention Procedure. The chairman of the national committee, who has been chosen at the preceding national convention, initiates the proceedings of the convention. He is succeeded by a temporary chairman chosen by the convention. The convention committees, the most important being the committee on credentials and the committee on rules, are then chosen, the delegation from each state choosing one member for each committee.

The report of the committee on credentials, affecting contested seats, is then presented to the convention as a whole, which either approves and adopts the report in its entirety, or votes upon each contested seat separately. In the Republican convention, under the ruling of Senator Root, in 1912, every person entered upon the temporary roll of the convention by the national committee, even though his own right to sit in the convention is contested, is eligible to vote with respect to the seating of any other contested delegate. See *Convention, Political.*

National Defense. This term is used to describe the established provisions of a state for protecting its rights and territory, particularly from foreign invasion or aggression. Some such provision has ever been regarded as indispensable for national existence and security. The preamble to the Constitution of the United States declares that one object of the Union is to "provide for the common defense."

The type of defense establishment varies greatly with different states, generally according to their size, their frontiers, their geographical security, their traditional friendships and enmities, and the aims of their foreign policies. The main reliance may be naval, as in the case of Great Britain, or, at an earlier date, of Holland; or it may be land forces. In the main, four types of armies have been relied upon by states for the attainment of their military policies: (1) professional armies; (2) mercenary troops; (3) "militia," or organizations of citizens trained in time of peace, and volunteer forces raised in case of emergency; (4) forces prepared by universal or general military training.

Professional Armies. The first, that of a professional army recruited voluntarily, was the general reliance of European states down to the French Revolution. Great Britain, throughout her history, has relied almost entirely upon professional armies, except where she has employed mercenary troops or has subsidized foreign troops in common wars. In the World War, an army conscription bill was not enacted by the British Parliament until 1916. A professional army may be brought to the highest state of proficiency, and, for a country possessing overseas responsibilities which have to be guarded, it is a well-nigh indispensable element in the national plan of defense.

Mercenary Armies. Mercenary armies have been employed in all times, and their use has frequently been notorious, as in the case of the mercenary bands that infested Italy in the 16th century, or in the employment of German troops by Great Britain against the American colonists in the Revolutionary War. Their use has been unsparingly condemned by practically every serious student of the art of politics or of war.

Volunteer Forces. The third, the method of volunteer forces raised in time of emergency, has been the traditional policy of the United States. Reliance upon hastily raised troops, while a congenial policy to a people little troubled by threat of war, has proved again and again in American history to be ineffective from a military standpoint, and frightfully wasteful of life and treasure. The highly technical character of modern warfare, the variety of war matériel, the extreme expenditure of munitions, and especially the need of trained officers to take command of levies of troops, have rendered obsolete and indefensible a reliance upon extemporized volunteer forces.

Universal Training. Some system of general training of all young men for military duties appears at once the most satisfactory, as it is the most just and the most democratic, of all plans of defense. It recognizes the duty of

protection of nation and civilization as a common duty, from which no man of suitable age or physique may properly be exempted. It imposes the hardships and sacrifices of warfare upon all classes of society alike, and puts at the disposal of a nation its full resource of man power without the demoralizing effects of discrimination and bounties. That such a policy is now endorsed by the American people is evidenced by the draft legislation of Congress of 1917 and by the National Defense act of 1916 and of 1920.

This latter legislation gives the country a policy of national defense and a prospective complement of forces adequate for any probable emergency. Under this act, the army of the United States is formed of three components: (1) the "regular army," a small standing body of professional soldiers whose duties are to man the coast defenses, garrison overseas possessions, care for the stores, ordnance, fortifications, camps, and other military property, supply a limited mobile body of troops as a first element for defense and, through its officer and noncommissioned officer personnel, furnish instruction to the national guard, organized reserves, reserve officers' training corps in colleges and schools, and citizens' training camps. (2) The second component is the "national guard," organized in such a manner that each state is charged with the responsibility of maintaining, in times of peace, certain units of citizen soldiers, which may be combined into a number of army divisions and corps. (3) Third, the "organized reserves," comprising officers and men of training, so developed as to form the "cadres" or skeleton structures of additional divisions, which, within a few months' time after a declaration of war, could be raised to full strength, armed, equipped, and trained for the field.

The National Guard. The national guard, with the regular army, constitutes the first line of defense and is to be so officered, equipped, and trained as to approximate, in its organization and performance of duty, the standards of the regular army. The national guard in each state is, moreover, under the orders of the governor of the state, and constitutes a constantly ready force at his command for the execution of the law and for the maintenance of public order. It may, by order of the president of the United States, be called into the Federal service to repel invasion, to suppress insurrection, or to enforce the laws of the Union.

Naturalization. A term given in law to the acquisition of citizenship in a country other than that in which one has been a citizen or a subject.

The act is necessarily voluntary on the part of the person acquiring naturalization, and must have the consent of the state in which citizenship is acquired. The consent of the state whose citizenship is renounced is not necessary to the act, and may even be refused. The act of severing citizenship is called "expatriation." It is a renunciation, by formal action, of the rights and obligations of citizenship therein. If the act of renunciation is not recognized by the state in which citizenship was formerly held, it may happen that two states may claim the same citizen or subject. See *Citizenship*.

American Naturalization: First Papers. The United States government has given great attention to naturalization of foreigners who seek permanent residence in this country. In recent years the process of naturalization has been surrounded with added precautions. It consists primarily of two steps. The first is called the "declaration of intention." This step may be taken by an alien immediately upon arrival in this country, provided he is 18 years of age or over. Certain formalities of naturalization must be complied with before a United States court or before a state or territorial court of record. The applicant takes an oath that it is his honest intention to become a citizen of the United States. He fills out a paper, giving his name, age, occupation, address, date of arrival in the United States, and the name of the vessel upon which he came.

Second Papers. After a residence in the United States of at least five years and an interval of at least two years after the declaration of intention, the candidate, if he can speak English and sign his name in his own handwriting, may apply for his "second papers." This step is called "the petition for naturalization." He takes to the office of the clerk of the court a copy of his first papers and of his "certificate of arrival," if he came to this country after June 29, 1906. He must also be accompanied by two witnesses, who are citizens of the United States and have known him for five years.

Citizenship. At least ninety days after the candidate files his petition for naturalization, he will be notified to appear in court for citizenship. He must then undergo an elementary test as to his knowledge of the American form of government. The extent of this test depends upon the views and policy of the particular court before which the applicant appears. He must also be able to satisfy the court of his good character and of his loyal purpose. When these tests have been met, the candidate takes the "oath of allegiance" to the government of the United States and receives his "certificate of citizenship."

In many states the public school system now offers special instruction for aliens desiring to prepare for the citizenship examination, and the practice of making the oath of citizenship a formal ceremony is becoming common.

Naturalization of Children and Women. Minor children of an alien become citizens upon the naturalization of their father. By a law of September 22, 1922, women do not become citizens through the naturalization of their husbands. Women of alien nationality may now obtain naturalization under the same procedure as men. However, an alien woman, married to an American citizen, need make no declaration of intention and may attain citizenship after three years of continuous residence (or one year if marriage or naturalization of her husband took place after September 22, 1922, and before 12 noon, May 24, 1934). A woman who, prior to September 22, 1922, lost American citizenship by marrying a foreigner may be repatriated by a simple affirmative act in a court of competent jurisdiction. She may go before a naturalization examiner, prove that she has lost her citizenship under the naturalization laws, then go into court and take the oath of allegiance. An American woman who marries a foreigner does not lose her citizenship unless her husband is ineligible to citizenship.

Naturalization is a privilege which Congress has bestowed only upon aliens who are "free white persons" or "aliens of African nativity and persons of African descent." No provision has ever been made for the naturalization of races other than the white and the black.

Neutrality. The status of a nation taking no belligerent part in a conflict between other nations, but preserving friendly relations with both or all.

By international law, citizens of a neutral nation may trade freely with a belligerent, even to the extent of furnishing arms and munitions. Such goods, however, may be seized as "contraband of war," and neutral merchant vessels are subject to "visit and search" by war vessels of the belligerent states to determine the presence of contraband in their cargoes.

A nation, to remain neutral, must be strictly impartial in the assistance which it or its citizens afford. It may not permit its territory to be used as a refuge for troops of belligerent nations, nor as a means of transit for them, nor for the recruiting of troops. Its ports may be used by the war vessels of belligerents only for a limited number of days, and that use is restricted to the making of repairs or to the securing of supplies indispensable to the continued voyage of the belligerent vessel. Similar obligations bind the neutral state with respect to the use of its territory for purposes of communication by telegraph, by cable, or by radio, and, while private citizens may freely sell their wares to a belligerent state, a nation may not dispose of its naval vessels or of war matériel to a belligerent during the actual period of the war, without violating neutrality.

A legislative attempt was made in 1935 to safeguard American neutrality in foreign wars by directing the president to forbid sales of arms or loans to warring nations and warning American citizens against trade and travel. In 1939 the law was changed to allow the sale of arms, to be paid for and transported by the purchaser ("cash and carry"). American citizens were forbidden to travel in belligerent countries or on their ships, or to extend credits to such countries. American ships also were forbidden to enter combat areas.

Nihilism (*nī'hĭ-lĭz'm*). A term given to Russian radicals who refused to recognize the validity of existing institutions, social, political, or religious. The word was first used in this sense by the novelist Turgéniev in his *Fathers and Sons*, published in 1862.

The movement, which at first centered in student communities, was highly rationalistic and materialistic. It regarded religion, family life, private property, and even public administration as obstacles to the free development of the individual and of rational society. The movement had philosophical points of contact with anarchism. The repressive action of the Russian bureaucracy led to acts of retaliation and terrorism by the Nihilists, the most sensational being the assassination of the czar Alexander II in 1881.

The word is frequently applied in the United States to all "terrorists," or to those who use the assassination of officials to intimidate the government.

Oligarchy (*ŏl'ĭ-gär'kĭ*). A government in which the power of the state is held by a few, as opposed to the many. It is distinguished from an aristocracy only as being a corrupt form. Of all forms of government—democratic, aristocratic, or monarchic—an oligarchy has generally been condemned as the worst, its members invariably being led to exercise their power in their own interest, unrestrained by such consideration as is felt by a king for his people, or by the traditional sentiments of honor and public responsibility that may characterize an aristocracy under the phrase, "noblesse oblige." Oligarchies have frequently been associated with the seizure of governments by violence, chicanery, fraud, or by monetary power.

Open Door Policy. The preservation of opportunity for foreign trade in a country, on a basis of fair and equal competition for all nations. Open door policy means also that, in the development of economically backward countries, all foreign nations shall have an equal opportunity to offer the services of their credit and their technical experts, and to obtain concessions for transportation construction or for mineral development upon equal terms. For the nation whose territory is being opened for commerce or exploitation, it means preservation of the right to purchase in the cheapest markets, to borrow money on most favorable terms, and to award contracts for internal development on the conditions that appear most advantageous, without coercion by foreign political authority. The principle of the "open door" is opposed to so-called "spheres of influence" or "spheres of interest."

The term "open door" seems to have been first used by Admiral Lord Charles Beresford in 1899. Secretary Hay adopted it in 1900 in stating the policy of the United States toward China in opposing the aggression of other nations, particularly Japan.

Open Town or **Open City.** A term applied to a city or town which has been formally declared undefended and open to the enemy. The approach to the town must be open, all troops withdrawn, and fortifications dismantled. Such a town may be occupied, but not bombarded nor destroyed. The immunity apparently does not extend to military installations such as arsenals within the town nor to railway yards, and other facilities in its suburbs. Paris, Manila, and Rome were declared open cities in World War II.

Pacifism (*păs'ĭ-fĭz'm*). An attitude of convinced opposition to war. Pacifists vary in their programs from those who, like Tolstoy, teach a doctrine of pure non-resistance to those who, admitting the justice of defense for the individual and the nation, deplore and oppose all forms of preparation for national defense.

Most pacifists are temperamentally optimistic with regard to human nature and the willingness of nations to compromise. The weakness of this type of pacifism lies in the failure properly to appreciate that the forces of cupidity and inherited antipathy are very powerful in human society and that a sense of the rights of a people is rapidly impaired by a knowledge that it lacks the resolution to defend those rights.

Another school of pacifists takes the view that the profit system is the mainspring of aggressive warfare. Socialists, who advocate production for use instead of profit, claim an end of imperialistic wars as a central merit of their proposals. Likewise the guiding principle of actual and proposed legislation to ensure neutrality, as placed before the United States Congress, has been limitation of profits from war and from preparation for war.

Pair. When legislators who are opposed to each other on a particular measure agree that the vote of one shall cancel the other, it is called a pair, and neither votes. The agreement does not affect the result. It is usually resorted to when one or both has to be absent.

Pan-Americanism. A term produced by newspaper discussion of the international American Conference at Washington in 1889 and 1890. It is the doctrine that the states of the American hemisphere possess certain common interests and institutions not generally shared by the peoples of the Old World, and that these should be the basis of a common understanding and of common political and commercial actions among these American states. Such an idea is involved in the Monroe Doctrine. To give effect to the ideas, the first International American Conference met at the call of Secretary Blaine at Washington in 1889-90. Including one in 1937, eight such conferences have been held. A special one for discussion of peace machinery in the New World was called at Buenos Aires in 1936 at the instance of President Franklin D. Roosevelt.

American advocacy of the Monroe Doctrine has at times advanced the sense of Pan-American unity, and at other times has awakened in Central and South America a sense of irritation and of concern. A considerable body of writers exists in several countries of Spanish inheritance, who assert that the cultural affiliation of those countries is with Europe rather than with the United States.

Pardoning Power. The existence of an executive power of remitting the consequences of a conviction is an almost necessary provision of government. The power frequently is invoked to mitigate the severity of the law, to assume a responsibility which is beyond the competence of a court, to recognize an alteration in conditions taking place subsequent to conviction or in view of new evidence, or to recognize good behavior or reformation of character in a person who has endured a portion of his sentence. Under monarchical government, such power resides in the king, who is the fount both of grace and of justice. The development of constitutional government has transferred this authority to ministers, as to the home secretary in the British government.

In the United States, the pardoning power is constitutionally vested in the president, and, by state constitutions generally, though not invariably, in the governor. A pardoning power usually exists in the legislative branch unless, as frequently under the American system, it has been limited or denied by the Constitution.

Party Platform. A document issued by party leaders or by a party convention, setting forth the principles and the measures for which the party stands and upon which it purposes to make its appeal for the support of the electorate.

Party Whip. A member of a legislative chamber assigned by party leaders to the task of rounding up members of the party to insure their vote on important measures and to hold them in line with party policy. In the British House of Commons, the whips may act as tellers at a "division" of the chamber when important votes are taken. They have other responsible functions of keeping track of sentiment on public matters, of arranging patronage, and, in general, of promoting party solidarity.

It is customary in England for the whips of the party in power to be appointed to the ministerial offices of "junior lords of the treasury," which offices are now sinecures.

The term whip is often used in the United States to designate party leaders in Congress.

Passport. A certificate of identity granted by a government, authorizing the holder to leave the country he is in or to enter a foreign country, and requesting for him safe and free passage and all lawful aid and protection. Passports are issued by the foreign office of a government, or by its diplomatic agents resident abroad.

In the United States, passports may be obtained by applying to the "passport bureau" of the department of state. It is customary for passports to be "viséd" by the representative of the foreign country to which it is proposed to go, in order that any difficulties may be met and surmounted before departure from the home country.

Paternalism. A policy whereby the state assumes to enter into and to regulate the activities of individuals in their social and industrial life. The early part of the 20th century, and to a less degree the latter half of the 19th century, have been marked by an extension of the activities and functions of government, directly opposed to the policy of the 18th century in Europe, which was dominated by the doctrine of "laissez faire," or noninterference by the state. See *Social Legislation.*

Patronage. Places in the government employ at the disposal of persons elected to political office. The term is also broadly used to cover contracts, franchises, and other public favors turned over to preferred individuals or localities by those in power. See *Civil Service*

Peonage (*pē'ŏn-āj*). A form of servitude in which a laborer is compelled against his will to remain in the service of his creditor or employer. Peonage arises out of a contract whereby a debtor undertakes to serve a creditor until a debt or an advance of money or goods is paid, or it may result from the operation of law upon mere nonpayment of a debt. The word is derived from the Mexican term "peon," in which country peonage is a long established institution.

Amendment XIII to the Constitution, which prohibited "slavery or involuntary servitude except in punishment of crime," made peonage unlawful. Congress, by a law enacted March 2, 1867, further provided that "the holding of any person to service or labor known as peonage is abolished and forever prohibited in the territory of New Mexico or in any other territory of the United States." The law further made the holding of anyone in peonage punishable as a crime.

Personal Representative. Heads of governments have long followed the practice of sending special and often secret agents to secure information abroad and even to negotiate treaties with foreign states. Inasmuch as the Constitution of the United States requires the consent of the Senate to the appointment of ambassadors, other public ministers, and consuls, the conduct of official relations with a foreign government by a personal representative of the president, unconfirmed by the Senate, would seem to be of doubtful constitutionality, and the practice has met with criticism and congressional opposition. Nevertheless, on numerous occasions the president of the United States has dispatched personal representatives on diplomatic missions.

President Washington, in October 1789, sent Gouverneur Morris to England to negotiate a commercial treaty, without having his appointment confirmed by the Senate. Several hundred such representatives, in all, have been dispatched by different presidents. Well-known examples are the mission of Nicholas Trist to Mexico in 1847 to negotiate a treaty of peace; of James H. Blount to Hawaii in 1893 to end a revolutionary movement of Americans against the Hawaiian monarchy; of John Lind and several other representatives to Mexico; and of Edward M. House to Europe by President Wilson. Trist was authorized by President Polk practically to order the American army

and navy to cease active hostilities against Mexico. Blount was endowed by President Cleveland with "powers paramount" to those of the American minister at Hawaii. Lind was sent to force the retirement of President Huerta from the head of the Mexican government.

A survey of the instances in which personal representatives, rather than diplomatic agents confirmed in their appointments by the Senate, have been used by the presidents of the United States reveals the following purposes for which they have been employed: to make special reports on conditions prevailing in foreign countries; to reopen relations with countries with which diplomatic relations have been broken; to interfere in the internal affairs of countries disturbed by revolution; and to negotiate treaties.

The motives that have led to such appointments are the advantages of secrecy, of expedition, and of the opportunity of avoiding a compromising situation in case of failure. Against them may be directed all the arguments in favor of open diplomacy and the constitutional privilege of the Senate to participate in developing the foreign policy of the government and of confirming the appointment of agents through which the promises of the government are expressed and the obligations of the nation are created.

Persona Non Grata (*pĕr-sō'nà nŏn grā'tà*). A term applied to a diplomatic representative who is not acceptable personally to the government to which it is proposed to send him. All countries reserve the privilege of refusing to receive any representatives accredited to them who are thus unacceptable, or to cancel for cause acceptance of such envoys.

Pigeonholing. The laying aside of a bill or other matter by a legislative committee, presumptively for future consideration, but in fact with the intent of allowing the bill to die through failure to act upon it; also similar action by an executive, where such action is equivalent to a veto.

Plebiscite (*plĕb'ĭ-sĭt*). In ancient Rome, a "plebiscitum" was the enactment of a law by the assembly of the "plebs" or common people.

In modern politics, the term plebiscite is given to an expression of the popular will, taken in various forms and for various purposes, such as an alteration in the form of government, change of rulers, or the transfer of territory from one sovereignty to another. The last purpose is of great modern interest, because of numerous provisions, in the treaties of peace that followed the World War, for the holding of plebiscites to ascertain the preference of peoples for the sovereignty of one state or another.

This application of the principle of self-determination arose during the period of the French Revolution, when a plebiscite of the inhabitants of Avignon was taken before the transfer of that city and adjacent territory from the sovereignty of the pope to that of the French republic. The practice was soon abused and discredited.

The plebiscite again came into use in the period 1848 to 1870, especially in the process of the unification of Italy. A plebiscite of the inhabitants of Nice and Savoy accompanied their cession by Piedmont to France. In 1877 a plebiscite was taken of the inhabitants of the island of Saint-Barthelemy in the West Indies, before the transfer of that island from Sweden to France, and again upon the separation of Norway from Sweden in 1905.

The following plebiscites were provided for in the peace settlements following the World War: Allenstein and Marienwerder, districts in East Prussia; Eupen and Malmedy, small districts or "kreisen" on the border of Prussia and Belgium; Upper Silesia; Klagenfurt, lying between Austria and Serbia; Northern Schleswig; and the Saar Basin. These have all been held, resulting in the retention of Allenstein and of Marienwerder by Germany; the cession of Eupen and of Malmedy to Belgium; the division of Upper Silesia between Poland and Germany; and the retention of Klagenfurt by Austria. By a plebiscite the Saar, which was under French control for 15 years, was returned to Germany in 1935.

A plebiscite was provided also for the district of Teschen, in dispute between Poland and Czechoslovakia, but this was abandoned in favor of a diplomatic settlement ratified by the powers.

Plurality. The number of votes received by a successful candidate in excess of the number cast for the next highest candidate for the office. In the election of public officials, the law may be so framed that a plurality only may elect. In such a case, if there are more than two candidates, it may happen that a candidate is elected even though he fails to obtain a majority of the total number of votes cast. See *Majority.*

Police Power. A general term that expresses the fundamental power vested in every state to limit and to regulate the exercise of private rights in the interest of public health, public morals, public safety, and the general welfare of the community.

Under this power, it has been held that a state may absolutely prohibit the sale of intoxicating liquor (*Mugler* vs. *Kansas*) or of cigarettes (*Austin* vs. *Tennessee*), as intrinsically harmful to the health of the community. It has also been held to be within the scope of the police power of the state to prohibit the manufacture of a commodity, such as oleomargarine, which readily lends itself to fraud upon the public (*Powell* vs. *Pennsylvania*). Laws designed to prevent gambling, such as the prohibition of dealing in grain "futures" or the buying and the selling of stock on margins are also within the police power (*Booth* vs. *Illinois*; *Otis* vs. *Parker*).

Under the police power, a state, or, when properly authorized, a municipality, may prohibit within a particular locality the manufacture of bricks, the maintenance of livery stables, public laundries, billboards, public garages, coal yards, slaughterhouses, and the erection of buildings of more than a prescribed height, and may impose any other regulations which are reasonably calculated to secure the public welfare while not unreasonably interfering with the liberty of the individual.

Laws limiting the hours of labor for women and children, prescribing the conditions under which factories shall operate, laws regulating the relative rights of landlord and tenant, as well as those prescribing regulations for buildings used as tenements, are other instances of the exercise of police power. With the growing complexity of society and with the greater interdependence of individuals and classes, the theory of the police power has been extended far beyond the narrow confines to which it once was thought to be limited. Thus antitrust laws, although directly interfering with the liberty of contract, and statutes prohibiting the sale or use of trading stamps, have been upheld (*National Cotton Oil Company* vs. *Texas*; *Tanner* vs. *Little*). Zoning ordinances designed merely to promote the æsthetic interest and general welfare of the community are constitutional exercises of the police power (*Lincoln Trust Company* vs. *Williams Building Corporation*). But anti-littering ordinances and laws requiring licenses to distribute handbills or to make addresses at appropriate places on public property have been held beyond the police power because they violate freedom of press and speech.

In the last analysis, whether an act is within the police power of the state depends upon a judicial balancing of interests—that of the individual in the unlimited use of his property and the unrestrained pursuit of his own inclinations on the one hand, and that of the rest of the community and of the state on the other.

Populism. Term applied to the series of reforms advocated by the People's or Populist party in the United States. Chief among these reforms were the free coinage of silver at the ratio of 16 to 1, the creation of a national paper currency to replace the national bank notes, stringent government regulation of railroads and of monopolies, and a general policy of legislation directed against the alleged control of the government by financial interests.

Pork Barrel. A term applied in the United States to appropriation bills for Federal expenditures in various parts of the country. So termed because each congressman secures his "piece of bacon" to bring back to the "folks at home." See *Logrolling.*

Pourparler (*pōōr'pär'lā'*). An informal, preliminary conference of representatives of different groups, factions, or countries, looking to a formal agreement settling disputed questions between the parties.

Preferential Voting. See *Proportional Representation.*

Pressure Group. Advocates of a cause who bring pressure to bear on lawmakers by lobbying or other means to compel passage of legislation they favor. They also use propaganda to convert public opinion to their views to add to the pressure, or to bring about a change in public policy. See *Lobbying, Propaganda.*

Primary. A preliminary election, held by voters of a party to determine the party's candidates for office. When carried out by a legally prescribed election and as a substitute for local meetings or conventions, it is generally termed the "direct primary."

In the "nonpartisan primary," all aspirants to office, regardless of political affiliation, enter the primary election, and members of all parties are eligible to vote. The two candidates receiving the highest number of votes for any office are regarded as nominated, and these two then compete against each other in the final election.

Prime Minister. A term applied to the head of a ministry, particularly in Great Britain and in the dominions of the British Empire. He is called also "the premier." In France, he is legally termed "the president of the council of ministers."

Privileges and Immunities of Citizens. The 14th amendment to the Constitution of the United States provides that "No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the

United States." These privileges and immunities are incidents of Federal citizenship. They include the right to protection of life, liberty, and property on the high seas and in foreign countries; the right peaceably to assemble and petition the Federal government for redress of grievances; the right of habeas corpus; the right to use the navigable waters of the United States; the right to hold office under the Federal government; and the rights secured to citizens of the United States by treaties with foreign nations.

Article IV, Sec. 2, of the Constitution provides that "Citizens of each state shall be entitled to all privileges and immunities of citizens in the several states." These rights include protection of life, liberty, and property under state law; the right to sue in the state courts; the right to engage in any lawful business; and the right to acquire and to devise or bequeath property. See *Civil Rights and Liberties.*

Prize Courts. Tribunals of a belligerent state, established for the purpose of adjudicating the title to property captured by its citizens on the high seas, and of examining the nationality of such property.

Prohibition. Governmental action which prohibits by law the manufacture and the sale of intoxicating liquors except for medicinal or sacramental uses. In the United States, the first state prohibition law was enacted in Maine in 1851. Between that date and 1920, nearly half of the states, at various times, enacted laws prohibiting or strictly limiting the manufacture and sale of liquor. The XVIII amendment to the United States constitution (in force January 16, 1920) made illegal the manufacture and sale of liquors containing more than one-half of one per cent of alcohol. The ensuing 13 years provided a working test of the policy. The prohibition, fairly effective at first, became less so as time went on. Bootlegging of liquor on an unprecedented scale diverted large sums of money to criminal elements of the population. These and other considerations led, in 1933, to the adoption of Amendment XXI to the Constitution, repealing the earlier one but giving Congress power to prevent transportation of liquor into states where its sale is illegal.

Propaganda. This term is used to describe any means of instilling or promoting ideas favorable to a cause or organization, particularly in the field of politics. Usually, this is accomplished by indirect or incidental means, as by suggestion, insinuation, or by more or less subtle appeals to prejudice. If the propaganda is sufficiently clever, the victim is led to think that he has arrived independently at impressions that have been introduced into his mind by someone else. Propaganda may be conveyed by news articles, plays, motion pictures, or even in conversation. The word itself has a respectable origin, in the sense of missionary work. Its evil repute comes from its political use in spreading half truths by illicit methods.

Proportional Representation. Any one of a variety of plans designed to give minority parties or groups representation in a legislative body, in proportion to the relative strength of each minority group as shown in elections; frequently called also "minority representation."

Such a plan was first tried on a national basis by Denmark in 1854 and was successfully adopted by Belgium in 1899.

History of the Movement. Proportional representation was discussed and advocated for both national and local elections for about 60 years preceding the World War, but, before 1914, it was adopted only for the choice of national representatives, by several smaller states, as Denmark in part, Belgium, Sweden, Bulgaria, Serbia, and Portugal.

During the World War, the system was adopted by Holland and was extended in Denmark. It appears in most of the post-War new constitutions: Germany, Austria, Czechoslovakia, Jugoslavia, Danzig, Greece, Poland, Esthonia, Latvia, Lithuania, and Bulgaria. France adopted it in 1919 but in 1927 returned to the uninominal system. In Switzerland, it was adopted nationally by an initiative proposal in 1918.

Plans in Use. Of the several plans, the following may be mentioned:

(1) The "limited vote" plan. Each constituency or district elects several representatives, but each voter therein casts a ballot for a number of candidates, less than the number of seats to be filled, giving his vote but once to any one candidate. A minority, by limiting its nominees, may be large enough to elect one or more candidates. This system was applied to certain constituencies in England in 1867 but was abolished in 1885.

(2) The "cumulative vote" plan. Each voter has as many votes as there are places to fill, but he may cast all his votes for one candidate or may distribute them between candidates, as he chooses. Here again, a minority party, by limiting its nominees, may elect. This device was used for election to the legislative council of Cape Colony before the Union of South Africa was formed. English school board elections also have used this system, and the state of Illinois employs it to elect its House of Representatives.

(3) The "single vote" plan. In each constituency, though there may be more than one place to fill, each voter is allowed to cast his ballot for one member only. Minorities, by this plan, may elect if they confine nominations to the number of candidates their voting strength represents. Japan has used this system since 1900, and her experience shows that quite close approximations to the results of more elaborate methods of proportional representation may be obtained.

(4) The "single transferable vote," known as the "Hare system." First used in Denmark in 1855 and adopted in 1909 by the Union of South Africa. Each voter indicates on the ballot his first, second, third, etc., choice. A "quota" determining the number of votes necessary for election is obtained by dividing the total number of votes by one more than the number of places to be filled and by adding one to this number. When all the first choices are counted, if a candidate is found to have the quota, he is elected. If there are surplus votes, they are transferred by various methods under various systems to other candidates as indicated by the ballot. The Hare system of preferential and proportional representation has been adopted in a few cities of the United States and Canada.

(5) The "list system." Lists of candidates are nominated by political organizations or groups of voters. Each voter has as many votes as there are places to be filled, but he may not "cumulate" them. The number of votes registered by a group or party is used to determine the number of elective candidates of the group. There are various ways of apportioning seats under this system, but the most widely copied is "the d'Hondt system" in Belgium, known from its originator. It may be made clear by illustration. Suppose an election for 5 seats, and 4 party lists obtain 24,000, 11,000, 9000, and 3000 votes, respectively. These figures are then divided by two, with results of 12,000, 5500, 4500, 1500; by three, with results of 8000, 3666+, 3000, 1000; if necessary by four, and so on. As there are 5 seats, the 5th largest of the figures thus obtained (in this case 8000) becomes the "quotient." By dividing the party votes by this quotient, we obtain the number of seats to which each party is entitled; namely, 3, 1, 1, and 0.

Protective Tariff. See *Tariff.*

Protectorate. A country or territory under the political control and protection of another. A protectorate invariably represents some restriction upon the foreign relations of the country, and may extend to complete control of them. Usually foreign authority is exercised also over the financial affairs and obligations of the protectorate. A nation claiming or exercising such protection becomes responsible to other nations for the protectorate's regard of international obligations, and the tendency is to go even further and admit responsibility for internal order and well-being. For examples of protectorates under the United States, see *Cuba, Panama, Santo Domingo, Haiti, Nicaragua, Liberia.*

Protocol (*prō'tō-kŏl*). A preliminary agreement between two or more countries, intended to form the basis of a more formal and complete treaty.

Public Lands Policy. Over two-thirds of the total area of the United States, including Alaska and consisting of over 1,800,000,000 acres, has at some time been the property of the nation. The development of this vast public domain into farms and homes, privately owned, has been one of the most important policies of the American government, and its carrying out has profoundly influenced the development of American society. Of this original domain, there remains about 400,000,000 acres, mostly arid or otherwise unfit for settlement. The rest has been distributed.

The Constitution gave to Congress the right to dispose of public lands, and under this power Congress has developed a public land policy, which, however, has taken several different forms. In the beginning it was believed that the sale of these lands would produce a considerable revenue and, among other common benefits, would extinguish the public debt. Accordingly, large tracts were sold to companies for subdivision and speculation. After 1800, small tracts were sold to settlers on credit. In 1820, a system of cash sale was adopted, the minimum price being reduced from $2.00 to $1.25 an acre. Public land was frequently occupied by settlers in advance of government surveys, and without negotiation with government agents. These settlers, known as "squatters," came to be recognized as having prior claims to the acquisition of lands which they had improved.

Homestead Policy. The policy of using the public domain to encourage national development received complete recognition in the "homestead law" of 1862. This act permitted any head of a family to secure 160 acres, or a quarter section of land, by residing on it for five years. Amendments changed the law so as to extend the privilege to any person 21 years of age or older who was a citizen or had declared his intention to become a citizen.

For homesteads in certain arid regions, Congress extended the acquirable tract to 320 acres, without the necessity of residing on the land. On other tracts, designated as "grazing lands," the law permitted the acquisition of 640 acres. An act passed in 1878, and in 1892 made applicable to all public lands, allowed the outright purchase of 160 acres of unappropriated nonmineral land unfit for cultivation but valuable for timber or stone, at a minimum price of $2.50 an acre.

Land Grants to States. The government has also granted public lands to states, to individuals, and to corporations, for specific purposes. Previously to 1850, one section out of each 36, within a state, was granted to it by the national government for support of education. Since 1850 the amount has been doubled. In 1860 the "Morrill act" granted each state an amount of land for the support of a college of agriculture and mechanic arts. This measure forms the basis of a large number of western state institutions. Extensive grants of land were made to the soldiers of the Revolutionary and Mexican wars, as compensation for their military service. To encourage the building of railways, particularly the transcontinental systems, Congress granted large areas of public land along the lines of these railways through undeveloped country, such grants amounting to more than 155 million acres.

Conservation. The "Desert Land act," as amended in 1891, enabled settlers to obtain 320 acres by bringing the land under irrigation within three years' time and expending not less than one dollar an acre for improvements. The government has undertaken also the reclamation of arid and swamp lands.

In recent years a new policy, called "conservation," has been defined, designed to preserve the remaining public domain from wasteful exploitation. Under this policy, the timber, the minerals, and the surface of the lands are disposed of separately, and water power sites have been withheld from entry.

Congress also granted authority to the president to withdraw the public domain from private acquisition and to create extensive reservations, either as "forest reservations" or as "national parks." Nearly 200 million acres are included in forest reservations in the West.

All unappropriated land was withdrawn from settlement by an executive order in 1935 signed by President Franklin D. Roosevelt. This move was in accord with recommendations of a national resources committee which the President had commissioned to report on the best use of land and other natural resources. Among the points made by the committee was the fact that much land unfit for cultivation was nevertheless being tilled. Farmers so engaged, who required public relief for their support, were given aid in acquiring better land elsewhere through the agency of a Federal resettlement administration. At the same time an extensive land-purchase program was carried out, the land so acquired being reforested or otherwise used as appeared desirable.

Public Ownership. See *Government Ownership, Municipal Ownership, Socialism.*

Punishments, Cruel and Unusual. The English Bill of Rights 1688 contained a provision, forbidding the infliction of "cruel and unusual punishments." This provision has been incorporated in the Constitution of the United States, in the 8th amendment, and in the constitution of nearly every American state.

"Cruel and unusual punishments" within these provisions are such punishments as are revolting to the civilized mind, or involve torture and lingering death. However, a punishment wholly disproportionate to the crime committed may, under some circumstances, constitute a "cruel and unusual punishment."

Recall. A process for removing an elective official from office before the expiration of his term. This method is entirely distinct from impeachment, as the latter is applicable only in case of gross malfeasance or breach of trust. The recall is initiated by a petition signed by a designated percentage of the electorate. Within a certain period after the filing of the petition, a recall election is held, in which the official against whom the recall is directed is compelled to contest for the office with one or more candidates who have been nominated to replace him.

Recall of Judicial Decisions. A process whereby the decision of a court declaring any law unconstitutional may be submitted to a popular referendum initiated by petition, and, in the event that the popular vote is favorable to the law, the court decision is disregarded and the law is enforced notwithstanding. The incorporation of such a provision in the United States Constitution would be tantamount to providing a special method of amendment by a mere majority vote.

Colorado is the only state where the recall of judicial decisions has been adopted, with specific limitations.

Reciprocity. An arrangement between two or more countries whereby each admits the exports of the other duty free, or at rates more favorable than those applied to similar importations from other countries.

Reciprocity provisions were incorporated in the American Tariff act of 1890. The method of making them effective was to empower the president to impose higher duties on certain imported articles if the foreign countries from which they came should appear to have imposed, upon products of the United States, duties which might be deemed to be "reciprocally unjust or unreasonable." See *Tariff.*

Red Tape. An expression signifying official formality and delay. It owes its origin to the red tape usually employed in tying up public documents. The phrase is said to have been first used in this sense by Lord Minto in 1775.

Referendum of Laws. (See also *Direct Legislation.*) A constitutional procedure whereby a measure enacted by a legislature may be subjected to the judgment of the people before becoming effective.

The referendum has been closely associated with the initiative of laws; but the two procedures differ in character, the referendum being conservative in its nature, and the initiative, radical. The referendum, as well as the initiative, in its modern use, has been most highly developed and employed by Switzerland, and it was from this country that the influence came which lead to the adoption of these procedures for ordinary legislation in American states.

The referendum may be "optional" or "obligatory." An optional referendum occurs when a legislature provides that a measure shall not become effective until approved by the voters of the jurisdiction affected. In this form, the referendum was common in the United States even before 1898, the year when the popular referendum of statutory laws was adopted by South Dakota, and was applied particularly in such matters as county division and creation of bonded indebtedness.

Under the obligatory use of the referendum, a law is suspended, usually for 90 days, to provide an opportunity for the voters to scrutinize the measure and, by petition of a certain number, to compel its reference to popular judgment at a general election. There may be exception of certain law, called "emergency measures," such measures usually requiring for passage an extraordinary majority of votes in the legislature.

Besides the "popular" referendum of laws, recent constitutions have provided other means whereby legislation may be submitted to the judgment of the voters. In Sweden, by a recent constitutional enactment, there is a referendum of laws if the government and the national legislature concur in its submission.

The popular referendum has made no progress in the Latin American republics, but in some of these countries, according to an old practice, acts of the government are referred to the councils of the municipalities for approval.

There appears to be a growing practice to except certain measures of the legislature from the operation of the referendum. The constitution of the state of Massachusetts, the last American state to adopt the referendum, exempts from its operation a large group of subjects.

In the United States, 21 states have adopted the referendum in some form.

The referendum is a popular safeguard against hasty or corrupt action of legislatures. In the United States its adoption was distinctly encouraged by distrust of state legislatures. This dissatisfaction, at an earlier period of constitutional amendment, took the form of placing in the state constitutions a wide variety of limitations upon the legislative power. The substitution of the referendum for this precaution would seem to recommend the repeal of many existing constitutional limitations which now unduly limit and embarrass the work of state legislatures. See *Referendum and Initiative of Laws.*

Republic. A political community which is not under monarchical government, that is, in which there is no nominal or actual emperor, king, or prince. The essential characteristic of a republic would seem to be that political power is not vested in one person or in a single line of descent. The term has been used repeatedly to cover aristocratic governments, like the medieval "Italian republics." More and more, however, the word has come to imply a government in which political authority rests on popular will and support and is exercised through representatives chosen by the people. In this sense Great Britain is sometimes referred to as a republic, and the Roman Empire was held to be a republic long after political power was consolidated in the emperor.

The word republic is frequently used as synonymous with democracy; by other writers it is distinguished from democracy as being a government where the power is exercised by elected representatives of the people, rather than by the people themselves. Owing to these contrary usages, an arbitrary use of the word republic seems necessary; namely, to designate a state characterized by the absence of the institution of kingship and by the exercise of political power for the glory and advantage, not of a ruler, but of the commonwealth, or, to use the Roman

phrase from which the word republic is derived, the *res publica*.

Republics Supersede Monarchies. A national monarch may be an impressive and useful symbol of strength, unity, and devotion, and, under such a guise, monarchy in all ages has appealed to popular admiration and has commanded intense devotion. The conception of a republic, in which the central personal leader is lacking or is transitory, undoubtedly calls for higher political development and is successful only by the display of higher popular political capacity. Thus monarchy is far older than republican forms of government and has played a far greater part in the political life of the past. The modern tendency, however, is distinctly toward the substitution of republics for monarchies. Even so ancient and conservative a state as China has, in recent years, become a republic, apparently with the preference of the vast body of the nation. The advance of republicanism as an institution has been strikingly exhibited in the change of governments since the World War.

The New World is the natural home of republics, and the United States of America, the foremost example. The Constitution of the United States not only provides a republican form for the national government, but, while, in other respects, leaving the states free to devise such political institutions as they may prefer, guarantees to every state a "republican form of government." American political and social institutions may be considered to be thoroughly implanted upon the republican ideal. Even the so-called "dictators" of Spanish American history have professed republican principles and, while holding tenaciously to dictatorial power, have actually advanced the ideals of republican society.

Republicanism rejects not only kingship, but hereditary caste, class privileges, and hereditary distinctions. The price of this repudiation and of the refusal of these great rewards to political ambition is the frequent inability of republics to command and to keep in the public service the highest talent of the nation. Republics, even more than monarchies, demand a constantly higher order of political sagacity and patriotic devotion. No republic has yet fully solved the problem of keeping at its head those best fitted to serve the interests of the commonwealth.

Residence. Legally, the place where one habitually resides or sleeps. Residence differs from "domicile" in that the latter term generally designates a more permanent attachment to a particular place, and includes the intention of remaining in that place indefinitely, while residence may connote a less permanent habitation. One may possess two residences, but he can have but one domicile, at any particular time. In the United States, voting privileges and eligibility to office usually are limited to one place of residence.

Retroactive Legislation. A law made to apply to acts performed or to conditions existing prior to its enactment.

Revolution, Right of. The right of the people to revolt against the established government whenever that government becomes tyrannical or fails to afford public satisfaction.

This right was particularly asserted by such writers as Locke in England (1689), by Rousseau in France, and by Thomas Paine during the American Revolution. The Declaration of Independence, in which the ideas and even the language of Locke are used, is based on the assertion of this right.

The right of revolution is particularly opposed to the doctrine of legitimacy of royal rule or of "divine right."

Rider. A measure, the passage or executive approval of which seeming doubtful, is "tacked on" to a bill which is assured of passage, such as an appropriation bill, in order that the doubtful measure may "ride in" on the strength of the main bill.

This device is frequently effective in the Federal government of the United States because of the inability of the president to veto a part of a bill, without invalidating the whole. In many states, however, the governor is now given the power to veto part of a bill and to ratify the remainder.

Right and Left. In legislative bodies of continental European countries generally it is the fixed habit of the conservative groups and parties to seat themselves on the right hand of the president or speaker, and of the liberal or radical elements to seat themselves on the left. The terms have thus come to be used as indicative of conservative and radical position on political matters; and, with the differentiation of positions within the group, the expressions "extreme right" or "extreme left," etc., have come into vogue. Thus the socialist party, which is always a left group, is divided into "right and left wings" according to the moderate or the revolutionary character of the group. The term "center" is used for middle parties or groups.

Roll Call. If one-fifth of the members present of either house of Congress wishes a record of the yeas and nays on a particular measure, a roll call vote showing how each member voted must be taken and published in the *Congressional Record*.

Roorbach or **Roorback.** A libel, or falsehood of a defamatory nature, used for political ends. The word had its origin in the presidential election of 1844, when a forgery of this nature was published to the detriment of James K. Polk. It was supposed to be an extract from the *Travels of Baron Roorbach*, but was later traced to G. W. Featherstonhaugh's *Tour*, whence the malicious statement had been drawn by a newspaper writer, William Linn.

Sabotage (*sá'bô'tázh'*). The wanton destruction of the property of employers by laborers, or the practice of various means to slow down or stop production, to damage machinery, to discourage employers, and to make capitalism unproductive. As a resort for the enforcement of labor demands, it is a substitute for the strike. As stated by an advocate, "it means to strike but stay on the pay roll." It is particularly advocated by the revolutionary element among the working class as a means to end private ownership of productive capital.

The modern practice of sabotage arose among the radical French labor circles known as "syndicalists" (See *Syndicalism.*), and the term is derived from the supposed practice of a French workingman of throwing his wooden shoe, *sabot*, into moving machinery, thereby causing wanton damage.

Sabotage, or the destruction of private property, began to be advocated and practiced in the United States about 1910, particularly by members of the "Industrial Workers of the World." (See *I.W.W.*) It was advocated also during the first years of World War I by sympathizers with Germany, as a means of stopping the production of munitions furnished to the Allies. During the World War and immediately thereafter, legislation, called "syndicalist laws," was passed by many American states, severely punishing the practice of sabotage and even making it a crime to advocate such doctrines.

Satellite. A country which is under the political and economic domination of a stronger power.

Scratching. The practice, by American voters, of marking out from a party ballot one or more of the regularly nominated candidates. It is the opposite of voting a "straight ticket."

Sectionalism. The advocacy of measures or policies designed to promote the interests of a particular section rather than the good of the country at large.

Self-Determination. The principle or proposal that every distinct people or nation ought to have the right to determine the question of its independence, its form of government, and its political destiny. The phrase appears to have originated in the "Manifesto to the Proletariat" adopted by the conference of antinationalist socialists, held at Zimmerwald, Switzerland, in September 1915. This manifesto summoned the propertyless workers of Europe to a battle for peace "without annexations or war indemnities." Neither whole nations nor separate sections of nations were to be forcibly incorporated into states. "The right of self-determination of peoples," it declares, "must be the indestructible foundation of the creation of national relations." The Zimmerwald conference was attended by Lenine and by other Russian socialists, and among the early declarations of the Bolshevik revolutionary government in Russia was a pronouncement for "no annexations, no indemnities, self-determination of peoples."

Stated in a broad way, this declaration would seem to be equivalent to the principle of "government with the consent of the governed." On some such understanding, the principle of self-determination was championed by President Wilson in his proposals for world peace, preceding the entry of the United States into the war, and particularly in his program presented to the Paris Peace Conference. In President Wilson's mind it was associated with a league to maintain the rights of peoples and with the probable reduction of certain great states into a number of minor sovereignties. In Paris the phrase became a shibboleth leading to demands by numerous peoples for national independence. Its practical result is seen in the dissolution of the Austro-Hungarian Empire and in the emergence of new states, such as Poland, Esthonia, Latvia, Lithuania, Czechoslovakia, and Ruthenia, and particularly in the declarations of independence of numerous small republics within the area of the former Russian Empire. The phrase also had great influence on political movements in Ireland, Egypt, Persia, the Ottoman empire, and elsewhere.

Difficulties of Application. In spite of the glamour attending a declaration seemingly so democratic, the principle is difficult of application and may even lead to political reaction. Much depends upon what constitutes a small nation or people with the presumptive right to separation and self-government. Peoples are not wholly independent, economically, politically, or morally, especially where they have previously been united under a common sovereignty. Dissociation inevitably carries with it the repudiation of certain obligations involving hardship,

injustice, and, almost inevitably, economic injury to all parties. Particularly has it led to the setting up of new economic barriers, where freedom of trade and movement formerly existed, to the stimulation of animosities, and to a particularism dangerous to political unity and stability. Political progress, according to one well established ideal, is toward the uniting of the human family into larger political units, with a consequent suppression of national prejudices, rivalries, and retaliations, either political or economic. The multiplication of small states, in this point of view, must be regarded as a backward step. For the great nations, particularly when composed of peoples presenting local differences, united under some form of federal government or empire, the principle is a disintegrating one, dangerous to their existence. Strictly applied, the right of self-determination would have justified the separation of the Southern Confederacy from the American Union, or the division of any state on grounds satisfactory to the seceding portion.

Senate. The upper legislative chamber in the Congress of the United States and in each of the 48 states of the Union except Nebraska; also a similar body with the same name in a number of other modern governments.

The happy agreement in the American constitutional convention to give to all the states equal representation in the Senate made possible the acceptance of the Federal Constitution. This feature has been successfully copied in the "senates" of other federal governments, including Canada, Australia, Union of South Africa, Mexico, and Argentina, in the Union of Soviet Socialist Republics (Russia), and in the Swiss "Council of States."

In a large number of other governments, American and European, which are not federal, the upper chamber of the national legislature has been given the name of Senate. The list includes France, where in 1875 a Senate was added to the National Assembly; Belgium under the constitution of 1831; and, more recently, Italy and Cuba.

It is the general practice, following the American provision, to set a higher age qualification for eligibility to a senate, to fix a longer term than for the lower house, and to renew the senate by degrees, thus giving it a continuous life and a slowly altering membership. The net effect is believed to be to increase the conservative character of the government.

Senatorial Courtesy. A custom whereby the president, in making nominations to Federal offices, is expected to consult the United States senators from the state in which the vacancies exist before submitting nominations to the Senate for confirmation. Where the senators are of a different political party from the president, the custom is not applicable.

Separation of Powers. A principle of government which sharply separates the executive, legislative, and judicial branches of the government, confining each to its special sphere and making each independent of the other two.

The principle was enunciated by the French political writer Montesquieu in his *Spirit of the Laws*, and was, actually, a misapprehension of the British constitution as it existed in the 18th century. To the supposed separation of powers and the "checks" upon arbitrary action which it secured, Montesquieu attributed the security of English freedom.

The theory of Montesquieu was much regarded by the founders of independent government in America and by them the separation of powers was proclaimed as an indispensable element of free government. Many state constitutions endeavor specifically to apply it and to make it mandatory. The constitution of the state of Massachusetts, of 1780, declares: "In the government of this commonwealth the legislative department shall never exercise the executive and judicial powers or either of them; the executive shall never exercise the legislative and judicial powers or either of them; the judicial shall never exercise the legislative and executive powers or either of them, to the end that it may be a government of laws and not of men."

As a matter of fact, the precise principle never existed in England and has not been truly realized in the United States. The president and the state governors participate actively in legislative programs and exercise a veto over laws. Courts have been intrusted with numerous executive functions, and, by judicial interpretation, they expand or nullify legislation. In the commission type of government, the theory is entirely abandoned.

Serfdom. A status of personal servitude whereby the peasant is deemed bound to the soil upon which he is born, and is required to perform certain services and to give to his lord a certain proportion of the yield of the land. On the other hand, the peasant may legally be entitled to the protection of his lord and to certain assistance, and may have rights to his holding of which he may not arbitrarily be dispossessed.

Serfdom is closely connected with the institution of feudalism. It existed generally on the continent of Europe until the close of the 18th century. The French Revolution suppressed it in France and in other countries to which the Revolution extended. In Prussia it was ended by the edict of Stein in 1807. In Russia it continued until the emancipation of the serfs by the czar Alexander II in 1861. Until the reform of the landholding system in 1871, Japan had a feudal form of society, in which the status of the tiller of the soil resembled European serfdom. Its last traces in England disappeared in the reign of Queen Elizabeth.

Single Tax. A principle of taxation, advocated by Henry George in his work *Progress and Poverty*, published in 1879, whereby all increase in the value of land would be appropriated by the state as a substitute for other taxes. The principle rests upon the theory that the appreciation of value of unimproved land is an "unearned increment" due to the growth of society itself, and not to the exertions or investments of the owner. Thus the owner justly may be deprived of this increased value by land taxation sufficiently heavy to absorb it.

The theory has attracted less attention in the United States than in Great Britain, where vast private estates held in an unimproved condition invite the application of the doctrine. It has been sparingly applied in certain cities of the United States and Canada.

Smuggling. Illicit importing of goods into a country without submitting them to the customs authorities or paying legal import duties.

Social Contract. The theory that the state originates in a contract between individuals, whereby the freedom and the equality of the "state of nature" are surrendered for the advantages of state protection and authority.

The theory fills a large place in the history of political philosophy, particularly in the writings of Hobbes, Locke, and Rousseau. Thomas Jefferson and many of the political thinkers of the time of the American and French revolutions rested their governmental doctrines upon this theory of the origin of the state, and from it deduced their justification of the right of revolution, or of dissolving the social compact.

As a historical explanation of the origin of political society, the social contract theory is rejected by modern students of government.

Socialism. A social program whereby private ownership of land and of all other "productive capital" would be extinguished in favor of ownership by the state.

The present day orthodox theory of socialism is that expounded by Karl Marx, particularly in his work, *Capital*, published in 1872, although the essential ideas were expressed in the *Communist Manifesto* issued in 1848 by Marx and Engel.

The distinctive feature of Marxian Socialism is the doctrine that the socialist state will arise inevitably out of the evolution of modern industrialism. Marx predicted a progressive and inescapable concentration of the means of production in the hands of the few, until there would remain but a few capitalists, or bourgeois, on the one side and the rest of the community of propertyless workers, or proletariat, on the other. The so-called "middle class" would entirely disappear. When this stage had completely evolved, modern industrialism would be "mature," and revolution, either peaceful or bloody, would be inevitable. The masses would take from the capitalists control of the means of production and would operate them in the interest of the community. The socialist state would arrive.

Economic Crises. The chief impetus toward the transition is held to be economic crises, or depressions. Their recurrence is represented as inevitable under capitalism. From the Socialist point of view, these crises serve the double purpose of speeding up the concentration of "productive capital" in the hands of the few and creating active discontent in the involuntary idle. These results are expected to lead to a demand that society should plan its production so as to use the services of all who wish to work.

Half a century after the death of Karl Marx, Socialism passed from the realm of political theory to a testing laboratory, so to speak. That is to say, it was adopted by Russia. Its evolution there did not follow the sequence predicted by Marx, since capitalism was much less advanced there than in many other countries.

Socialism and the Nation. Orthodox socialism repudiates national allegiance in favor of loyalty to the "proletariat of all lands." It views the modern state as the buttress of capitalism and as the means for "imperialistic aggressions" in favor of the capitalist class. In the World War, while the socialist parties generally supported the governments of their respective countries, an extreme international wing in each belligerent state repudiated the war aims of its nation and even sought its defeat or overthrow. A so-called "Third International," with headquarters at Moscow, directs the policy of those working in separate nations for the realization of Socialist aims.

To Marx is due also an "economic interpretation of history" in which all human activity and social development are held to be controlled by economic motives and causes.

Social Legislation. Under this term is embraced a wide variety of measures designed to protect terms of employment and to improve the general well-being. Modern legislation of this character followed the rise of the factory system in England and in Continental Europe and the industrial inventions which revolutionized industry in shops, mines, and transportation.

Legislation in England. During the first decades of the 18th century, there prevailed a doctrine of *laissez faire*, or complete abstention of government from interference in the conditions of employment and in the relations between employer and laborer. Such interference was held to be an unwarranted trespass upon the freedom of employment and of labor and an unwise disturbance of the law of supply and demand. Factory and mining conditions, however, became so deplorable as to lead, in 1802, to the beginnings of English social legislation, the first law regulating the labor of "bound" children. Such legislation was at first confined to the protection of the health, safety, and morals of children and women. In 1842, a working day in excess of 10 hours for women and children was prohibited. The English example was followed in many other industrial countries toward the end of the 19th century.

Legislation in America. In the United States, laws have been passed for the protection of the laborer from the following hazards of employment: dangerous gases, acids, and dusts, poisonous and nonpoisonous; harmful bacteria and micro-organisms; compressed or rarefied atmospheres; improper lighting; extremes of temperature and of humidity; and excessive physical or mental strain. Many laws have been designed to prevent accidents both to employees and to the public, and to require the installation of provisions for safety in dangerous employments, such as mining. Child labor is limited or prohibited in most states. Federal laws prohibiting employment of children having been ruled invalid by the Supreme Court, a constitutional amendment was submitted to the states in 1924 which would empower Congress to regulate or prohibit the employment of persons under 18 years of age. It was not ratified, but the situation was saved when the Supreme Court held that the child labor restrictions in the Fair Labor Standards Act of 1938 were constitutional.

Social Security. Legislation to insure workers against the hazards of industrial life was first enacted by Germany, a law of 1883 providing for sick benefits. Such benefits have been widened in numerous countries to include compulsory accident insurance, unemployment compensation, aid for dependent children and invalids, and old age pension. Social security is one of the rights guaranteed under the constitution of Russia.

Other measures regulatory of abuses are laws requiring the payment of employees in cash rather than in store credit or commodities ("truck laws"); the regulation of housing accommodations; and the protection of immigrants.

A comprehensive Social Security act was passed by the United States Congress in 1935, providing for a system of old age pensions, unemployment insurance, and aid for dependent children, and the blind.

Old Age Pensions. These are of two kinds—aid for the needy aged and annuities based on the employment history of the individual. The first kind is a contribution to be matched by states and paid on a non-discriminatory basis to indigent persons over 65 years old. These are the assistance grants paid out of federal and state appropriations and are distinct from the Social Security insurance programs financed by taxes.

Old age pensions of the second type are entirely under the supervision of the Federal government. The system provides payment to retired persons and to survivors of deceased persons covered by Social Security. The age limit of eligibility is 65 years for men and 62 years for women. By a measure passed by Congress in 1956, protection benefits became available for the first time as a matter of right to persons totally and permanently disabled at age 50 or higher who are covered by Social Security. Funds for the program are raised by a payroll tax falling half on the worker and half on the employer.

Unemployment Compensation. The Federal government does not directly administer this program. Its part is to collect a pay roll tax and to hand the proceeds, less administrative expenses, over to States for carrying out their own programs provided these programs meet the standards laid down in the Federal law as interpreted by a social security board. Those who have been employed for a minimum period and then lose their jobs are entitled to unemployment compensation for a limited number of weeks. Details differ from state to state. Funds are raised by an impost on pay rolls of employers.

Provision is made also for Federal contribution to states on a matching basis for aid to dependent children and for child welfare. This includes support for needy mothers with children to support. Each state program must be mandatory and uniform in all districts as a condition of receiving Federal contributions.

The Minimum Wage. Legislation has also been passed establishing the "minimum wage" that may legally be paid in certain industries. The theory of a minimum wage is that it corresponds to the lowest compensation which will afford a livelihood that is not destructive to health and to self-respect. Minimum wage laws were initiated by the state of New South Wales, Australia, and were followed by legislation of the British Parliament affecting the industries of Great Britain. Such laws in the United States were long held invalid as interfering with freedom of contract. In 1936, however, the supreme court reversed itself on this point (*Parrish* vs. *State of Washington*).

Sovereignty. The ultimate or supreme political authority in the state. In a democracy, sovereignty is vested in the people; in an absolute despotism, it is in the monarch.

Soviet (*sō'vyĕt'*). Russian term for a council or deliberative body; used particularly with reference to the village, city, county, and provincial councils, composed of deputies elected by the workmen, soldiers, and peasants, which form the basis of the Russian Soviet government and constitute the governing bodies of the local districts. See *Russia*.

Sphere of Influence. A "sphere of influence" or a "sphere of interest" is a region, frequently the territory of another recognized state, within which some foreign power claims a position of preponderant or "special interest." The conception arose in the "partition of Africa" by the European states, which followed rapidly after 1884. In these settlements, which were partly arranged at the Berlin Conference of 1884-85, the entire seaboard of Africa, not already possessed, was distributed as colonial possessions or protectorates among the European states, particularly Great Britain, France, Belgium, and Germany. In addition, the interiors or "hinterland" covered by the coastal possessions were declared to be "within the sphere of influence" of these particular states. The agreement aimed to establish rights of subsequent penetration and development over areas of Africa which the colonizing powers were not at the moment prepared to occupy effectively.

Subsequently the conception was applied to China, where vast areas of that country were more or less definitely accorded by one European power to another as a sphere in which economic and political preference was recognized. The foreign country claiming a sphere in China endeavored to maintain a claim of exclusive or preferential opportunity in railroad building, in mineral development, and even in financial and political affairs. Certain of these arrangements were recognized in treaties between the several foreign states.

Following the Russo-Japanese war, Russia and Japan, by a series of three secret treaties, divided Manchuria and Mongolia into respective spheres of influence, in which each power recognized the predominant position and privilege of the other.

Spheres of interest are in direct conflict with the policy of the "open door." The United States has never formally recognized spheres of influence, and in the Far East and the Pacific it has vigorously protested them. It would seem to be a fundamental foreign policy of this government, while seeking no exceptional privileges for itself, to resist the creation of such privileges for other nations.

Splinter Group. A group which has seceded from a larger parent political organization.

Stampede. A break in the balloting at a nominating convention, when the great majority of the delegates desert the candidates whom they have hitherto supported, and rush to the support of the candidate who appears likely to be the nominee.

State, The. The word "state" is popularly used to denote a country, such as France. It is used also, both popularly and legally, to designate the constitutent parts of the United States, as, the state of Ohio. In this latter sense, the word is applied to the parts of the commonwealth of Australia, as, the state of Queensland.

As used in political science, the term "state" implies a body of people organized for government within a definite territory, and possessing a degree of independent authority within that area. Theoretically, the state is the corporate being or legal person which, under the above conditions, is acknowledged as the supreme source of law. The distinguishing attributes of such a state are sovereignty with respect to its own affairs and independence with respect to other states. The political state is thus to be distinguished from the territory over which it is sovereign and from the government through which it operates. Political scientists generally agree that the state is constituted by the will of the people who share in the making of laws and the choosing of officials.

Modern political thought recognizes that both sovereignty and independence are never actually absolute, but always relative, even in the greatest states. Further it is conceded that a sovereign state may delegate certain functions without impairing its sovereignty. These two considerations justify the application of the word "state" to

the constituent units of a larger state, where, as in Australia and in the United States, a federal form of government exists. By virtue of the constitutions of these countries, the individual commonwealths share in the sovereignty of the general state while retaining, in the spheres of their peculiar interests, a measure of sovereignty.

State Judiciary. In the United States, each state maintains its own judiciary, comprising courts of merely local jurisdiction in counties and municipalities and courts of various higher grades. Each state system includes courts of general civil and criminal jurisdiction as well as special tribunals for certain types of cases. Some of the courts exercise both judicial and large administrative functions, the practice varying rather widely in different states.

The law administered in a state court is, in general, that of the state statutes, the Federal statutes, and the English common law adapted to American conditions. In Louisiana, the civil law is based upon French and Spanish precedent. A state court is bound by the Federal Constitution and by the constitution of its particular state. Some judges and justices are appointed, but the general state practice is to elect judges. In state courts of general jurisdiction a jury is employed, a unanimous verdict being usually necessary.

The following summary represents, in general, the organization of the state judicial systems:

1. *The lowest grade of courts,*—(1) the justice's court, held by a justice of the peace, who may be a town, township, or county officer; (2) municipal courts (under various names) in towns and cities, presided over by judges or magistrates, who are officers of the municipality; (3) the county court, held by a judge who is, in some states, a county official and, in others, a state officer.

2. *The intermediate grade of tribunals,*—known variously as district, superior, and circuit courts. The judges of these courts are state officers, elected or appointed, either for the entire state or for particular districts. Under whatever name, these are the principal trial courts of the state. In a few states, another court, sometimes called "supreme court," either takes the place of the circuit court or is intermediate between that court and the highest tribunal of the state.

3. *The highest tribunal, or court of last resort.*—In most of the states, this is called the supreme court; in others, it is termed court of appeals, court of errors, or court of errors and appeals. The opinions rendered by this court are held to be of binding authority in the lower courts of the state.

Special Classes of Courts. (1) *Court of Probate.*—Generally, this name is applied to the court having charge of the probate of wills, the administration of estates, and the supervision of orphans. In New York and New Jersey, it is called the surrogate's court. In Georgia, the old ecclesiastical term "ordinary" is applied to the judge of probate. In Pennsylvania, Delaware, and Maryland, the name "orphans' court" is used.

(2) *Court of Common Pleas.*—Originally, in England the term "common pleas" applied to cases arising between subjects, as distinguished from those to which the crown was a party. In the United States, the name has been retained in New Jersey, Pennsylvania, Delaware, Ohio, Missouri, and Kentucky for courts whose jurisdiction is limited to a district made up of one or more counties.

(3) *Court of Quarter Sessions.*—This name arose originally from the quarterly sessions held by English justices of the peace. In Pennsylvania, a court under this title has some important administrative functions.

(4) *Juvenile Courts.*—These are sometimes called children's courts. Their jurisdiction includes cases of dependent, neglected, and delinquent children. Generally, the upper age limit is 16 years, although in some states it is 18 or even 21 years. These courts endeavor to correct the conditions responsible for a child's wrongdoing rather than merely to determine punishment for an offense.

State Rights. The field of independent action enjoyed by states in the American Union. The discussion of the exact character and scope of these rights has played a great rôle in the constitutional history of the United States. The framers of American government were divided between those who sought a strong national government and those who jealously defended state rights. Among the most extreme of state claims, advocated after the formation of the Union, were the doctrine of "nullification," or the right of a state to nullify national legislation which it might judge inconsistent with the Constitution, and the doctrine of "secession," or the right of a state to withdraw at will from the Union. These doctrines were lost by the issue of the Civil War.

Growth of Federal Power. There has been a natural and almost inevitable tendency for the Federal power to grow. This growth has been contributed to by decisions of the supreme court of the United States, which during long and important periods of its history was disposed to interpret the Constitution in favor of Federal jurisdiction. But the main factor operating to enhance the power and importance of the national government has been the extraordinary integration of the American people as a nation, the predominance of their national loyalty and interest over state and local feeling, and the binding together of all sections of the country by economic attachments.

This economic unity, which was happily provided for by the Constitution when it assured freedom of trade between the states, has made necessary an ever-increasing authority of the Federal government over economic affairs. This is particularly evident in its control of interstate commerce. It has appeared also in federal promotion of agriculture, in protection of labor, and in the enforcement of nationwide prohibition under the 18th amendment.

The 14th amendment extended the authority of the national government to the protection of life, liberty, and property, while the 15th amendment, enfranchising the colored race, and the 19th amendment, guaranteeing political rights to women, largely removed from the decision of the states the determination of the rights and privileges of citizenship. The 16th amendment, conferring upon Congress the right to levy taxes upon incomes, diverted a source of public revenue of increasing interest to state taxation. In recent years, Congress has passed a number of appropriations providing for the distribution of sums of money among the states in aid of education, agriculture, and other projects, provided additional appropriations are made by the states and a national policy is followed in their expenditure. These sums of money, appropriated out of the national treasury for objects belonging exclusively to state government, have had an undoubted tendency to bring further under Federal control matters constitutionally reserved to the state.

Present Status. The continuous growth of the power, service, and repute of the national government, while highly gratifying from many standpoints, has undoubtedly an unfortunate effect upon the vitality and activity of state governments, and prejudices popular interest in their conduct. Thus the question of state rights emerges anew in American politics, and it is now representative, not of the aims of those who desire to deny or to reduce the necessary powers of the Federal government, but rather of the purpose of those who feel the necessity of preserving an actual distinction between the scope of the national government and the functions which properly and necessarily, under a federal system, are reserved for state governments. Interest in state rights in this sense is no longer represented by party lines. While the Democratic party originally was a strong "state rights" party, since the Civil War, Democratic presidents, hardly less than Republican, have by their actions augmented the national control. And some of the American statesmen who are today most sensitive to the need of preserving state rights are members of the Republican party.

Statute of Limitations. A law which prescribes a definite limit of time within which a legal right or remedy must be prosecuted by action in the courts, or thereafter be barred. Such laws are intended to protect the individual against stale demands, when, from lapse of time, death of witnesses, failure of memory, or other causes, the true situation may be obscured.

The periods prescribed by statutes of limitations vary in the different states, and differ in the same state for different kinds of claims. Under the laws of most states, rights in regard to property must be asserted within twenty years or be barred by the continuous "adverse occupation" of another.

Steam Roller. A term descriptive of the manner in which the faction in control of a political convention or legislative body may force through a slate or program previously determined upon. The use of the "steam roller" at the Republican convention of 1912, through the control of the national committee, gave the term and the procedure wide publicity.

Steering Committee. An informal committee in each house of Congress, dominated by the leading members of the majority party in the body, which determines the order in which business shall be taken up by the house. In the House of Representatives, the steering committee is practically synonymous with the committee on rules, which is vested with the power of reporting a special rule placing any important measure ahead of ordinary business.

Still Hunt. A secret campaign on behalf of or against a candidate for office. The phrase is used also to designate secret propaganda against a particular candidate.

Straight Ticket. See *Scratching*.

Straw Vote. An informal, unofficial canvass of political votes, taken prior to a regular election, for the purpose of determining the direction of political sentiment.

Syndicalism (*sĭn'dĭ-kăl-ĭz'm*). A labor organization originating in France which has for its aim the destruction of the state and the organization of society by trade-unions ("syndicats"). The organization upon which syndicalists depended for the accomplishment of their aims was the

"General Confederation of Labor" (*Confédération Générale du Travail*, commonly known as the "C. G. T."), founded in 1895 and attaining a final form of organization in 1902. This was a national association of revolutionary labor unions.

The Syndicalist Program. Syndicalism differs from socialism and the extreme form of socialism, or bolshevism, in that it entirely repudiates the state. In this respect it approaches anarchism. Syndicalism, however, adopts as a central principle the distinctive socialist doctrine of the "class war." It has developed certain tactics and policies which have been adopted also by bolshevism. These tactics completely repudiate political activity or "parliamentary action" and substitute therefor methods of industrial warfare, commonly called in America "direct action." These include the boycott, sabotage, and the "general strike." By the general strike is meant such an organization of industrial labor, embracing all crafts and industries, and so general and synchronous a cessation of labor therein as to completely paralyze industrial production and the supply to communities of the necessities of life. By so general a strike, syndicalists aim to throw existing society into chaos, to overthrow the state, and to gain social power for the federation of industrial workers.

Syndicalism came into prominence in the great French railway strike of 1910, which was broken by the action of the French minister Briand, who arrested the strike committee, mobilized the army reserves, including strikers, and replaced striking workingmen by soldiers under military discipline.

As stated above, syndicalism differs fundamentally from socialism and communism, with which it is frequently confused, by the fact that these latter social programs have in mind the realization of a "great state" devoted not only to political objects, but also to owning and operating all productive capital, controlling the activities of all individuals, and thereby becoming the common employer.

Influence of Syndicalism. The World War and the repressive action of the French government upon all revolutionary movements shattered French syndicalism, and, since the rise of bolshevism in Russia, revolutionary elements have turned toward the program of this socialist party rather than toward the program of syndicalism. The influence of its theory, however, is traceable in other movements than the above, and particularly in "guild socialism," which, like syndicalism, views with alarm that exaggeration of the state which pure socialism would produce, and proposes to organize society in a decentralized form around industrial groups or "guilds."

Tariff. The word is used in America in two senses: (1) It is used to describe any schedule of charges, but particularly rates for the shipment of goods by public-service corporations, or other services afforded the public. Such charges at the present day are usually controlled by the government, either through the interstate commerce commission or by public utility commissions in the states. (2) Tariff is used to designate the scale of customs duties imposed upon foreign products entering home territory. It is in this second sense that the term "the tariff" is used politically in the United States.

Broadly speaking, a tariff is devised either "for revenue only" or "for the protection of home industry." As a means of raising revenue, tariffs have been employed by nearly all governments. This form of taxation has the advantage of being "indirect." It falls upon the people in higher prices paid for such articles as they purchase and thus avoids the difficulty and the irritation arising from the collection of "direct taxes"; it is relatively easy of administration, being collected at the frontiers at certain designated points where customhouses are established; and, in the case of a highly industrial or commercial people, it may be productive of a very great revenue.

Protection. A "protective tariff" rests upon different principles. It is devised not solely nor mainly for revenue, but rather as a means of building up national manufactures or other forms of production in the face of foreign competition which, if given free entry, would endanger the native industry. It is upon this basis that American tariffs have been largely framed. The effect of such tariffs is undoubtedly to bring profit to certain interests and to certain sections of the country at the cost of the purchasing public generally. Defenders of the protective system, however, urge the desirability of developing all reasonably profitable industries and forms of products as a means of bringing a nation to its highest point of economic development and of making it self-sufficient, particularly in the event of war and blockade.

Reciprocal Trade Agreements. These are pacts, authorized by Congress in 1934, between the United States and other nations for the reciprocal lowering of tariffs. The policy is based on the belief that protective tariffs adopted by many nations against one another's goods have the effect of choking trade and production to the disadvantage of all. These agreements extend to other nations the advantages given each nation signing a pact, but with the proviso that these other nations may be barred from the benefits if they refuse to enter into similar agreements after a reasonable time or if they discriminate against American products. The adoption of this policy in America came at a time when trade barriers had been raised to unprecedented heights and when commerce and industry throughout most of the world had dropped to less than half their volume of five years earlier.

Free Trade. Opponents of protection, or "free traders," take the broad view that the modern world is, or should be, organized internationally for industrial production. Under such a system each country would produce mainly those things which, because of its resources or its situation, it can produce most cheaply, and would purchase elsewhere, in the cheapest markets of the world, other necessities and luxuries of life. Thereby, it is argued, we should avoid the waste through excessive cost to the consumer, occasioned by an artificially stimulated domestic production of goods that can be acquired abroad more cheaply.

Taxation. Taxes are general compulsory contributions of wealth, levied upon natural persons or upon corporations, to defray the expenses of government. They are inseparable from all governments and are a part of the price paid for protection and for the advantage of society. While taxes are general in the sense that they affect all persons and all classes of society, there have been and are many exceptions to their universal payment. These take the form of "exemptions." In European feudal society, the nobility, the clergy, and their properties were untaxed. Even in democratic countries, like the United States, it is usual to exempt from the payment of certain direct taxes persons possessing small incomes or small properties. Ex-soldiers or veterans of certain wars are frequently granted tax exemptions. States that impose a "poll tax" or a per capita tax upon citizens generally exempt women, even though enfranchised, from the payment of poll tax. Taxation may take the form of money payments or of personal services, such as labor on roads or public works.

Kinds of Taxes. Taxes may be classified as "direct" and "indirect." The former embrace contributions of money or service directly furnished by those upon whom the tax is imposed. Indirect taxes take the forms of customs duties, "excises," or taxes on articles of luxury or common use, and government monopolies, where the state reserves the exclusive sale of a product at a price advantageous to the public revenue. The most common and lucrative form of direct tax is the property tax, which may be levied upon land or "real property" or upon movables or "personal property."

Other forms of indirect imposts are the sales tax and the pay roll tax. The most widely used form of the sales tax in America is that imposed on gasoline. The principal argument advanced against sales taxes is that they fall with disproportionate weight on those least able to bear them. The pay roll tax has been used to pay the costs of social security legislation, on the ground that insurance against uncertainty in employment is properly accounted as one of the costs of doing business.

Two forms of taxation which have become extremely important in recent years are "inheritance taxes," or "death dues," and "income taxes." Under the former tax, the state appropriates a certain proportion of the estate of a deceased person before the balance is distributed among his heirs. In the second form of taxation, the state regularly collects a proportion of the gross or the net income of a person or of a corporation. Not only are these last two types of taxes, in certain cases, made to yield large revenues, but they have a definite social effect in limiting the accumulation of private fortunes and their succession. Usually the amount appropriated by the government increases rapidly with the size of the fortune or income.

Income Tax in America. In 1894, the Congress of the United States imposed a Federal income tax, which was declared unconstitutional by the supreme court in 1895. This decision led to the adoption of the 16th amendment, empowering Congress to lay and to collect taxes on income without apportionment among the several states. The Federal income tax became an immensely valuable resource to the government. The states also have made use of this source of income.

As applied to corporations, the income tax has been used as an instrument of governmental policy. By making the rate higher for larger incomes, an advantage is given to smaller corporations. Similarly, by assessing a higher rate when larger proportions of earning are retained instead of being distributed in profits, money is forced out to individuals where, if the individuals are wealthy, it may be taxed at the very high rates imposed on large personal incomes. This device is aimed against concentration of wealth.

Tax Dodging. The practice of avoiding payment of taxes. A means frequently employed by people of wealth is that of acquiring a nominal or actual residence in a small town or village where taxes are light, or in another state,

in order to avoid the heavy personal property taxes which they would bear if legal residents of the city in which their interests are actually centered.

Tenure of Office Act. The United States Constitution, while making the president the general appointive authority to positions in the Federal service, is silent upon the method of removing such officers. In 1789, during the session of the first Congress, the question of whether the president could remove such officers without the consent of the Senate was raised, and at that time, after some discussion, it was recognized that the power of removal rested in the president.

In 1867, however, Congress passed, over the president's veto, an act known as the "Tenure of Office act," which aimed to prevent the president from removing Federal officials without the consent of the Senate. President Johnson disregarded this law, holding it to be unconstitutional, and his conduct was the basis for charges of impeachment.

In 1869, the act was in part repealed, and the remaining provisions of the act were repealed in 1887. A decision by the supreme court in 1926 supported the President's right to remove appointees of executive departments when the term of appointment is not fixed by law. Removal of a member of an independent agency, however, appointed for a definite number of years was ruled beyond the President's authority by a decision in 1934.

Theocracy (*thē-ŏk'rà-sĭ*). A form of government in which God is viewed as the supreme civil ruler, and in which government is conducted by a priesthood claiming the representation of Deity and enforcing laws supposed to be divinely inspired.

Third Parties. The American system of government, as well as the British, is considered to function properly only where two great parties divide the political field and contend for the possession of the government. So-called "third" parties have often been formed, but in the United States they have had brief existence. They have from time to time served the purpose of organizing support for new or neglected policies to the point where they have been adopted by either or both of the major parties. The Prohibition party, the Populist party, and the Progressive party are examples of this result.

Third Term. Before the adoption of the XXII Amendment to the United States Constitution in 1951, there was no limitation to the number of terms a president could serve. The example set by Washington, who refused to consider a third term, established a precedent which was followed until it was shattered by President Franklin D. Roosevelt, who was elected to a third term in 1940, and to a fourth term in 1944.

In 1880, a strong movement within the Republican party sought the nomination of Grant for a third term, but was unsuccessful. Again, in 1912, the question of the third term arose when Theodore Roosevelt sought nomination after having occupied the presidency 7½ years. In this case the third term would have been separated from previous executive position by an interval of four years. This fact, in many minds, removed possibilities of danger.

Other nations which have adopted the institution of the presidency have in some cases limited eligibility to a single term. In Mexico, where the right to indefinite re-election was secured by President Diaz, the principle of "no re-election" has been made constitutional both for national and for state executives.

Three-Mile Limit. By general recognition, it has become a principle of international law that the territorial sovereignty of a nation bordering on the high seas is not limited to its shores at low tide, but extends out into the seas a distance of three marine miles. This understanding among nations permits a country to enforce its domestic laws within this limit and has proved of much practical value. The distance of three miles was settled upon at a time when this was regarded as the extreme possible range of guns. Owing to the difficulty experienced by the United States in preventing the landing of contraband liquor from the sea, the British government consented to an exercise of American jurisdiction over British shipping up to a distance of twelve miles from the coast.

Town Meeting. An assemblage of all of the voters or qualified inhabitants of a town, held annually for the purpose of electing administrative officials of the town and of passing upon all important legislative matters.

The town meeting, since colonial times, has been the chief organ of local government in New England. It is an example of direct popular government in its simplest form. When the community, however, reaches the proportions of a city, some form of representative government becomes essential, and many towns in New England have abandoned the town form of government.

Treason. The Constitution of the United States provides: "Treason against the United States shall consist only in levying war against them, or in adherence to their enemies, giving them aid and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act or on confession in open court. The Congress shall have power to declare the punishment of treason, but no attainder of treason shall work corruption of blood or forfeiture except during the life of the person attainted." (Art. III, Sec. 3).

The purpose of these provisions was to provide a clear definition of this crime in place of the broad and elastic interpretation given to it by English courts and to limit punishment to the actual offender.

Treason may be committed against any state of the Union as well as against the United States. The limitations given above are not limitations upon the states, but most state constitutions contain similar provisions.

Treaty Making Power. This power is quite universally recognized as an executive function. The president of the United States is vested with the power "by and with the advice and consent of the Senate to make treaties, provided two-thirds of the senators present concur." Negotiations leading to the making of a treaty are carried on exclusively by the president, usually acting through the state department. Congress has invariably refused to receive foreign missions or representatives and has not even a constitutional right of being informed of the progress of negotiations. As a means of assuring the Senate's ratification, it is the preferable practice for the president to appoint members of the Senate upon commissions of negotiation, particularly peace negotiations.

Trial by Jury. The United States Constitution, Amendment VI, provides: "In all criminal prosecutions the accused shall enjoy the right to a speedy and public trial by an impartial jury of the state and district wherein the crime shall have been committed." Amendment VII provides: "In suits of common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any court of the United States than according to the rules of the common law." Likewise in all the state constitutions, there are provisions which insure trial by jury to those accused of crime and to litigants in civil actions, the right being generally limited to those cases in which trial by jury was assured at the time of the adoption of the particular constitution.

Trial by jury, unless otherwise constitutionally provided, means trial by a jury of twelve men of the jurisdiction in which the case is tried, men who are impartial and who have been chosen by impartial officials, and who are sworn to render a verdict according to the evidence and the law.

An essential feature of "trial by jury" is that the jury shall proceed under the guidance and instructions of the court, and that only questions of fact upon which there can be a reasonable difference of opinion shall be submitted to the jury. It is the duty of the presiding judge to "instruct the jury" as to its verdict. He may even take the case out of the jury's hands if the situation so demands.

Alongside the common law courts of England, which decided criminal and civil controversies with the aid of a jury, there grew up a system of "equity" jurisprudence, under which cases were determined by the chancellor as the representative of the king. In this field of equity jurisprudence, the right to trial by jury did not exist at the time of the adoption of the United States Constitution and the early state constitutions, and therefore is not guaranteed by them.

Civil and criminal cases of minor importance, by custom, are tried before justices with summary power, and in these cases the right of trial by jury does not exist unless expressly provided by law.

A grand jury is a body of 12 to 23 members which, in some jurisdictions, must bring in a formal indictment before certain types of cases can be tried. It may act on information of prosecutor, witnesses, or its own members.

Ultra Vires (*ŭl'trà vī'rēz*). A Latin phrase meaning "beyond powers." It is used of an act beyond the authority vested in a public or private corporation exercising functions limited by law or charter.

Unicameral System. See *Bicameral System.*

Unit Rule. A practice followed at nominating conventions which permits the majority of a state delegation to decide how the delegates shall vote as a unit.

Unwritten Law. General principles of justice, which, together with the customary rules of law and of procedure of courts in medieval England, formed the basis of the unwritten or "common law" of England and of those countries that have inherited their law from England. The term is used in contrast to the "written" or statute law passed by the legal legislative authority. The unwritten law exists in a vast and ever growing body of judicial decisions in which its principles are expounded and applied by courts.

In a popular and sensational sense, "unwritten law" is used to express a moral justification for illegal acts, like

murder under excessive provocation. This so-called "unwritten law" is entirely without legal foundation, but juries in the United States have been influenced by its appeal to find for the accused in direct disregard of positive law.

Veto. Executive refusal to approve an action, particularly a legislative enactment. The word "veto" comes from the Roman practice of conferring the same power upon two magistrates, as on the consuls, either of whom by pronouncing the word *veto*, "I forbid," could negative the action of the other.

In the constitutional development of Europe, a veto power was assumed to reside in the king, particularly as against acts of Parliament. As late as the Stuart kings of England, the monarch retained and frequently exercised the power of refusing assent to acts of Parliament, and royal assent is still nominally given. Every statute takes the form of an act of the king, but the assumption of the king's powers by ministers and the responsibility of these ministers to the House of Commons have made the royal veto an anachronism. The last employment of the royal dissent was by Queen Anne in 1707. Today, a British monarch's refusal to subscribe to a statute of Parliament would be an act of revolution.

Veto Power. The American colonists were thoroughly familiar with the veto power, as this right was exercised constantly in the name of the king by their colonial governors. It was thus adopted by them in the Constitution of the United States as a presidential power. In bestowing it upon the president, the framers of the Constitution intended to set up another of those "checks and balances" which the political theory of the time recommended. It was also felt that a president's veto was needed to protect the executive department against usurpation by the legislative. The veto, however, was not made absolute; it can be overridden by a two-thirds vote of each house of Congress.

In the early decades of the American republic, the veto power was sparingly employed by the president. It was very boldly used, however, by President Jackson, and its exercise in recent decades has become common. President Cleveland used it unsparingly to defeat private bills. The disposition today is to associate the president with congressional legislation and to hold him, as well as Congress, responsible for all legislation which he may not disapprove.

The veto power has also been finally conferred upon every state governor except in North Carolina, and, in a number of states, it may extend to items of a bill and particularly to items in an appropriation bill.

In American city charters which bestow legislative power upon a council and executive power upon a mayor, the veto power is usually given to the mayor.

The veto power has been provided generally in the constitutions of those countries adopting presidential government. Sometimes it takes the form of a "suspensive veto," whereby the executive simply returns the bill to the legislature for reconsideration. In states where the initiative and the process of framing laws is in the hands of the executive, the veto power has no significance.

The term is often, though inaccurately, applied to the procedure in the Security council of the United Nations, where any one of the five permanent members is able to defeat a motion by voting against it.

Visa (*vē'zä*; *vē-zä'*). See *Passport*.

Voting. Voting is the formal expression of opinion or of choice, either upon some question submitted for decision or upon the election of officers or representatives. In a democratic government or society, voting is almost an essential institution for determining the will of the majority. It may, however, be expressed in a variety of ways: orally, or *viva voce*, either with or without a "call of the roll"; by some physical manifestation, as, by rising, or by a "show of hands"; by ballot.

Early forms of balloting consisted in dropping a small object, like a pellet or ball, into urns, or other receptacles; hence the word "ballot," meaning "a little ball." Balls of different colors, as white and black balls, have been and still are used to express affirmative or negative decision; from this practice comes the expression, "to blackball." For political purposes at the present time, however, a ballot is a written or printed expression of the will or choice of the voter.

In political elections, practically all countries have experienced difficulty in providing balloting machinery that would be simple, inexpensive, and protected from fraud or intimidation. In the United States, voting systems have been greatly abused down to recent decades. Agitation for an official secret ballot commenced about 1882. In 1888, Massachusetts adopted a form of ballot called, from its place of origin, the "Australian ballot," the principle of which rapidly spread until today nearly every state has some such system. In some states voting machines, in which the voter records his choice by pressing a lever, have come into use. The main objects are secrecy, to protect the voter from intimidation and to discourage bribery, and a fair count and return of the vote.

Similar forms of voting have now been adopted by many European countries.

Short Ballot. One of the mistakes of the democratic theory in America has been to make elective too many nonpolitical administrative offices. This results in cumbering ballots with so large a number of offices and names as to make a judicious selection impossible to the ordinary voter. A wise reaction has occurred in favor of the appointment of administrative officials so that the voters' responsibility is limited to the selection of a few important executive and legislative representatives. This is the principle of the "short ballot."

Plural Voting. The democratic theory would seem clearly to limit one man to one vote in any election, on the principle that all persons and all classes should have identical political weight in all decisions. In Prussia, before the World War, a system of "three-class voting" existed, whereby electors were divided into three categories, each of which represented equal taxpaying power. Each class then chose one-third of the representation. This system is imitated in Japan. The democratic movement in Germany, which triumphed at the conclusion of the World War, has abolished this system in that country. In Belgium, before the World War, a system of plural voting prevailed, whereby two and even three votes were given to citizens possessing unusual qualifications. This system was abolished in the electoral reformation after the World War. In Great Britain, under certain circumstances, a voter may vote for two parliamentary representatives, one in the district of residence, the other in some other district in which he may have exceptional qualifications.

Compulsory Voting. The lethargy or indifference of the electorate is one of the most serious problems of democracy. Certain countries have endeavored to solve it by obliging qualified electors to vote, under penalties for abstaining. Compulsory voting was introduced into Belgium by constitutional amendment in 1893, the penalty for the first offense being a reprimand from the justice of the peace or a fine of from one to three francs, and, for subsequent delinquency, a penalty amounting to as much as the deprivation of the right of suffrage for ten years.

Absentee Voting. State legislatures in the United States have repeatedly made provisions whereby citizens absent from the state on military duty have had their votes taken at important elections. Certain American states allow all voters absent from their town or election district, but within the state, to cast their votes in another electoral district. Vermont passed such a law in 1896; Kansas in 1901 provided that railway employees might vote by mail, and in 1911 extended this privilege to all voters. Among other states with similar laws are North Dakota, South Dakota, Nebraska, Minnesota, Missouri, Colorado, Iowa, Michigan, Montana, Oregon, Wisconsin, Washington, Wyoming, Virginia, Utah. In Sweden, a husband may deliver his wife's vote in a closed envelope, and a wife that of her husband. In other elections in the same country, soldiers, absent seamen and fishermen, employees of railways, ports, customs, and pilot service, may vote by mail. Absentee voting is legalized also in Australia, New Zealand, Norway, and in some of the Swiss cantons.

War. War is an act of violence inflicted by one people or nation upon another people or nation, in order to compel compliance with its will.

Coercive measures that fall short of actual employment of force and the infliction of damage and destruction are not war. Recognized "measures short of war" include: severance of diplomatic relations; "embargo," or the detention of ships in port; "reprisals," which may take the form of the seizure of property or the death of the citizens of another state, and even such extreme steps as the occupation of enemy territory and "pacific blockade," or the stoppage of communication with a country by arrest of shipping. Such measures as these last may become actual warfare, although war has neither been declared nor been legally recognized. Among such cases may be cited the German blockade of Venezuela in 1902 and the American occupation of Vera Cruz, Mexico, in 1914.

War may be carried on upon the land, upon the sea, or upon both elements at the same time. From the warfare of Rome upon Carthage to the World War, superior sea power, or the domination of ocean communication by one belligerent, has been demonstrated to be a factor of immense influence upon the prospects of victory. The actual decision, however, must almost of necessity be gained by the victory of land forces and by the destruction of the enemy's power of armed resistance. With the great advance in aerial warfare, "control of the air," or the power to deny another enemy the employment of aircraft, is recognized as a paramount and perhaps a decisive factor in future wars.

It has long been the continued effort of supporters of international law and of humanitarian principles to con-

fine the practices of warfare to the armed forces of the belligerents. But modern warfare is waged upon a scale so much vaster and with so much greater intensity of resolution that the undoubted theory of present day warfare is that it is a contest between the entire populations and resources of the belligerent nations. The object of warfare today, therefore, is not only the destruction or capture of the enemy's armed forces, but also the embarrassment, the injury, and the depression of the enemy's civil population to such a degree that its will for resistance may be broken.

Declaration of War. War dates from the first act of hostility and may precede a formal declaration. The declaration of war itself may take various forms, including formal advice to the enemy government, a general proclamation of hostilities, or the declaration of a blockade of the enemy's territory.

The decision to end peaceful negotiation and to embark upon war is without doubt the most weighty and the most terrible responsibility that a government may have. In the past, the power of decision usually has been vested in the sovereign or in the executive branch of government. By the constitution of the former German Empire, the final decision rested with the kaiser. But more and more the development of the sense of responsibility in governments has tended to place this decision in a representative legislative body. This is specifically done by the Constitution of the United States, which recognizes Congress alone as capable of making a declaration of war. In spite of this constitutional provision, however, it must be recognized that the issue of peace and of war rests more with the president than with Congress. The president, by his conduct of negotiations, by the movement or employment of the armed forces, practically may commit the nation to war in advance of the authorization of Congress. Congress alone, nevertheless, has the power to furnish the vast supplies of money and men whereby a war of magnitude can be waged. A similar situation exists in the British government, where, although the war-declaring power is a crown prerogative exercised by the ministry, no British government today would embark upon war without the assured or expressed support of the House of Commons. This was sufficiently indicated in the last days of August 1914, preceding Great Britain's entrance into the World War.

The confiding, to the executive branch of government, of so momentous a responsibility as the issue of war or peace springs from the necessity of prompt decision and the instant employment of war measures. The opening actions of modern warfare have an extreme, if not a decisive, influence upon the outcome. These actions embrace rapid mobilization of troops, the seizure of strategic or defensible positions, the sudden and, if possible, unexpected destruction of the enemy's forces, and the seizure of the "initiative." It is for these reasons that such an extreme proposal as the requirement of a national plebiscite, in place of an executive or legislative decision, might delay a nation in the employment of its military strength until the enemy had gained insuperable advantages.

Restrictions on Warfare. Since the time of the great jurist Grotius, the legal thought of the modern world has been consistently occupied with efforts to abate the severities and inhumanities of warfare. Numerous authoritative writings and repeated conferences of European nations have been directed to this end. Particularly was this the object sought in the agreements reached at the second Hague Conference. The practices of armies and navies in the World War, however, disregarded most of these conventions. Extreme supporters of vehement warfare have laid stress upon the expediency and justification of severity as the policy most likely to shorten war and to bring an enemy to the acceptance of peace. It must be clearly seen, however, that ruthless measures may weaken more than they may aid the nation employing them. This they do by the sacrifice of neutral sympathy, by the weakening of the moral quality of the people employing them, and by the strengthening of the passion of resistance in the people against whom they are employed. These moral elements in warfare, "the imponderables," as Bismarck styled them, are among the decisive factors in victory.

Right to Make War. Justification for warfare is a matter of wide differences of view which must be weighed from moral rather than from legal considerations, although international law writers have attempted to define acts legally warranting hostility, which are termed "casus belli." Opinion varies from the view that war may be engaged in only as an unavoidable act of national self-defense, to the view that war is but a "continuation of politics," a reenforcement to the aims of statesmen and diplomatists where these efforts are unduly obstructed or delayed. This was the view advocated by extreme partisans of war, both political and military, in Germany before the World War.

"The right to wage war" has long been recognized as one of the essential attributes of a sovereign state. In certain cases, however, this right has been surrendered by treaty, as in the case of Switzerland and of Belgium before 1914. Japan renounced war by its constitution of 1946. "Protectorates" also do not possess the right to wage war.

Warfare, however it must be deplored, appears to spring not more from the ignoble passions of a people than from its noble qualities—from its national pride and high spirit; from its quickness to feel injustice and wrong; and from a moral preference for the sufferings and losses of warfare rather than for the acceptance of injustice and oppression. In the defense of national interests, all peoples not weakened by decay show intense stubbornness and resolution.

The prospects of future avoidance of war, as a practical matter, would seem to lie less in the establishment of leagues and treaty engagements than in the general diffusion of sympathy and understanding between nations, and in the cultivation, particularly among the greater peoples, of patience, restraint, and a spirit of concession. Perhaps no more effective proposal for preserving peace was ever made than the dictum of Edmund Burke that "the superior power may offer peace with honor and with safety."

Welfare State. A state which by its social legislation shows its concern for the well being of the people in such matters as health, old age pensions, unemployment insurance, child welfare, etc., and gives direction and support to such programs.

Whitewash. The exoneration of officials accused of misconduct, without a sincere attempt by the investigation committee to uncover the real facts or to punish the offenders.

Wirepulling. A term used to describe the secret means whereby political bosses control legislation and political appointments.

Woman Suffrage. During the colonial period, women in Massachusetts and Virginia who possessed the necessary property qualifications were at times permitted to vote. However, under all of the state constitutions adopted during the Revolution, voting was restricted to male citizens, except in New Jersey, where women voted until an act of the legislature in 1807 expressly limited the suffrage to "white male citizens."

The woman's suffrage movement in the United States began about the middle of the 19th century. In 1848 the state of New York passed a law, soon adopted by other states, which permitted married women to hold and to dispose of property. This was the beginning of a series of laws which ultimately extended full civil rights to women.

In 1869 were formed both the National Woman's Suffrage Association and the American Woman's Suffrage Association. The latter sought suffrage for women through amendments to state constitutions, while the National Woman's Suffrage Association sought it through Federal amendment. In 1890 the two associations merged into the National American Woman's Suffrage Association.

The first victory of the American suffragists was in 1869 in the territory of Wyoming, where women were granted full and equal suffrage. The territory of Utah followed in 1870. In 1890, when Wyoming was admitted as a state, its state constitution provided woman suffrage, and Wyoming thereby became the first state in which equal political rights were extended to women. The suffrage was granted to women in Colorado in 1893; in Idaho and Utah in 1896; in Washington in 1910; in California in 1911; in Kansas, Oregon, and Arizona in 1912; in Alaska in 1913; in Nevada and Montana in 1914; in New York in 1917; and in Michigan, South Dakota, and Oklahoma in 1918. In 1917 women obtained the right to vote in primaries in Arkansas; in 1918 they obtained a similar right in Texas. In certain other states, the right to vote for president was granted.

Finally, in the fall of 1918, a resolution to amend the Constitution by providing that "the right of citizens of the United States to vote shall not be denied or abridged by the United States or any state on account of sex" was passed by the House of Representatives by the necessary two-thirds vote. It was twice defeated in the Senate and was not passed until the special session called by President Wilson in 1919. The amendment was ratified by the necessary 36 states in 1920.

Suffrage was extended to women in Finland in 1906, and in Norway and Denmark in 1907. By 1936, it had been granted in more than two-thirds of all countries in the world. In some of these countries, however, women were under legal disabilities in holding public office. Enfranchisement of women appears to follow with the evolution of society from a feudal and agricultural stage to the industrial stage.

Zoning Ordinances. Ordinances passed in American cities, dividing the municipal territory into zones or districts of several kinds, as residence zones, business zones, industrial zones, unrestricted zones, and definitely limiting the uses to which property in these districts may be devoted. The purpose of these ordinances is to insure health, beauty, and convenience in the geographical development of the city. Doubt has existed as to the power of legislatures or their agents, the municipalities, to enact such laws; but recent decisions of the courts have upheld them as within the police power of the state.

TEST QUESTIONS

Distinguish between the art and the science of politics 1389
Criticize the 18th century idea that savage peoples enjoyed an ideal freedom 1389
Compare Aristotle's idea of a state with that of Plato. What, in Aristotle's view, is the object of the state? 1389
Discuss the contributions made to political philosophy by Machiavelli and Bodin. Through what ideas did John Locke influence the American colonists? 1389
Point out some political movements produced by the World War 1389–1390
State some of the political problems of the present day. Differentiate politics from history 1390

THE UNITED STATES

Name two intercolonial assemblies, with the date of each, previous to the assembly which declared American independence 1391
What general reason for the issuance of the Declaration of Independence is set forth in the first paragraph of the document? . . . 1391
From what source are governments said to derive their just powers? 1391
Enumerate ten facts set forth in the declaration as proof of the purpose of the king of Great Britain to establish a tyranny in America. 1391
By what title are the signers of the declaration described? By what authority do they affirm the declaration to be issued? 1391–1392
Whose name headed the list of signers of the declaration? 1392
Enumerate the defects of the Continental Congress as an agency of government. When were the Articles of Confederation adopted by Congress? When were they finally ratified? 1392
For what kind of united government did the Articles of Confederation provide? Of what body did the central government consist? . 1392
By what title did the members of the Congress refer to themselves in the heading of the Articles of Confederation? 1392
In what words is the confederation described in Article III? What purposes of the union are enumerated? 1392
To how many delegates in the confederation Congress was each state entitled? to how many votes? 1393
How many delegates were elected to the Constitutional Convention of 1787? How many attended the sessions? Characterize the membership of this body 1395
Enumerate the six institutions which were given original form by the Constitution. For what two characteristics of form is the Constitution remarkable? Quote Gladstone's judgment about the Constitution 1395
Upon what date was the Constitution signed? Name the nine states that first ratified it . . 1395
What methods of amendment are provided by the Constitution? How have amendments actually been proposed and adopted? . . 1395
For what reason were the first ten amendments proposed and adopted together? . . 1396
Give the dates upon which the several amendments became effective 1396
Who, according to the preamble of the Constitution, established that frame of government? Enumerate the purposes of the Constitution, as stated in the preamble. . . . 1396
What article of the Constitution of the United States provides for the taking of the decennial census? 1396
What two theories of government strongly influenced the framers of the Constitution? . 1400
Of what two houses does Congress consist? State the length of the term of each Congress. Upon what date do the regular sessions of Congress begin? By whom are special sessions called? 1400
How many United States senators are elected from each state? By whom are they elected? State the length of a senator's term. Who are eligible for election to the Senate? . . . 1400
Outline the powers of the Senate 1400
By whom are members of the House of Representatives elected? for what term? Who is eligible for election to the House? . . . 1400
Outline the powers of the House of Representatives 1401
Summarize the method of electing the president of the United States. State the eligibility requirements of the office 1401
Enumerate the powers and duties of the president 1401
Who elects the vice president when the state electors fail to make a choice? What is the salary of the vice president? State the order of succession to office, in case of the removal, death, resignation, or inability of the president 1401
Enumerate the executive departments of the government. Summarize the particular field of each. What is the salary of cabinet members? 1401
By whom are judges of United States courts appointed? What is their term of office? . . 1401
How many members constitute the supreme court? Summarize the field of the supreme court's original and appellate jurisdiction. What especial function, outside the court, attaches to the chief justice? 1401
Over what classes of cases do the inferior courts have jurisdiction? What judges are competent to sit in a circuit court of appeals? . 1402
How many United States district courts are there? State the jurisdiction of the United States court of claims. 1402
Point out how the Senate is associated with the president in the direction of foreign relations. What customs and practices indicate the extent of the president's power in foreign affairs? Indicate the Senate's peculiar function with respect to war and peace. What body only can declare war? 1402
Compare the importance of membership in the Senate with that of membership in the House. 1402
State the fields to which the legislative powers of Congress are limited by the Constitution. 1402
Enumerate the acts which are at present forbidden to Congress by the Constitution. In what field of legislation may Congress overstep these prohibitions? 1403
Tell three ways in which Congressional committees influence legislation 1404
How does a bill become an act? Is the President's approval necessary for a concurrent resolution of Congress? For a public resolution? 1404
From what powers and practices does the president derive his great influence over legislation? 1404
What is the function of the cabinet? 1404
Discuss the question of the disability of a president. Is the president limited as to the place where he may officially act? 1404
Point out the appointive powers of the president that make him the real head of the national administration. Indicate the extent of his power through the army and the navy and through the department of justice. 1404–1405
Discuss the authority of the president in respect to war and peace. Discuss the growth of the power of the presidency and the maintenance of the integrity of the office by those who have occupied it 1405
Enumerate the functions of the secretary of state with respect to treaties; presidential elections; laws and resolutions of Congress. 1405

Is the secretary of war a civil or a military officer? Summarize his duties 1406
What secretaries of war served under two successive presidents? Name the secretaries of war who later became presidents. Under what president was Jefferson Davis secretary of war? 1406
Summarize the duties of the secretary of the treasury in respect to government finance; in respect to other functions of government. 1406
Outline the duties of the attorney-general. Upon what questions must he give his own opinion? What president appointed five different attorneys-general? 1406
Outline the duties of the secretary of the interior in relation to parks; to conservation of natural resources 1407
When was the first secretary of this department appointed? Under what president was Carl Schurz secretary of the interior? . . 1408
What is the title of the head of the Federal postal service? Indicate the scope of his powers of appointment. Outline his other functions 1408
Name the postmaster-general who served under three presidents 1408
Outline the duties of the secretary of agriculture. By what president was the first secretary of agriculture appointed? 1408
State the general field of action of the secretary of commerce. Enumerate some of his specific duties 1408
What departments co-operate in the enforcement of the food and drug act and the insecticide act? 1408
What are the general duties of the secretary of labor? Summarize his special powers and duties. When was the first secretary of labor appointed? 1408
Enumerate the functions of the secretary of the navy. Is he a civil or a military officer? 1409
In what year was the first secretary of the navy appointed? 1409
What president appointed six different secretaries of the navy? 1409
Discuss the Department of Defense 1409
Tell two duties of each of the following bodies: the Federal works agency; Federal loan agency; Federal security agency 1410
Enumerate the functions of the civil service commission 1410
What Federal body assigns wave frequencies for radio broadcasting stations? When was this body established? 1410
Describe two duties with which the Federal power commission is charged. What act does it aid in administering? 1410
State the composition of the Federal trade commission. What are the duties of this body? What is its chief purpose? 1410
By what acts have the powers of the interstate commerce commission been defined and enlarged? How many members constitute the commission? Indicate the range of the powers of this body 1410
When was the Smithsonian institution created? Who made it possible? For what purposes was it created? Name three of its divisions 1411
Of how many members is the United States tariff commission composed? What are the duties of this body? 1411
State the purposes of the veterans administration 1411
When were the United States supreme court and district courts organized? From what year does the present system of circuit courts date? What is the function of the circuit courts? 1411
From what provision of the Constitution do the United States courts derive their power to pass upon the constitutionality of laws? . 1412
What proportion of the supreme court must agree to a decision? Explain "concurring decision"; "dissenting opinion." Name the chief justices of the United States. . . 1412

American State Government

What two classes of government are recognized by the Constitution? What authority stands back of these governments? 1413
Point out the influences that have tended toward the extension of the field of the Federal government's activity 1413
Outline the field of state administration. Discuss the relation of the Federal and state governments in the protection of public order 1413
What states of the Union never held the status of territories? 1413
State the first step in admitting a territory to statehood 1413–1414
Enumerate the existing methods of amending state constitutions 1414
For what purpose is the constitutional convention generally used? By what authority may a constitutional convention be called? 1414
In what states is amendment by popular initiative now authorized? Point out some restrictions attending the use of this procedure 1414
Summarize the history of popular ratification of state constitutions 1414
Indicate the extent of the state legislative field under the Federal Constitution. Why have numerous state constitutions limited the powers of legislatures? Discuss the movement for greater legislative freedom 1414–1415
Describe the general form of legislative body adopted in American states. By what names are the body and its parts known? 1415
Discuss the qualifications for membership in the legislative houses 1415
Who is usually the presiding officer of a state senate? 1415
Point out several ways in which state legislatures are overburdened and embarrassed by too great a volume of legislative projects . 1415
Discuss the use of the referendum and the initiative in state legislation. Indicate by statistics the extent to which these plans have been used 1415–1416
State the qualifications required for election as governor 1416
Account for the small degree of authority attached to the office of governor. What is the relation of the "short ballot" to gubernatorial power? Estimate the present status of the governor's office in American politics. 1416
Discuss the effect of the veto power in gubernatorial influence upon legislation. What are "administrative measures" in state legislation? 1416
Explain the nature and the extent of the governor's pardoning power in various states 1416–1417
Describe the several important types of administration in vogue in the states. Criticize the system of boards and commissions. 1417
Name some states which have recently reorganized their administrations. What are the functions of the California board of control? 1417
In what states are civil service laws now in force? Point out the usual powers of a civil service commission 1417
What is the recall? Summarize the provisions governing its use in various states. 1418
Point out the two purposes served by local government. Indicate some types of public service in which the interests of the state and those of the locality overlap 1418

Indicate the proportion of the population of the United States which is classed as "urban." Name the three chief plans of American city government 1418
In what city was the commission plan first used? Name several important cities now governed by commissions. Describe the essential features of the plan. Indicate its merits 1418
Name some important cities which operate the "city manager" plan of government. Point out the function of the manager 1418
Describe the government of Puerto Rico . . 1419
How is the governor of Puerto Rico chosen? 1419
What representation have Puerto Rico and the other dependencies at Washington? . . . 1419
How are the Virgin Islands governed? . . . 1419
Under what authority is the Panama Canal Zone administered? 1419
How was American Samoa obtained? How is it governed? 1419
What smaller Pacific islands does the United States own? Why are they significant? What islands are held in common with Great Britain? What as trustees? 1419
Name two special features of the government of Alaska. 1419
What is the governmental relation of Hawaii to the United States? 1419
What state has the greatest number of members in its house of representatives? 1420
In what states are the judges of the highest state court chosen by the governor and legislature? in what states, by the legislature? 1421
Enumerate the states which require ability to read as a qualification for the suffrage. . . 1422
Why are records of "popular" votes for president before 1824 of no significance? 1424

FOREIGN GOVERNMENTS

State a generally recognized test of "sovereignty." Distinguish between "protectorates," countries under "mandate," and "dependencies" 1427
Name two new types of government which have arisen since the World War 1427
What is the distinguishing characteristic of a monarchy? an aristocracy? a democracy? . 1427
Can a monarchy be a democracy? What is the opposite of a democracy? 1427
How many independent countries are there in the world? in Europe? in South America? . 1427
What is the title of the ruler of Afghanistan? 1428
Point out some of the political effects of the geographical position of Afghanistan . . . 1428
By what body is Andorra governed? What two individuals act as its suzerains? 1428
Summarize the political history of Argentina down to 1852. Compare the general provisions of the Argentine constitution with those of the United States Constitution . . 1428
Name the houses of the Argentine Congress. What property qualification is imposed upon members of the Senate? Describe the organization of the judiciary 1429
What is the title of the Belgian monarch? Point out his constitutional and actual relation to the government. Outline the organization of the Parliament. Name the departments of the ministry 1429–1430
What racial differences give rise to political problems in Belgium? 1430
Summarize the relations of Belgium to the Belgian Congo 1430
Give the dates of important constitutional changes in Bolivia. State the constitutional provisions as to the presidency and the ministry. Outline the composition of the Congress. Describe the organization of departments and municipal districts 1430
Who may vote in Bolivia? 1430
Compare the states of Brazil with those of the United States, as to number and powers. What are the qualifications prescribed for a candidate for the presidency? Summarize the powers of the president 1431
How is representation in the Chamber of Deputies apportioned? What are the qualifications for the suffrage? 1431
What professions are closed to foreigners in Brazil? With what countries is Brazil brought into direct relations through boundaries? Summarize the history of Brazil's boundary controversies 1431

British Empire

Indicate the application of the name Great Britain. Summarize the character of English constitutional history. What is the present status of the king in the system of British government? 1431–1432
How many officials are styled "ministers"? By whom are they selected? Name the chief ministries. Point out the functions of the cabinet. What happens when the House of Commons rejects the proposals of the cabinet? 1432
Who constitute the House of Lords? State the relation of the House of Lords to the House of Commons in respect to legislation . . . 1432
Of what does the constitution of Great Britain consist? Why may it be called "unwritten"? 1432
Describe the system of local government in Great Britain; the local government of London 1432–1433
Summarize the relations of the self-governing dominions to the British crown and to England 1433
Of what states and territories is the Commonwealth of Australia composed? What officer and legislative bodies constitute the Federal government? Point out a likeness between the Australian government and that of the United States. By whom is the Federal administration conducted? 1433
Discuss the history of Canada, leading to the establishment of self-government . . 1433–1434
Compare the distribution of powers between Dominion and provinces with that between Federal government and states in the United States 1434
Enumerate the subjects reserved for the action of the Dominion Parliament. What powers are expressly bestowed upon the provincial legislatures? 1434
Explain the concurrent action of the Dominion and the provinces in respect to immigration. 1434
Indicate the relation of the Dominion government to education in the provinces 1434
Discuss the qualifications for membership in the Dominion Senate. How are senators selected? How is the ratio of representation in the House of Commons determined? . . 1434
Compare the legislative powers of the Senate and the House of Commons 1434–1435
Indicate the jurisdiction of the supreme court of Canada. Discuss the organization of the provincial governments 1435
Indicate the status of Ireland with respect to government before 1920. What are the main provisions of the Government of Ireland act of 1920? 1435
Summarize the organization of government in Northern Ireland 1435
What is the status of the Irish Free State in the British Empire? Tell three steps taken by it in the direction of making the country an independent republic 1435
Describe the legislative organization of the Irish Free State; its executive 1435
What is the political status of Newfoundland? 1435–1436

State the correct political designation of New Zealand. Outline the governmental organization of the country 1436
Under what authority, and at what date, did the Union of South Africa come into existence? How is the Senate of the Union constituted? Describe the governmental organization of the provinces 1436
How are colonies governed? Characterize the British method of managing protectorates. Enumerate several British colonies and protectorates in Africa 1436
Name some British mandates in the Pacific 1436–1437
Point out three principles of British colonial policy 1437
What action was taken by Great Britain in 1936 for the government of India? 1437
What was done in 1946? 1437
Why was India divided? 1437
Describe the Indian government under the draft constitution of 1946 1437
What is Pakistan? 1437
What is the status of Ceylon? 1437

Central American States

Summarize the history of attempts to unite the Central American states in a federation 1437–1438
Characterize the constitution under which Costa Rica is governed 1438
Characterize the population of Guatemala. How is the legislature of this state constituted? Discuss the executive power and the administrative system of the country . . . 1439
What provisions for local government are made in Nicaragua? State the relation of the United States to this state. 1439

Other Foreign Countries

Outline the chief features of the Chilean constitution. Discuss the powers of the president 1439
By whom are members of the Chilean Chamber of Deputies elected? What are the provisions for local government in Chile? . . 1439–1440
Describe the former imperial system of government in China. Characterize the provincial government under this system 1440
Review the imperial attempts at reform before 1912. Why did the first republican governments after 1912 fail? When did the Nationalist government come into power? how was it affected by the Japanese war? 1440
Discuss the difficulties of China in foreign affairs. What agreements were secured at the Washington Conference in 1922? 1440
Summarize the political history of Mongolia since 1911; that of Tibet since 1906; the relations of Manchukuo, China, and Japan since 1931 1441
Summarize the political history of Colombia down to 1863. What changes in Colombia's fundamental law were made in 1886? . . . 1441
Enumerate several political reforms in the Colombian government since 1910 1441
When and by what body was the present constitution of Cuba framed? State the chief provisions of the "Platt amendment". . . 1442
Review the circumstances and results of the United States intervention in Cuba in 1906. 1442
Discuss the local government of Cuba . . . 1442
How was the government of Czechoslovakia affected by World War II? 1442
What change took place after World War II? 1442
What powers are held by the king of Denmark? 1442
Can women succeed to the Danish throne? . 1442
Describe the method of election of members of the *Folketing* 1442
Name Denmark's colonial possessions. . . . 1443
Describe the government of Ecuador. How are its provinces administered? Point out the status of the boundaries of the state . . . 1443
Outline the relations existing between Egypt and Great Britain from 1882 to 1922; what is the present government? 1443
Indicate the racial affinities of the so-called Baltic nations. Summarize the stages by which, between 1917 and 1922, Estonia attained general recognition as an independent state. What was the effect of the treaty with Russia in 1939? 1443–1444
Summarize the political history of Finland from 1899 to 1919 1444
How is the president of the republic of Finland elected? Outline his powers. By what provisions are the acts of the president brought under the supervision of the Chamber of Representatives? 1444
Discuss the relations of Finland and Russia. . 1444
How long has France been a republic? Under what circumstances was the present constitution adopted? 1444
Upon what principle is the division of France into departments based? 1445
Discuss the office of prefect. What are the functions of the general council? What is a "canton"? Describe the government of a French "commune." Outline the powers of the mayor of the commune 1445
Outline the functions of the French council of state 1445
Why is the French parliament bicameral? What are the powers of the National Assembly? Discuss the Council of the Republic . 1445
Discuss the relation of ministers to the National Assembly. Name the ministries . . 1446
Point out the relation of the president of the French Republic to the government. How is he elected? 1445
How may the French constitution be amended? How is the position of the French colonies changed by the constitution of 1946? . 1446
How is Indo-China organized? 1446
Indicate the classes of states which, in 1871, united to form the empire of Germany. . . 1446
Discuss the relation of the states to the general government under the German federal system 1446
Describe the constitution of the *Reichstag;* the composition and powers of the *Bundesrat.* What was the status of the imperial chancellor in Bismarck's time? 1446
Summarize the facts as to the power of the former German emperor. 1447
Describe the course and the result of the German revolution of 1918. 1447
Indicate the enlargement of national powers under the Weimer constitution. How was the president of the empire elected? 1447
Who made laws for Germany under Nazi rule? How may the constitution be altered? . . 1447
What is the meaning of the title Führer, held by the head of the German nation? 1447
What was the effect upon Germany of the quarrels between Russia and the Western Powers? 1448
What additions were made to the territory of the Reich in 1938 and 1939? what disposition was made of them after the War? . . 1448
How did Greece become independent? Outline the changes of government since 1922 . . 1448
Describe the present government of Haiti . . 1448
What is meant by the saying that Hungary was a monarchy without a monarch? What changes resulted from World War II? . . 1449

Indicate the present political status of Iceland. Describe the system under which members of the *Althing* are elected. Outline the procedure of the *Althing* 1449
Discuss the reason for the political importance of Iran 1450
Give an account of the manner in which revenues are collected in Iran 1450
Discuss the political fortunes of Iran as they were affected by the World Wars and consequent events. By what title is the ruler of Iran known? 1450
State the relations with Iraq assumed by Great Britain in 1922 1450
Under what authority was Palestine governed? How was the republic of Israel established? 1450
What law serves as the constitution of Italy? Characterize the form of the Italian government 1450
Describe the Fascist government of Italy. What changes took place as a result of the Allied victories? Outline the present constitution 1450–1451
Point out the territorial consequences for Italy arising from World War I; the changes effected by World War II 1451
Describe the Japanese system of government as it existed before 1868 1451–1452
Where was the seat of power in Japan under the Meiji constitution? 1451
How was Japan governed after its surrender? 1452
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Fine Arts

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FINE · ARTS
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FINE ARTS

INTRODUCTORY

An acquaintance with the products and results of the fine arts is necessary to the well-being of every individual. In the absence of such acquaintance, there can be no balance in human life. Subconscious aspirations apparently create in the mind of even the barbarous man unrest and anxiety comparable with those sensations which are occasioned by the want of food, as evidenced in the infant and in the animal. Exercise must be provided for the play-impulse, which urges the one who receives a pleasurable impression through the avenues of sense to interpret his experience in imaginative, personal terms.

The Play-Impulse. In obedience to this impulse, the specifically gifted and instructed externalize their emotions and trains of thought in music, poetry, architecture, sculpture, or painting. Parallel with those instincts which make for the preservation and the propagation of human life, there exist the finer movements of the being whose end is nobler than self-gratification and whose most vital expressions, such as the Parthenon, the Cathedral of Amiens, the compositions of Bach and Beethoven, are sufficient to immortalize the memory of a people or a race.

Deprived of the exercise of the play-impulse, man, according to the theory of the poet Schiller, is either a slave or a dictator. His gross appetites are tempted and constrained from without. His moral sense restrains him from within. Yielding to his appetites, he lapses into a hopeless, passive state. Opposing them, he becomes a stern, vigilant guardian of law, understanding no password save duty. In either case, his existence lacks an essential. In the too passive state, his spirit is surfeited and stifled. In the too watchful attitude, it is starved. But happily he may revolt from either control to enter a third condition in which there is no question of either slave or master. There his appetites do not lure him. Nor does his combative, moralized will resist him. Governed by the play-impulse, man becomes a creator. He spontaneously produces the offspring of his imagination. He completes his existence by pursuing activities which neither subserve any necessity of nature nor fulfill any moral duty. "Only when man plays," concludes Schiller, "is man truly man."

The exercise of the play-impulse, in thus completing human existence, acts like a health-giving physical gymnastic. It eliminates the clogging poisons of grossness. It induces the mood that animated Robert Browning, when he wrote: "God's in his Heaven. All's right with the world!"

Value of Fine Arts. Influences which are soothing, curative, inspiring, essentially maternal, must be fostered in the United States, if a national life is here to be permanent. Our "melting-pot of nations" must be resolved into a laboratory, the processes of which shall eliminate and purify, disengage and recombine. And among the agents to be employed there is no doubt that the fine arts might be one of the most active. They are even now cleansing the "city slum," as the "settlement" music schools and elementary courses in drawing and modeling develop, liberating the play-impulse in the minds of those whose lives are set in sordid surroundings. By these beneficent agencies the poor and the rich are brought together, and democracy is so furthered.

In consequence of their social and economic worth, a discussion of the principles underlying the fine arts is essential to complete any reference book professing to survey the mental accomplishments of humanity.

MUSIC

As here presented, such discussion treats the major arts, beginning with music, which meets the widest appreciation among the people. From the early 19th century, this art has been progressively cultivated in the United States, its course having been directed by Germans as instrumentalists and largely by Italians as interpreters of opera and teachers of voice. Within this period, along the Atlantic seaboard and in the Middle West, there have been developed musical centers of great importance, with the result that today New York offers, during a single season, richer opportunities of hearing the newest works of all schools and a larger number of the best artists of all nationalities than any other capital of the world.

History of Music. This situation, temporarily due to the causes which make life so difficult in many European countries, is likely to become permanent. Therefore, in view of such existing conditions, and in consideration of the importance of music in our national life, the means of acquiring an appreciation of this art should be sought by the many. An elementary knowledge of rhythm, of the relations between melody and harmony, and of the families and the functions of instruments suffices, for the casual listener, to transform an orchestral performance from chaos into a cogent example of law and order. To provide such equipment, as well as to show the development of music from its primitive forms, used by ancient, civilized peoples, to its present highly specialized state, has been the aim of the makers of this book.

First to be treated are the periods in the growth of the art and the detailed history of musical notation, the latter section containing an interesting table of characters and symbols, especially useful to students of ecclesiastical music. But a larger number of readers will eagerly follow the discussion of principles—notably that of tonality, which is so important to the appreciation of modern composers.

Musical Form. Under the caption of *Musical Form*, the general reader receives a lesson in the structure of music, necessary to the adequate enjoyment of any worthy concert or recital. Met at the opening of the section by the picturesque definition: "Form is the frame which encloses the musical design," he is led, progressively, from the phrase or "motive" to the sonata, the symphony, and the concerto. At the end of this survey, through the aid of the clear, technical statements there offered in logical sequence, he will have amassed a definite and practical fund of information.

Then, as an interest awakened in musical form is always extended to correlated subjects, provision for that certainty is made by an accurate characterization of the instruments of the orchestra and of the military band, with respect to their tone-quality and their interpretative power. These explanations are given in answer to the growing demand for such knowledge occasioned by the recently and very widely increased opportunities for hearing large bodies of instrumentalists.

Finally, other popularly expressed needs are recognized by including, in the section of *Music*, a chapter of synopses of the plots or "texts" of the most frequently performed operas and a glossary of musical terms.

PAINTING

Among the arts of form, painting permits the freest play of the imagination. Through its essential element of color, it addresses itself to the child who is less easily attracted by line. Through its "counterfeit presentments" of persons and things, it is capable of awakening suspicion in the savage as an exercise of magic. Its history, when followed according to the stages in the evolution of the art, becomes a fascinating succession of movements. If otherwise treated, the same history presents a wearisome succession of names and dates, with descriptions of works having little to connect them save their association with local influences. Therefore, the material here offered upon the subject is divided according to the practice of those who have professed the art.

Two Periods. By the use of this method two divisions or periods suffice. Within the first of these are included the primitive, tentative, incomplete efforts of painters from 5000 B. C. until the beginning of the 15th century. The second period embraces the experiments in perspective, modeling, foreshortening, and the treatment of color by which painting has passed from childhood, through adolescence, to the state of a mature art.

Accordingly, a vertebrate system confronts the reader. His memory is not taxed with elaborate detail, but his imagination is quickened as he follows the solutions of problems in the art of representing things as they appear to be. Further, he reaches a clearer judgment of the individual contributions made to the art during its long development than if he should, as a beginner, study a series of masterpieces, even though they were chronologically presented. At the end of a survey so devised, one who has carefully followed it finds himself equipped to judge of the century, the school, or the movement which has called into being any given picture. For him, a gallery of exhibits chosen with an eclectic taste is no longer pathless. It is a charted sea which invites him to voyages ending in enchanted islands.

ARCHITECTURE

Alone among the major arts, architecture in its visible forms does not result solely from the exercise of the play-impulse. It involves the idea of protection. For this reason, its practice antedates the moment when the savage, beating upon a resonant surface, produced rhythm, which is the first essential of measured music. Again, the primitive dwelling was either excavated or erected long before the forms of animals were graven upon its walls. Developed principally by the Aryan races, architecture might be accepted as the expression of their constantly changing desire to make, unmake, and remake, in the hope of yet higher attainment. This art is, as well, a sensitive instrument, recording the mental fluctuations, no less than the capabilities, of those who produce it.

Four Styles. The history of architecture is here treated briefly, conformably to the structural principles which have been successively used by builders, from the beginnings of civilization in the Nile valley and in Mesopotamia down to the present time.

Classified by means of these principles, architectural development resolves itself into three styles, to which may be added a fourth, determined very recently by accomplishments in engineering and in the use of steel and concrete.

As these distinctive styles pass in historical order before the reader, he will observe that the Parthenon, with its superlative, unique beauty, derives from the cabin built from clustered reeds and clay, some three thousand years earlier, by Egyptian peasants.

The second principle, the domical, as expressed in its simplest, most excellent manifestation, the Pantheon at Rome, acquires an added interest, when traced backward to its rise in the prehistoric baking oven of Assyria and forward to its descendants, Santa Sophia at Constantinople, the cupola of Brunelleschi at Florence, and that of Michelangelo at Rome, with Saint Paul's at London offering the last structural modification.

Then, as a connecting link between the second and the third principle, appear the flexible clay-and-mortar constructions of the late Byzantines (864–1204), which are the antecedents of the complicated, balanced, pointed arch system, misnamed the Gothic.

For knowledge of the fourth, still progressing development, the North American has but to look about him. By the aid of current literature and a visit to an important commercial building, he will, without great difficulty, reach an understanding and an appreciation of the latest structural type, the "skyscraper," and be convinced that, as an expression of the period, it ranks with the airplane and with wireless telegraphy.

SCULPTURE

The art of sculpture, as the handmaiden of religion, attained its first great climax among the Hellenic Greeks. They, with their prompt translation of the abstract into the concrete, personalized and visualized all the forces of nature, all the attributes of Divinity. They rendered them in sculpture as gods in human form. But it was only under the decline of the state polytheism that the greatest works of sculpture came into existence, the prime object of their creation being to maintain and to promote patriotism.

The bloom of Hellenic art, thus dependent upon the unified state, was necessarily brief. But the study of the Greek sculptors, working between 480 and 200 B. C., fixed for all time the treatment of the nude figure. Therefore, the one seeking enlightenment upon any epoch or period of sculpture must first fortify himself by tracing the development of bony and muscular structure, of pose and facial expression, as it is set forth in the statues of the above-named epoch.

Three Periods. Adapted to this point of view, a brief history of sculpture is here presented. It is consequently divided into three periods, with the Hellenic strongly emphasized, the Renaissance being treated as a derivative, and the modern as the heir of the two preceding phases. A survey so finished could not, however, be regarded as complete, since it would leave unexplained certain strong elements resident in the sculpture of the second and of the third period. An acknowledgment is therefore made of the direction given to the art by the Romans, when, having accepted the Hellenic principles, they created a new type of monumental sculpture in the triumphal arch and in the military column. And, in the present instance, as usual, this naturally inartistic people became transmitters, so that the governmental art of all modern nations remains under a great debt to them.

Again, much less adequate would our review have been rendered through the omission of reference to the sculpture of the middle ages. For, although then reduced to a secondary rôle, as an adjunct of architecture, the statues of holy personages and kings, stiffly draped and limited in pose, developed an expressiveness, at once rugged and touching, which they bequeathed to the marvelous 15th century and again, four hundred years later, to the art of Rodin and of his disciples.

All these elements, carefully traced in our review from their beginnings, will be seen to unite in our American sculptors of Parisian training, who have inspired deep respect in the Old World and have already produced several undeniable masterpieces.

EACH epoch of the world's history bequeaths to its successors, together with its more material possessions, an image of its undying soul. This inheritance, "gift immortal though by mortals given," is Art, whose peculiar graces of form and endowments of spirit so truly portray the higher æsthetic life, in which is to be found the real soul character of a people. To designate all the arts over which the nine Muses presided, the Greeks used the word *μουσική*, from which our word "music" is derived.

PRIMITIVE AND PREHISTORIC MUSIC

Extensive work in what is usually called comparative musicology has provided a clear picture of the music in the various strata of primitive civilizations and, with this picture, a good idea of the evolution of our own music in prehistoric times from the origins to the level of oriental music.

The foremost musical fact in these civilizations is the predominance of singing. The primitive singing is generally very far from the melodic styles of today. It is either a psalmodic, unemotional recitation of poetry on two or three different notes, or else an emotional, passionate ejaculation, in which the voice jumps up to its top and helter-skelter topples down to the bottom.

Instruments were of later origin. The lowest civilizations that we know have no instruments at all. But most of them use parts of the body as an accompaniment in even beats: the feet pound the ground, and the hands either clap together or slap the chest, the abdomen, the buttocks. Later, they intensify such striking by some device that anthropologists would call an extension: the bare feet pound a board instead of the ground, or bamboo tubes instead of the feet pestle the ground, and, instead of the hands and the body, sticks would clap together or strike some wooden object. According to their particular shapes and sounds, the earlier instruments became involved in the intricate network of magic ideas, some representing the masculine, solar, and some the feminine, lunar principle. Masculine, solar instruments have an elongated form and a shrill and terrifying sound; feminine and lunar instruments are hollow and rounded in form with a hollow, muffled tone. It must have taken thousands of years before the musical interest superseded magic connotations.

The earliest instruments are idiophones, i.e., they are of solid, sounding materials, such as wood, bamboo, fruit shells, and, later, metal. Rattles, clappers, stamping tubes are among them. Then came the aerophones or instruments in which the air vibrates, such as the propeller-like bull-roarers, the trumpets of branches or conch shells (which at first were used as megaphones), and the whistles of bone or of reed. Membranophones or drums appeared in the third place; and, at last, the chordophones or stringed instruments, which in the primitive world did not exceed the rudimentary stage.

MUSIC OF THE ORIENT

The ratio of the four classes of instruments is entirely different in the high civilizations of the East: the bewildering number of idiophones is reduced to a minimum, and the stringed instruments are in the van. There, we distinguish harps, i.e., instruments in which the strings run to or through the soundboard; lyres, in which the strings are tied to the crossbar of a yoke; lutes, in which the strings are tied to a neck; zithers, in which the strings are tied to the body of the instrument without needing a yoke or a neck. The harp, today abandoned in the East, was the chief instrument of ancient Egypt, Mesopotamia, and India. It appears in the Bible as *nevel* (which has been wrongly translated as lyre). The lyre, abandoned, too, was at home in South West Asia and appears in the Bible as *kinnor*, the instrument of King David (mistakenly translated as harp). The lute was and is the common property of all the East from Morocco to Japan, but has its homestead in ancient Persia or Sumer. The zither is still the most essential classical instrument of the Far East, of China (*ch'in*) and of Japan (*koto*).

The stress on stringed instruments implied two novel tasks: to tune the open strings, and to find consistent stopping places on the strings of the lute family. In other words, the Orient provided what the primitives had had no reason to provide: orderly scales and systems based on arithmetical ratios. It is this systematic foundation that distinguishes full-civilized from half-civilized music.

The scales of Eastern music are manifold. The two largest groups among them are pentatonic and heptatonic or diatonic. In heptatonic or diatonic scales there are seven steps within an octave, of which, as a rule, five are wholetones and two semitones (as on the white keys of our pianos). In pentatonic scales, there are only five steps within an octave, of which, as a rule, two are thirds, either of the minor kind (as on the black keys of our pianos) or else of the major kind.

Often, a scale means much more than it does in the modern West. It is not a dry sequence of steps, but a living, flexible pattern, which gives each note a function of its own, requires a certain tempo and a well-defined mood, and even has characteristic turns and formulas of melody. Such patterns, known as *râgas* in India and *maqamât* in Arabic countries, must not be violated; the composer, far from being free, is bound to follow one of the traditional patterns.

Standardization has even extended to rhythm: Indian and Near Eastern composers choose one ready-made metrical pattern for a piece, and often a very complicated one, and they repeat it over and over again to the end.

HEBREW MUSIC

Only two characteristic provinces of the ancient world shall be described here in a brief outline: Palestine and Greece. The few references to music that the Bible contains show clearly two successive phases, one coinciding with the nomadic, cattle-driving, and tribal period up to c. 1000 B.C., and the other, with the sedate, agricultural, and monarchic period from c. 1000 B.C. to the beginning of A.D.

In the former period, both singing and playing, and also dancing, were expressions of the people as a whole and particularly of its women. No mention is made of professional musicians; even young David, called to soothe King Saul's depression with the tunes of his lyre (not harp), was a shepherd, not a minstrel.

The change came in the time of King Solomon, when the newly built temple at Jerusalem required an elaborate ceremonial with representative music, such as the temples in Babylon and Egypt must have had. A conservatory was established to train both singers and players, and we must assume that the court, as did all other courts, entertained educated musicians and orchestras. Such example cannot but have enhanced the formation of a musical trade: the only reference to music in the New Testament is indeed the mention of professional pipers hired to play at funerals.

Of the instruments mentioned in the Bible (the names of which have generally been mistranslated), *ugab* seems to have been a flute, but also any pipe; *kinnor*, a lyre similar to the *kithara* of Greece; the *tof*, a tambourine reserved for women; the *shofar*, still in use in the synagogue, is a curved ram's horn without a mouthpiece; the *hasosra* was a short metal trumpet. The times after 1100 or 1000 B.C. added the *nevel*, a harp; the *asor*, probably a small rectangu-

lar zither with ten strings; the *halil* and the *abub*, double oboes like the *aulós* of the Greeks; the *mnaanim*, a shaken metal rattle or *sistrum* like the one of Egypt; *selslim* and *msiltayim*, cymbals. The *shalishim*, one of the worst stumbling blocks of translators, was obviously not an instrument at all, but a dance. Nor were the numerous terms that we find in the headings of some fifty psalms, as *nginot* or *gittit* or *shoshanim*, in any way connected with instruments: most probably, they indicated the melody patterns to which the psalms should be sung, just as today Arabian poets would indicate the *maqâm* that the composer was expected to follow.

Owing to the extreme tenacity of the Orient, it is quite possible to form a good idea of these melodies from remainders in our days. Remote and isolated communities in West Asia and North Africa have preserved a good many secular songs which, being closely related to each other, must be the common heritage of ancient times. Oriental Jewish congregations outside Palestine, cut off in centuries B.C., have in a similar way faithfully kept the cantillation of the holy books from the times of the Temples.

GREECE

Hellenic music was a province of oriental music; the Greeks themselves credited the East with having given them their music. Like the Orient, Hellas connected music with the planets and their influence on human mood and character; like the Orient, the Greeks gave to music a foremost place in healing and education; like the Orient, they laid the stress on melody and rhythm, without paying too much attention to the consonances in which they used to accompany their songs. But they outdid the East in theory: their system of scales and meters is more complete than that of any oriental people, despite the loss of precious, indeed, of irreplaceable sources.

Still, the difficulties of this theory are so great that its interpretation in almost two thousand years of research has been erroneous. Not until the last decades were writers able to convey a clearer idea of what it meant; and even today we are not yet at the end of our troubles. As we see the situation now, the nucleus from which Greek melody developed, was the stride of a major third, which was downward supplemented by a semitone to form a descending fourth or tetrachord. Out of this tetrachord arose an "enharmonic" heptad or seventh by "conjoining" a second, similar tetrachord so that the lowest note of the one and the highest note of the other coincided. An (later) octave, instead of the heptad, arose by "disjoining" these two tetrachords, so that the highest note of the lower one followed at the distance of a tone, instead of coinciding with the lowest note of the higher one. The Dorian scale, conjunct or disjunct, originated when the stride of a major third was filled in and the tetrachord became a "diatonic," descending sequence of a tone, a tone, and a semitone. The original enharmonic tetrachord, on the other hand, was not abandoned, but eventually transformed by cleaving the semitone into two microtones.

It seems that the other scales of the Greeks can be traced back to tetrachords in which a minor third was supplemented by a wholetone. Again, the third was later filled in to form a tone and a semitone; in the (descending) sequence tone-semitone-tone, the tetrachord assumed the form called Phrygian, and in the sequence semitone-tone-tone, it became Lydian. And here, too, the original empty third could be preserved intact, while the tone was cleft into two semitones. The resulting gender was called chromatic.

Thus, Greek scales followed three genders, enharmonic, chromatic, diatonic; and three modes, Dorian, Phrygian, Lydian.

Out of these elemental forms, the Greeks shaped an illimited number of scales, in which one of the genders and one of the modes could be used throughout or otherwise mingled with others, and in which the tetrachords could be conjunct or disjunct. Indeed, the very steps had different "shades" or sizes; there were, at least theoretically, eight different thirds, seven wholetones, thirteen semitones, and nine quartertones. And even the same melody could use different shades of the same intervals.

Since the Greeks had a notation or, better, two notations, which we can perfectly well decipher, a number of musical pieces or fragments of pieces have survived and can be read. There are altogether eleven of them, some complete, and some in tiny scraps. The most beautiful is a drinking song, engraved in a tomb stele in a town of Asia Minor; and the most interesting are probably the two solemn hymns to Apollo, which were found in the treasury of the Athenians at Delphi. These latter two pieces, written about 150 B.C., are archaistic in a similar way as the sculptures of that time assume styles of the past: they follow the older enharmonic gender, with major thirds and semitones, modulate between conjunction and disjunction, and proceed in a floating five-beat rhythm.

The leading instruments of the Greeks were lyres and pipes. Of lyres, or instruments with yokes instead of necks to fasten the strings, they had two basic forms: the *kithara*, heavy, solidly built, and carried upright, for professionals; the *lyra*, light, pieced together, and held in a horizontal position, for beginners and amateurs. The pipe, *aulós*, was a pair of separate oboes, which were played at the same time, both double reeds being held in the mouth. Other instruments, as zithers, harps, panpipes, trumpets, tambourines, and cymbals, had only a limited importance, since they were confined to special purposes.

SCHOOLS OF POLYPHONIC COMPOSITION

Polyphony results from the simultaneous sounding of two or more melodies, i.e., polyphony concerns itself with the artistic possibilities of combinations of melodies.

One of the earliest treatises on polyphonic music is the *Musica Enchiriadis*, of uncertain authorship, and dating from the 9th century. It describes a type of polyphony in which the plain chants of the Church were sung by voice groups in a predominantly parallel fashion in fifths or fourths. This simple type of polyphony was called *organum*. Modern instances of it may often be encountered, for example, in the works of Claude Debussy.

The Notre Dame School. Organum reached its high point about the middle of the 13th century at the hands of composers attached to the Cathedral of Notre Dame de Paris, a group of scholarly organists who form the first great "school" of composition. Two of its more celebrated members were *Leonin* (12th century) and *Perotin* (at Notre Dame from c. 1183–1238). *Canon*, the literal imitation of one voice by a succeeding voice, makes its first appearance in works of the Notre Dame school. An important medieval musical form, more properly speaking, a style, the *motet*, characterized by multiplicity of texts and the use of a preexistent *cantus firmus*, gradually evolved from the Notre Dame technique. The 12th century motet should be carefully distinguished from the better-known form of the 16th century associated with the names of de Lassus and Palestrina.

The medieval musician did not disdain to use secular texts and melodies in his motets, and amorous or ribald tunes might be combined with chants of the Church. Incongruities of this sort must not be judged by modern standards: the sacred and the secular were not opposing viewpoints for the Gothic artist be he composer or architect.

Ars Nova. The term *ars nova*, "new art," an expression coined by the poet, courtier, diplomat, bishop, composer, and theorist *Philippe de Vitry* (c. 1291–1361), describes both the spirit and the product of 14th century composition in France. *Ars nova's* principal innovations were rhythmic, duple

rhythm being admitted to a position equivalent to that formerly held by triple. Pitch alterations, akin to our modern chromaticism, also appear. The greatest master of *ars nova* is *Guillaume de Machaut* (c. 1300–1377), a justly celebrated character in his own day. The first complete setting of the Ordinary of the Mass is attributed to him, although his greatest contribution lies in the sphere of secular music.

Ars nova was also assiduously cultivated in Italy, notably by the blind Florentine organist *Francesco Landini* (1325–1399). Characteristic Italian forms of the period, all secular, were the *ballata*, the *caccia*, and the *madrigal*, the last designed to become the secular form par excellence of the 16th century.

The English School. Early English polyphony differed from that practiced on the continent through its predilection for the use of intervals of the third and the sixth, a style of writing known as *gymel*. The technical proficiency achieved by early English composers is demonstrated in the famous *rota*, easily the best known of medieval compositions. *Sumer is icumen in*, a canon for four voices over a ground bass which is also a canon. *Walter Odington* (c.1300) and *John Dunstable* (c. 1370-1435) stand forth as the great figures of early English music.

The Burgundian School. The great strides made by the art of music during the 15th century may be traced to the fluency with which composers had learned to express themselves in the polyphonic idiom and to the impetus resulting from the establishment at the courts of the ruling classes, political and religious, of chapel choirs.

The English contributions to polyphony were exported cross Channel to a politically affiliated land, the Duchy of Burgundy, in the Low Countries. It was in the rich cities of this region that the so-called Burgundian school originated.

The two representative masters of the School are *Guillaume Dufay* (c. 1400–1474) and *Gilles Binchois* (c. 1400–1460). Dufay's idiom represents a synthesis of English, French, and Italian influences. Like many of his fellow countrymen he was for a time a member of the Papal choir in Rome.

The Burgundian composers brought the Mass to a high level of development. Dufay, for example, was the first to use one melody, called a *cantus firmus*, as a core around which he created the various sections of the Mass. One of the most famous of these *canti firmi* is the French secular song *L'homme armé*.

The Flemish School. From its significant beginning by the French organists at Notre Dame cathedral, and its scholarly advancement in Burgundy, the development of counterpoint passed next into the hands of the Flemish masters. From the standpoint of purely formal perfection and technical facility, the Flemish school probably represents the culmination of polyphonic development. The great significance which this school assumes in history is that of having assembled, developed, and exploited polyphonic devices and resources and the methods of thematic manipulation in general. It also systematized the acquired knowledge for teaching and so was able to supply all Christendom with singers, teachers, and singing schools. A natural demand for the capable services of the Flemish masters throughout Catholic countries, together with their roving disposition, led many of them away from home. A strong and persistent emigration toward the south of Europe about 1560 furnished Rome and other Italian cities with the rich products of their musical thought.

The most important technical contribution of this great school was the principle of "imitation," produced by causing the various voices of a polyphonic work to enter successively rather than simultaneously. Each voice upon its entry would repeat, i.e., imitate, the words and at least the initial features of the music of the preceding voice. Imitation is now one of the standard devices of the composer and may be seen in a highly developed state in such forms as the present-day *canon* and *fugue*.

One of the first great masters of the Flemish school was *Jean Ockeghem* (c. 1430–1495), *maître de chapelle* to two French kings, Charles VII and Louis XI, a composer of prodigious technical facility, as shown, for example, in a motet for thirty-six voices consisting of four nine-part canons. Another prominent figure in the earlier development of the Flemish school was *Jacob Obrecht* (c. 1430–1505), *maître de chapelle* at the Cathedral of Antwerp and also active in Italy. Obrecht's attractive melodies and sharply defined rhythms made his works quite popular during his lifetime and they achieved wide distribution over the continent both in Ms. and in printed copies.

Ockeghem's eminent pupil, *Josquin des Prés* (c. 1450–1521), enjoyed a fame so great that he was known as "The Prince of Music." He is universally held to be the greatest master of the Flemish School. His music contains much that is immediately attractive to modern ears, and his sensitivity to the rhetorical demands of his texts is quite remarkable.

Other noteworthy members of the Flemish group were *Antoine Fevin* (c. 1473–1512), *Pierre de La Rue* (?–1518), *Antoine Brumel*, at the court of the Duke of Ferrara in 1505, and *Heinrich Isaak* (c. 1480–1517), in the service of the Habsburgs at Vienna.

The art of printing music was first mastered by a Venetian craftsman, *Ottaviano dei Petrucci* (1466–1539). The most famous work to issue from his shop was the celebrated *Odhecaton*, published in 1501 and containing many compositions by members of the Flemish School.

Orlandus de Lassus. One of the greatest geniuses of the polyphonic period and of music history in general was Orlandus de Lassus, the Belgian composer (c. 1532–94). He left his home at the age of 16 and after many wanderings accepted the invitation of the Bavarian duke Albert V to go to Munich as chief chapelmaster. Lassus' style was majestic and dignified, and his works reflected feelings ranging from penitence to the gayest humor. Possessed of much greater versatility than his predecessors, he was momentously active in the transformation from purely linear polyphony to the conception of that independent and powerful harmonic style which reaches down to the present day. The period of the great Flemish school practically closes with de Lassus. Extending over approximately two centuries, the tremendous influence of this school is seen in the fact that it sent forth more than 300 distinguished composers, who carried a highly developed art of music into other countries, especially Germany and Italy.

Italian Schools. Polyphonic music reached its high point during the 16th century. While the imitative style formulated by the Flemish groups predominated and could be encountered throughout Western Europe, ascendency in composition, particularly of sacred music, passed to Italy.

The two outstanding sacred forms of the 16th century were the *Mass* and the *motet*. The latter had nothing in common with the 13th century French form mentioned above, and as used by latter-day composers the term *motet* indicates a polyphonic setting of some biblical extract, usually in Latin.

The Roman School. The musical tradition of Rome was thoroughly conservative and was in keeping with the ecclesiastical eminence of the city and its celebrated Papal choir.

The greatest of the long line of Roman masters is *Giovanni Pierluigi da Palestrina* (c. 1525–94), probably the best-known figure in the history of polyphonic music. His music constitutes the very essence of the spirit of the Counter Reformation, for all secular idioms, many popularized by Flemish composers, are notably absent from it. Its fitness for the high purpose of the Church caused the Council of Trent to commend it to other composers as a model,

Hence there arose a highly colored legend which treats Palestrina as "the savior of Church music." The result of the essentially simple direct idiom of Palestrina was an impressive and truly beautiful ecclesiastical style.

Although not geographically a member of the Roman School, the Spaniard *Tomás Ludovico da Victoria* (c. 1540–1611) has often and correctly been labeled "the Spanish Palestrina," although an intensity foreign to the Roman master may often be found in his works, all sacred in character.

Other well-known composers of the Roman School were *Giovanni Maria Nanino* (c. 1545–1607), *Felice Anerio* (1560–1614), and *Marco Antonio Ingegneri* (1545–92).

The Venetian School. The great republic of Venice, with its rich and bustling seaport and its celebrated St. Mark's Cathedral, was the seat of an enterprising, energetic school of composition whose works were characterized by brilliancy of choral writing and colorful use of instruments, all in marked contrast to the essentially conservative style cultivated in Rome. Much emphasis was placed on the coloristic effects which could be produced by contrasts of either vocal or instrumental groups differing from each other in location or strength. (The basic principle of the *concerto*.)

Two of the important composers who brought fame to the city, *Adrian Willaert* (1480–1562) and his pupil *Cyprian de Rore* (1516–65), were of Flemish birth. But the most prominent member of the school was a native Venetian, *Giovanni Gabrieli* (1557–1612), a composer whose style pointed clearly toward the 17th century. Gabrieli's successes in combining voices and instruments paved the way for much that was to be standard practice a century later. He achieved considerable fame during his lifetime and his style exercised a molding influence on the works of many of his contemporaries and successors, notably German composers such as *Hans Leo Hassler* (1564–1612) and *Heinrich Schütz* (1585–1612).

Willaert and another Flemish master resident in Italy, *Jakob Arcadelt* (c. 1514–57), made important contributions to the literature of the Italian madrigal, a form which reached a high point in Italy during the closing years of the Renaissance. The madrigal, the secular equivalent of the contemporary motet, was often in four or five parts and possessed a structure conforming to the divisions of its text. Although amorous texts were in the majority, almost any subject might be employed, in some instances religious as well.

Later composers of madrigals, *Luca Marenzio* (c. 1560–99), *Carlo Gesualdo*, prince of Venosa (c. 1560–1614), and *Claudio Monteverdi* (1567–1643) developed an elaborate type of madrigal rich in dramatic interest and tonal description. Despite the adherence to polyphonic tradition, dissonant chords, often of a surprisingly modern cast, were utilized for forceful interpretation of the text. *Orazio Vecchi* (c. 1550–1605) set entire plays to music in the form of a series of madrigals. The most famous of these, *L'Amfiparnasso*, performed in 1594, is an important precursor of the opera.

France. The most popular polyphonic form in France during the 16th century was the secular *chanson*, the contemporary importance of which is shown by the four part chansons which flowed from the press of the Parisian printer Pierre Attaignant. Like the madrigal, an analogue of the motet, the chanson might employ a variety of secular topics for its texts. Prominent among the many composers of chansons were *Clement Jannequin* (c. 1485–1550), celebrated for his many realistically descriptive pieces.

Another notable French contribution to 16th century music was the collection of settings of Psalm tunes issued in 1562 and used extensively not only by the Huguenots but by English, Dutch, and German Protestants as well. Of the many Huguenot composers who enriched the French Psalter, the finest was *Claude Goudimel* (1505–72).

Germany. The Lutheran Reformation was responsible for several new departures in music, of which the *chorale*, the congregational hymn which serves as the musical germ of the Lutheran service, is the most important. Viewing music as a vital agency in creating religious feeling, Luther utilized three sources for the melodies of his hymns: Catholic chants, folk-tunes, and original compositions of a simple character. *Ein' feste Burg ist unser Gott*, with both words and music by Luther, is typical. Melodies of the chorales served as material for organ works and for the elaborate combination of voices and instruments known as the church cantata, later brought to its climax by Johann Sebastian Bach.

The Reformation created a tremendous demand for new music, a need quickly met by German composers. Settings of Psalms and chorale texts were widely published, notably those of Luther's friend and musical counselor *Johann Walther* (1496–1570), as well as collections by *Johannes Eccard* (1553–1611) and *Hans Leo Hassler* (1564–1612).

In South Germany and Austria the Catholic musical tradition remained but with Flemish masters such as Orlandus de Lassus occupying most of the important posts. In fact, a Swiss Catholic composer, *Ludwig Senfl* (c. 1492–1555), de Lassus' predecessor at Munich, was the favorite composer of Martin Luther. *Philippe de Monte* (1521–1603), long at the Habsburg court in Vienna, ranks with Orlandus de Lassus and Palestrina as one of the principal figures of the "Golden Age" of music.

England. English music, like its kindred arts, attained an imposing degree of perfection during the reign of Queen Elizabeth (1558–1603). While sacred music of great beauty was produced, the music of the period followed the prevailing spirit of the age in its predisposition for the secular.

The most remarkable aspect of Elizabethan music was the assiduous cultivation of a polyphonic form which had been transplanted from Italy, the *madrigal*. Supplied with a liberal amount of fine texts, Elizabethan composers created a magnificent corpus of beautiful works with a wide emotional gamut. Madrigals were designed for rendition by amateur vocalists who sang from their part books for the sheer pleasure of performance. They were published under such captions as *Songs*, *Ayres*, *Canzonets*, *Ballets*. The last named of these possesses the chains of "fa, la"s which, of obviously Italian origin, are associated with this variety of madrigal.

Among the composers whose names appear in the forty odd collections of madrigals published in Elizabethan England are *William Byrd* (1543–1623), *Thomas Weelkes* (c. 1575–1623), *John Wilbye* (1574–1638), *Orlando Gibbons* (1583–1625), and *Thomas Morley* (1558–1603). Morley's guide, *A Plaine and Easie Introduction to Practicall Musicke*, tells us much about the music and music-making of his time.

Music for instruments also flourished in England in this period, consisting notably of colorful pieces for keyboard instruments, usually the *virginals*, and for an important group of predecessors of the violin family, the "consort" of viols. Variations and dance forms were the most popular types written for the virginals. Players of the viols found delight in the polyphonic "fancy."

Songs to be sung to the accompaniment of the lute also figured in the musical life of Elizabethan England. Particularly beautiful compositions of this type came from the pen of *John Dowland* (1563–1626).

Members of the upper classes were proficient performers on the keyboard instruments and the viols. In fact an English gentleman was expected to take his part in the rendition of a madrigal, playing on the virginals or on one of the instruments of the viol group. He was an amateur in the literal and best sense of the word.

Despite the emphasis on secular music, composers of the period wrote extensively for the service of the Anglican Church, the typical musical form of which was the uniquely English *anthem*.

SECULAR MUSIC OF THE MIDDLE AGES

Inasmuch as the Church was the custodian of most organized knowledge in the Middle Ages, it concerned itself primarily with its own music. Hence a large amount of secular music of the period has been lost to us and attempts to reconstruct much of it from the few available Mss. introduce an element of supposition. Not that there was a strong cleavage between sacred and secular styles. As has often been pointed out, a free exchange existed between the musical resources of the Church and that of the laity.

The Troubadours and Trouvères. Secular music of the Middle Ages is well typified in the activities of the *troubadours*, who originated in Provence (Southeastern France), and their northern French analogues the *trouvères*. The troubadours were members of the upper classes. They flourished from about 1100 to 1300, a significant portion of the Age of Chivalry, and many of their creations have topical significance. About 264 troubadour melodies have survived. A notable feature of the troubadour music is its emphasis on stylized forms and types, probably for the first time in the history of music. Among these may be listed the epic *chanson de geste*, and *canso*, a love song, the *alba*, a song of dawn, the *plainte*, a song of mourning.

Probably the most distinguished trouvère was *Adam de la Halle* (c. 1230–1288) of Arras. His *Le Jeu de Robin et Marion*, written for the Court of Robert of Artois and Naples, dates from c. 1275 and is one of the oldest monuments of French dramatic art.

The Minnesinger. A current of artistic activity similar to that which called the art of the troubadours into existence expressed itself in Germany during the 12th and 13th centuries. The Germanic poet-musicians were known as *Minnesinger* (German: *Minne*, love) and unlike their French counterparts they sang their compositions themselves. Richard Wagner's opera *Tannhäuser* is based on an episode in the life of a celebrated minnesinger of the same name (1205–70), and two other famous practitioners of the art, *Walther von der Vogelweide* (c. 1170–1230) and *Wolfram von Eschenbach* (flourished c. 1200–20) appear in it. One of Wolfram's epics *Parzival* served as a source for Wagner's *Lohengrin* and *Parsifal*. Texts of the minnesinger lean toward the narrative or devotional.

The Meistersinger. The Meistersinger (mastersingers), authentic accounts of whom date from the 14th century, undertook the care of musical art after it had passed from the knightly singers to the burghers and respectable artisans. Guilds of Meistersinger existed in Frankfort, Colmar, Prague, Mainz, and other cities. The meistersong attained its greatest popularity during the 15th century in Nürnberg, Augsburg, and Strassburg; also later in Ulm, Munich, and Regensburg. At Nürnberg the famous cobbler and poet, *Hans Sachs* (1494–1576), was the leading spirit. The schools of the Meistersinger fell into gradual decay after the Thirty Years' war. However, the corporation did not come to an end before 1839, when the four surviving members of the school at Ulm handed their corporation badges and records to the *Liederkranz* of that city, thereby dissolving their guild. In his opera *Die Meistersinger*, Richard Wagner vividly pictures the musical art of the Meistersinger and the traits of the honest but pedantic men who practiced it.

The Strolling Players. Of no inconsiderable value in the development of music is the influence wielded by the vagrant pipers, or *strolling players* (French: *jongleurs*; German: *Gaukler*) who were numerous about the time the minnesong passed over to the meistersong. Vagrant, homeless, despised, they were nevertheless welcomed on festive occasions for the amusement they offered. The strolling players became a significant influence upon the development of music because of the sacred plays which they presented. Up to the middle of the 12th century the sacred dramas, named *passion plays* in Germany and *mysteries* in France, were entirely in the hands of the clergy, but later these vagrants took part in the plays or presented them wholly themselves. One of the real benefits bestowed upon the growth of music by these simple folk was their constantly increasing dexterity in the use of their musical instruments.

The Baroque Period. The Baroque period, which extends from the beginnings of opera to the death of Johann Sebastian Bach, dates from about 1600 to 1750. It gave the world a new musical style characterized by emphasis on a single melody, supported by chords, crystallized an all important combination of music and drama, the *opera*, and witnessed the birth of a host of new instrumental forms. In short, it formulated the idiom of much of the music of today.

Apart from its forms, however, the Baroque period stands out through the conscious efforts of its representative composers to achieve a grand sweep, lively dramatic contrasts and a vividness of presentation. Richness of ornamentation, abrupt changes in instrumentation, harmonic complexity, all account in some measure for the continual movement in Baroque music.

Opera and Oratorio. Toward the close of the 16th century, a group of Florentine musicians in the course of their discussions on the nature of Greek drama concluded that it had been sung in a declamatory manner. Putting their theories into practice, they brought forth the first *opera*, a drama in which music was employed as an agency to heighten the expressiveness of speech. Such "song speech" is called *recitative*. The musical accompaniment, furnished by a few stringed instruments and a keyboard instrument, consisted of simple progressions of chords which by proper choice and arrangement could be used to add emphasis to the recitative. The musical texture so produced by the combination of a principal voice and accompanying instruments furnishing a harmonic background, is referred to as *homophony* in contradistinction to the equal-voiced style of polyphony. The chords produced by the instruments were constructed with reference to the lowest part, the bass, of great importance in defining the harmonic structure. This bass received the designation *basso continuo*, later shortened to *continuo*. English equivalents are *figured bass* or *thorough-bass*. So characteristic is the basso continuo in music of the Baroque period that the epoch is sometimes referred to as the *Basso Continuo Period*.

The opera experienced a phenomenally rapid growth in Italy and in 1637 a public theater devoted to it was opened in Venice. Admission was cheap and the public flocked to the new entertainment. But with the rise of the admissions-paying audience came a decline in dramatic values, and music which had initially been assigned a role auxiliary to the drama soon became the thing in itself, i.e., the means became the end. An emphasis on solo song and pure melody resulted and dramatic propriety receded into the background. Works were performed with elaborate stage-effects, complicated machines, and exotic costumes, leading an Englishman visiting in Venice in 1645 to describe the opera as "one of the most magnificent and expensive diversions the wit of man can invent." But the art of music received singular impetus through the development of solo song and the rapid recognition accorded the band of instruments located near the stage and taking its name from its position in the theater, the *orchestra*, eventually to become the supreme instrument of musical expression.

The two most important contributors to the Venetian theater were *Francesco Cavalli* (1602–72)

and *Marc' Antonio Cesti* (1623–69), the former becoming quite wealthy through the frequent performances of his operas.

The presence in Naples of *Alessandro Scarlatti* (1659–1725), a melodist of great gifts, accounts for the shift in the focus of Italian opera from Venice to that city. Scarlatti's use of the orchestra, notably in the instrumental introduction to an opera called the *overture*, and his use of the eventually stereotyped vocal form called the *da capo aria*, influenced almost every one of his European contemporaries. Despite the mythological or classical origin of the texts employed for serious Neopolitan operas, they can hardly be called more than concerts in costume.

It was frequently the custom to interpolate a short comic opera, an *opera buffa*, between the acts of a serious one. Texts of these short works were usually topical in nature. Curiously enough, an opera buffa *La Serva Padrona* by *Giovanni Pergolesi* (1710–36), mounted in Naples in 1733, is the oldest opera which enjoys regularity of performance today.

French Opera. An Italian, *Jean-Baptiste Lully* (1632–87), dominated French opera during its formative period. The national predilection for ballet and spectacle was responsible for the development of the necessary instrumental music, and to meet this need Lully wrote many fine dances, masterfully orchestrated and excellently fashioned. Lully is also an important figure in the evolution of the overture. A type created by him was widely imitated and is known to this day as the *French overture*.

English Opera. Opera in England has been preceded by the courtly entertainment known as the *masque*. With the reopening of the theaters in 1660, operas were produced with great frequency. Though Italian and French conventions were widely adhered to, English opera developed a style of its own, and in the hands of one of England's greatest composers, *Henry Purcell* (1659–95), reached a stage of excellence far in advance of most of the productivity of the Continent. Purcell's greatest work is also his only true opera, *Dido and Aeneas*. But the promise of Purcell was not fulfilled and English music remained essentially a pale imitation of German and Italian style until the end of the 19th century.

German Opera. In Germany as in France, the Italian manner was long dominant in the principal opera houses. The native product, the *Singspiel*, achieved little distinction.

Again as in Italy, commercial and artistic eminence went hand in hand, and Germany's first operatic capital was a prosperous seaport, Hamburg. Here *Reinhard Kaiser* (1673–1739) held sway. Despite the popularity of the Hamburg school in its time, it has little more than historical interest today.

The Oratorio. Like the orchestra, the *oratorio* owes it name to a location, in this instance the *oratory* of the church. Rooted in the liturgical drama and mystery plays of the Middle Ages, the oratorio in the modern sense came into being in Rome in 1600. The name of *Giacomo Carissimi* (1605–74) heads the list of important composers in this combination of music and sacred drama. Other Italians of note were *Antonio Lotti* (1667–1740) and *Antonio Caldara* (1670–1736).

A particular type of oratorio has the Passion of Jesus as its subject. The version of any of the four Evangelists may be used. While Passions had been written both in plain-chant and in the complicated texture of polyphony, the form took on new dramatic vigor with the adaptation to it of the new idioms of the opera, notably the recitative and the language of the orchestra.

The foremost writer of Passions, however, was a German, *Heinrich Schütz* (1585–1672). Active at the chapel at Dresden, Schütz had absorbed much of the Venetian tradition at its source.

Instrumental Music of the Baroque Period. The Baroque period is rich in literature for the organ, an instrument well suited to meet the expressive needs of the Baroque spirit.

The brilliant organ playing which had been found in Venice at the close of the Renaissance was transplanted to northern Europe by the Dutch organist *Jan Pieters Sweelinck* (1562–1621), active at Amsterdam. Sweelinck is of particular interest through his cultivation of a form which became one of the leading features of the organ music of the Baroque —the *fugue*. He taught extensively, and through his many pupils, the most outstanding of whom was *Samuel Scheidt* (1587–1654), created the great German school of organ playing which eventually reached its climax with Johann Sebastian Bach.

Northern German organists typified by *Adam Reinken* (1623–1722), *Dietrich Buxtehude* (1637–1707), and *George Böhm* (1661–1733), were partial to the larger, more spectacular organ forms—the prelude and fugue, toccata, and fantasia. Representatives of central and southern Germany, notably *Johann Pachelbel* of Nürnberg (1653–1706), cultivated variation types such as the *Chorale-Vorspiel*, an instrumental treatment of the congregational *chorale*, and also developed forms which had initially been fostered in Italy under the influence of *Girolamo Frescobaldi* (1583–1643).

Music for stringed instruments underwent rapid development during the Baroque period under the impetus provided by the perfection of the violin family by Italian craftsmen, notably the group at Cremona headed by *Nicola Amati* (1596–1684). Another Italian, *Arcangelo Corelli* (1653–1713), is credited not only with being the father of the modern school of violin playing but also with playing a signal role in the fashioning of two instrumental forms—the *sonata*, a piece for a keyboard instrument alone or another instrument, usually a violin, combined with a keyboard instrument, and the *concerto*, a work for a group of instruments. The basic principle of the concerto, contrast of instrumental groups, underlies almost all of the ensemble music of the Baroque period. Throughout the period emphasis fell on the bowed instruments as the core of instrumental ensembles.

THE CLASSIC MASTERS

Johann Sebastian Bach (1685–1750). Often spoken of, together with Beethoven and Brahms, as one of the "three B's" of music, Bach is one of the great masters of all time. Although he was one of the early classicists, his music contained innovations which in many respects are the basis of the most modern idioms in 20th century music. He was prolific in writing both vocal and instrumental works. For the Church he composed 226 cantatas, several masses, a number of oratorios, and a large number of sacred works for organ. His secular works included orchestral suites, concerti grossi, sonatas for various instrumental combinations, and many works for the organ and for the clavier (the keyboard instrument of the day). Most of Bach's works were unpublished during his lifetime and were not widely known until they were discovered and performed by Mendelssohn a hundred years after his death. Then the Bach Gesellschaft was formed and all of Bach's works were published by subscription. Bach was one of the greatest contrapuntists of all time, but even though his fugues and his part writing were so skillful that they excite the admiration of all musicians, his work was charged with a warmth and fervor that makes listening to it an emotional experience.

George Frederick Handel (1685–1759). Handel and Bach lived contemporaneously and had much in common. Both were master contrapuntists. Handel, however, had a flair for the theater, and his 46 operas exercised a tremendous influence on the operatic stage of the 18th century even though they are to-

day seldom performed in their entirety. The German born Handel spent the later years of his life in London, and wrote many of his works to English texts, particularly his oratorios. His handling of English words and phrases was in the florid Italian style which is outdated today, but because of the beauty of the music, the best of his oratorios, particularly *The Messiah*, are standard in the literature of music. In addition to his vocal music, Handel composed a large number of instrumental works—orchestral suites, concerti for organ, sonatas for various instruments and combinations of instruments, and numerous harpsichord pieces. His famous *Largo*, known today as an instrumental piece, was originally an aria from his opera *Serse*.

Christoph Willibald Gluck (1714-87). An early composer of opera who did much to found the modern styles of operatic writing. Born a German and living most of his life in Paris and Vienna, Gluck at first composed in the style of the early Italian operas. He became disgusted with the artificialities and banalities of the Italian composers of the day, and he sought a more even balance between the action of the story and the music. He tried to make the music less subservient to the whims and demands of the singers, and his innovations were resisted by both musicians and the public. Gluck's principal rival was *Niccola Piccinni* (1728–1800), an operatic composer who followed traditional patterns. Each composer had his adherents, and the controversy between the two factions was bitter. Piccinni was probably the more popular of the two during their lifetimes, but today his works are altogether forgotten, while a number of Gluck's operas are still favorites, notably *Orfeo ed Euridice*, *Armide*, *Iphigenia en Tauride*, *Iphigenia in Aulis*, and *Alceste*. Gluck composed a total of 39 operas.

Joseph Haydn (1732-1809). An Austrian composer who was one of the greatest of classic masters. In his symphonies, string quartets, and sonatas, he brought toward perfection the development of the sonata form which had been initiated by such earlier composers as *Johann Stamitz* (1717–57) and *Philip Emanuel Bach* (1714–88). Haydn also did much for the development of orchestral music. He increased the number of instrumental parts, and he was one of the first to use instruments for their individual tone-color, rather than as a medium merely for playing certain parts of the score, regardless of their adaptability for various instruments. Haydn composed more than 100 symphonies, 77 string quartets, 30 trios, 51 sonatas, numerous concertos, and other miscellaneous instrumental works. In the field of vocal music he composed several operas, numerous cantatas, and several oratorios, of which the best known today are the "Creation" (1799) and the "Seasons" (1801).

Wolfgang Amadeus Mozart (1756-91). Probably the most universal genius in music that the world has even seen. He was great as a writer of tragic, romantic, and comic operas, great as a composer of symphonies, quartets, and quintets, great as a writer of piano concertos and sonatas, great as a writer of songs and of Church music, and great also as an executive musician. Every measure of his music breathes the exquisite charm and tenderness of his nature, and so extraordinary was his facility and versatility that the world is still in doubt as to whether Mozart excels most in his orchestral or in his chamber music, in sacred music or in opera. In all these branches of the art he stands at the very front rank of the world's greatest musicians.

The salient characteristics of Mozart's operas are found in the truthful expression of human nature which is achieved wholly by the music, for Mozart used his librettos merely as skeletons. Even when the plot uncovers the whole gamut of emotional feeling from buffoonery to supernatural terror, as in "Don Giovanni," his touch of mastery never falters. The characters in Mozart's operas are recognizable as types, and their human nature belongs to no period, but to all time. No master was more successful in portraying the curious intermixture of tragedy and comedy, of horror and merriment, in which the emotional background seldom allowed expression of any one pure, unalloyed mood. Mozart grasped the unity of these contrasts and expressed them so surely and convincingly as to open up a new province for his art.

Mozart wrote more than forty symphonies, of which the last three are the most played today—E flat major, G minor, and C major (the "Jupiter"). He developed further than Haydn the art of tone color in instrumentation, and the musical content of his works is less formal than Haydn's.

Ludwig van Beethoven (1770-1827). The greatest of the classic composers, and the link between the classical period of music and the romantic era which was to follow. Beethoven distinctly derived from Haydn and Mozart, particularly from the latter, but his rugged temperament and his intense individuality made him break away from the restrictions of the 18th century and caused him to write music which was revolutionary to early 19th century ears. His first symphony is Mozartian in style, yet it is in no sense imitative. With his third symphony, the "Eroica," he showed the effects of the revolutionary age in which he lived, when the French Revolution had overthrown the court of Louis XVI and artists and writers were having their own struggle for freedom of expression.

Beethoven composed nine symphonies, which are still monuments in the literature of music. The fifth is probably the favorite of all symphonies in the repertoires of modern orchestras. In the ninth symphony the composer introduced a chorus in the last movement, using for his text Schiller's "Ode to Joy." In all his works Beethoven adhered to the classic forms, but he expanded them and made them more elastic and expressive. In his symphonies and sonatas he substituted the scherzo for the traditional minuet movement, and he made other innovations which made the form of his pieces secondary to their musical content, a medium for expressing the composer's ideas rather than a formal end in itself. He also expanded the development sections of the sonata form, and he ended his movements with codas which were in themselves extended developments of themes and material used previously.

In addition to the nine symphonies, Beethoven composed an opera, "Fidelio;" 5 concerti for piano and orchestra, one for violin and orchestra, and one for piano, violin, cello, and orchestra; sonatas for piano solo, and for violin and piano; a large body of chamber music (trios, quartets, quintets, etc.); and a number of choral works and songs.

THE ROMANTICISTS

The romantic era in music, starting in the early 19th century, was concurrent with the same period in the other arts and in literature. The revolts of the common people which led eventually to the Central Europe uprisings of 1848 encouraged artists, writers, and musicians to make their work a more personal expression and to voice their own thoughts rather than those of their patrons and protectors. The classic forms were not abandoned, but they became more elastic, and the composers of the romantic period followed Beethoven's lead in making those forms more sensitive and better adapted to the ideas the composers strove to express. There was also a closer relation between music and literature. Composers, notably Schumann, gave fanciful titles to their compositions. Harmonic combinations became bolder and richer, and composers made freer use of dissonances which had not been tolerated in 18th century music. Naturally, these were resisted at first, just as the more advanced dissonances of the 20th century have been accepted only slowly in our

time, but as the ears of music lovers became accustomed to innovations, the new tonal combinations became part of the accepted harmonic vocabulary.

Karl Maria von Weber (1786–1826). Generally considered the first of the romanticists, his work is considered somewhat archaic today, but in the 19th century he was regarded as one of the great composers. His operas are still fresh and vital, particularly "Der Freischütz," "Euryanthe," and the fairy opera "Oberon." His instrumental music was highly popular for many years. In his day Weber was distinctly an innovator. His orchestral tone color, his treatment of texts in vocal music, and his skill in making his music convey the mood and emotion of the action and dialogue of opera librettos, were matters which influenced all the composers who were to follow him. Even Wagner acknowledged his indebtedness to Weber.

Franz Peter Schubert (1797–1828). One of the greatest melodists, and one of the most natural geniuses who ever composed music. Compared with other great masters—Bach, Beethoven, Brahms, Wagner—his technical equipment was limited and meager, but his natural gift for melody was so fluent and spontaneous that he could accomplish with very little training that which many better trained but less inspired composers could never attain. He belonged distinctly to the romantic era, for his imaginative songs were written for plain people and not for the aristocracy which provided the sustenance of 18th century composers. He was the first of the German *lieder* composers, writing songs in which the accompaniment was such an integral part of the work that it helped either to describe the action of a poem, as in "Der Erlkönig," or to establish its mood. Even in his symphonies and chamber music Schubert was lyric and song-like.

He was successful in almost every form of music except opera, even though he did compose several operas which failed because he had chosen inferior texts. Altogether Schubert composed 603 songs, 8 symphonies, 7 overtures, 22 sonatas for piano, and a large number of piano pieces, 15 string quartets and other chamber music works, as well as choral works and the 14 unsuccessful operas.

Felix Mendelssohn-Bartholdy (1809–47). Mendelssohn was distinctly a romanticist in the poetic and imaginative character of his work, yet he was as much a master of the technique and form of composition as any of the classicists. His fugues and his contrapuntal writing are marked by an inventiveness and facility that rank him with Bach and Handel, even though his works lack the profundity and the emotional depths of the older masters. His music is always amiable, even when it seems superficial. He wrote in almost every form except opera: 5 symphonies, several overtures, two concerti for piano and orchestra, one for violin and orchestra, numerous chamber music works, several oratorios, of which the most famous is "Elijah," and many songs and piano pieces.

Robert Schumann (1810–56). One of the most typical representatives of the romantic movement. His music has a warmth of melody and harmony that proved an eloquent medium for expressing the poetic ideals of the 19th century. For many of his piano pieces Schumann chose fanciful titles which in effect made the works descriptive and programmatic. He was always at his best when writing for piano, for that was the instrument he knew best and on which his wife, the pianist *Clara Wieck* (1819–96), could interpret his music in public. In his orchestral music Schumann was limited by a meager command of the technique of instrumentation, but in orchestral or chamber music works where the piano was featured—notably the Piano Concerto in A Minor and the Quintet for strings and piano—his effective handling of the solo instrument more than atoned for his weak orchestration. In addition to his piano works, large and small, Schumann composed several hundred songs in which he developed still further the integration of voice and accompaniment that marked the best of Schubert's *lieder*. For orchestra Schumann composed four symphonies, a number of overtures, and incidental music for Byron's "Manfred." His concerti included the A minor piano concerto, one for cello and orchestra, and several other pieces for various solo instruments. He composed also three string quartets, the piano quintet, and a piano quartet, two trios and two sonatas for violin and piano, as well as a number of choral works.

Frédéric Francois Chopin (1810–49). Sometimes called "the poet of the piano," his works are perhaps the most standard and favored of any composer of any era in the concert repertoire of pianists. Himself a pianist, Chopin composed music that was always well adapted to the technical requirements and expressive possibilities of the instrument. His Etudes did much to advance the art of piano playing by posing difficulties which could actually be mastered, and which led later composers to devise still more difficult and correspondingly effective pianistic patterns.

Entirely aside from the technical nature of Chopin's compositions, their musically poetic nature, bordering at times close to sentimentality, started a school of romantic composition which at its best was sensitive and moving, and at its worst mawkish. When interpreted with restraint and taste, Chopin's emotionalism rarely goes beyond the bounds of good taste, and his subtle, refined voicing of his emotional temperament is marked by elegance and refinement. His works include hundreds of compositions for piano: Waltzes, Mazurkas, Ballades, Scherzos, Preludes, Etudes, Polonaises, as well as the two Piano concerti which are favorites with both pianists and audiences.

Hector Berlioz (1803–69). A composer of powerful individuality and influence. He is recognized as the originator of modern instrumentation. Although he adopted the German classics as his models, he trod a very different path. He was one of the first to let music portray and illustrate a program, and aimed to realize novel tone colors of the most vivid nature. His passion for unprecedented combinations and gigantic mass effects was unsated.

His best-known works are the music drama "The Damnation of Faust," the dramatic symphony "Romeo and Juliet," the overture "Carnaval Romain," the operas "Benvenuto Cellini," "The Trojans," "Beatrice and Benedict," and a splendid treatise on instrumentation.

Franz Liszt (1811–86). Undoubtedly the greatest piano virtuoso known to the music world. He is the founder of "transcendental" piano playing, in which the instrument is made to attempt all the resources of an orchestra. As composer he was an adherent of the new German school (free tonality, romantic realism, program music), and his especial donation to the already existing forms was the symphonic poem. In this form he makes free and original use of the leading motive, "local color," and all the arts and devices of orchestration, to interpret the inner meaning of the given poem or program. The best known symphonic poems are the "Dante" symphony, "Faust-symphonie," "Les Préludes," "Tasso, Lamento e Trionfo," "Prometheus," and "Festklänge." Liszt was personally and musically one of the grand figures in the history of music.

Several of the composers of the romantic period represented a reaction against full-fledged romanticism, by returning to the classical forms and by composing absolute, as contrasted to program, or descriptive, works.

Cesar Franck (1822–90). A Belgian-born composer who lived most of his life in Paris. He was one

of the early musicians to develop the "cyclical" form, in which the same thematic material is used in the several movements of a symphony or chamber music work. Franck composed in a meditative, thoughtful style that is contemplative in mood, and lends itself effectively to religious music. He wrote a symphony, a quintet for piano and strings, a sonata for violin and piano, a string quartet, several works for piano and orchestra, many organ compositions, and numerous choral works.

Anton Bruckner (1824–96). An Austrian composer who applied Wagner's instrumental technique to the symphony and who developed a larger formal structure. He completed 8 symphonies and left a ninth unfinished. He also composed several Masses and a large number of organ works.

Johannes Brahms (1833–97). Brahms was an idealist of the highest and purest type, and resisted the romantic tendency to write program music. He composed only absolute music and was the true standard bearer of the classic traditions. He was looked upon by many as the successor of Schubert and Schumann, the combination of the classic and the romantic schools. His harmonization and complex rhythms, with their frequent syncopations and cross accents, are distinctly romantic; his treatment of form and his instrumentation are classical. His harmony is rich, colorful, and new in unexpected changes; his counterpoint, complex. Although a master of every emotional expression, he leaned toward somber shades, in which his serious and classic mind delighted. As opposed to the license and chaotic passion of the ultramodern school, his works point back to the models and ideals of the classic age. Brahms may be called a reflective rather than a spontaneous composer, though for real warmth of feeling, intensity, and exaltation he has no contemporary equal.

In many of his songs one would say that Schubert lives again. The best-known and, in many ways, the most beautiful of his songs is "Wie bist du, meine Königin?" His songs, chamber music, much of his piano music, and several of his choral works ("German Requiem," "Triumphlied," and the "Schicksalslied") gained early popularity, but his four symphonies and the two piano concerti were slower in gaining popular recognition. In recent years they have been increasingly played and are now among the more popular items of the orchestral repertoire.

Lesser composers of the period included the French *Édouard Lalo* (1823–92) whose "Symphonie Espagnole" for violin and orchestra is still a favorite concert work among violinists, and *Max Bruch* (1838–1920), a German composer who is best remembered by his first Violin Concerto. *Robert Franz* (1815–92) continued the tradition of the German lied, and his many songs are still an essential part of the concert singer's repertoire. In Vienna *Johann Strauss, sr.* (1804–49) and his son, *Johann Strauss, jr.* (1825–99), created a type of waltz that is one of the most individual and popular artistic commodities that the Austrian capital ever produced.

19TH CENTURY OPERA

For many years during the 19th century, music lovers looked to Italy for their favorite operas. Melodramatic plots were set to scores which contained easily remembered melodies and effective arias, and which developed the "bel canto" style that in turn produced singers capable of the vocal display expected in the opera house.

Gioacchino Rossini (1792–1868). Although "The Barber of Seville" is the only one of his operas performed in its entirety today, Rossini is still known through his overture to "William Tell" and by his sacred oratorio, the "Stabat Mater." He had an extraordinary melodic gift, and he adapted from German composers the art of using the orchestra in symphonic style. Others of his operas were "Tancredi," "Semiramide," "La Cenerentola," "Moise," and "Italians in Algiers." The overtures to these works are frequently performed as concert pieces.

Gaetano Donizetti (1797–1848). The composer of "Lucia di Lammermoor," "Don Pasquale," "L'Elisir d'Amore," and "The Daughter of the Regiment." His works are filled with arias which are favorites with singers, but most of his operas are showy and superficial in spite of the truly beautiful melodies they contain.

Vincenzo Bellini (1801–35). Bellini was another great melodist, but he lacked the grand manner of Rossini. His "Norma," "Sonnambula," and "I Puritani" are his most popular works. Altogether he composed 11 operas.

Giuseppe Verdi (1813–1901). Unquestionably the greatest master the Italian opera has ever known. After a number of youthful operas, Verdi's most brilliant successes were ushered in by the signal triumph of "Rigoletto," followed by "Il Trovatore" and "La Traviata." Further untiring study and artistic growth, lasting up to the very advanced years of the composer's life, resulted in operas of genuine dramatic vitality, richer and more elaborate style of instrumentation and harmony, melody of greater passion and poignancy, and undeniable beauty. These operas, "Aïda," "Otello," and "Falstaff," have been rightly assigned foremost rank in operatic history.

Contemporary with Verdi were several composers known today principally for one work each: notably *Amilcare Ponchielli* (1834–86), for "La Giaconda," and *Arrigo Boito* (1842–1918), for "Mefistofele." Boito was the librettist for several of Verdi's operas.

Giacomo Puccini (1858–1924). Hailed by Verdi as the most promising of his successors, Puccini carried on the tradition of Italian opera, and developed it to suit more modern tastes. He was skillful in his use of the orchestra, and he adapted it to the requirements of the stage. He also knew how to choose librettos which were well suited to musical treatment. The melodies he assigned to the singers are warm and luscious, often erotic in their appeal. Nearly all of his 12 operas are standard repertoire items in modern opera houses, the favorites being "La Boheme," "Gianni Schicchi," "The Girl of the Golden West," "Manon Lescaut," "Madame Butterfly," and "Tosca."

Several contemporaries of Puccini were active in producing typical Italian operas, but they are each known today chiefly by one or two outstanding works: *Ruggiero Leoncavallo* (1856–1919) by "I Pagliacci;" *Pietro Mascagni* (1863–1945) by "Cavalleria Rusticana;" *Franco Leoni* (1864–) by "L'Oracolo;" *Umberto Giordano* (1867–1948) by "Andrea Chenier" and "Fedora;" and *Italo Dontemezzi* (1875–) by "L'Amore dei Tre Re."

In France the opera advanced along lines laid down by Gluck. Like Gluck some of the early Paris opera composers were born in other countries, but their associations with Parisian opera were so close that they are considered as belonging to the French school. Among these were the Italian-born *Luigi Cherubini* (1760–1842), composer of "Medea;" and *Gasparo Spontini* (1774–1851) who wrote "La Vestale."

The native Frenchmen who wrote operas during the first half of the 19th century included *Daniel Auber* (1782–1871), composer of "Fra Diavolo" and "Masaniello," and *Giacomo Meyerbeer* (1791–1864), composer of "L'Africana," "Les Huguenots," "Le Prophete," "Dinorah," "Roberto il Diavolo," and many other works. Meyerbeer lacked artistic scruples, but he knew how to write effective operas. *Jacques Halévy* (1799–1862) is known today principally for "La Jaive;" *Ambroise Thomas* (1811–96) for "Mignon;" and *Léo Delibes* (1836–91) for "Lak-

me;" while *Jacques Offenbach* (1819–80), born in Cologne but living in Paris from early childhood, created a type of light opera that made Continental operettas supreme until the English Gilbert and Sullivan proved worthy rivals. Offenbach's "Tales of Hoffman" is considered a "grand" opera but the rest of his works fall in the light opera class—"Orpheus in the Underworld," "La Belle Hélène," and many others.

Charles-Francois Gounod (1818–93). His "Faust" is one of the great operas of all time. Its music is delicately sensuous, and seems to derive more from Mozart than from the French Meyerbeer. Gounod followed the trend of making opera strong in its appeal to the masses of people, rather than merely to the cultured aristocracy. His other operas include "Romeo and Juliette," which is still performed, as well as "Mirielle." Gounod wrote much church music, including the oratorio, "The Redemption," and Masses and cantatas.

Georges Bizet (1838–75). Composer of "Carmen," which is still one of the most popular of all operas in the repertoire of the entire world. It combines ravishing melodies with ingenious harmonies, and its plot is melodramatic and powerful. Bizet wrote other operas, among them "The Pearl Fishers," and he also wrote incidental music for plays, among them "L'Arlésienne," and considerable instrumental and vocal music.

Camille Saint-Saëns (1835–1921). Composed 12 operas, of which "Samson and Dalila" was his masterpiece. Although many of his works are shallow and facile, Saint-Säens had a gift for melody and he was a skilled musical craftsman. His orchestration was brilliant and his contrapuntal technique was built on a solid foundation. He composed symphonic works, concerti, and numerous instrumental and vocal pieces.

Jules Massenet (1842–1912). Composer of "Thais," "Le Jongleur de Notre Dame," "Manon," "Herodiade," and several other operas. He had a graceful, melodious style, an exquisite command of instrumentation, and a typically French taste for beauty. He composed also considerable instrumental music and about 200 songs.

Gustave Charpentier (1860–). His opera "Louise," first produced in 1900, was an early attempt at realism. Charpentier was always interested in the welfare of the working classes and his opera has a sewing girl as its heroine.

Immediately after Mozart and Beethoven, the Germanic composers of opera were *Ludwig Spohr* (1784–1859), whose works are virtually forgotten today; *Heinrich Marschner* (1795–1861); *Albert Lortzing* (1803–51), composer of the light opera "Czar und Zimmerman;" *Otto Nicolai* (1810–49), composer of the "Merry Wives of Windsor;" and *Friedrich von Flotow* (1812–83), composer of "Martha" and "Stradella."

Richard Wagner (1813–83). The most original composer and the greatest exponent of dramatic music of all times. Possessed of a powerful and virile intellect, he attained almost equal eminence as poet and musician. In grandeur of conception and in boldness of execution, Wagner was without peer among musical dramatists. Gifted with a thoroughly poetic nature, he penned his own poems from the outset, and, in all his creations, made the preservation of the dramatico-musical unity his objective. Only in the co-ordinated co-operation of musical, dramatic, and scenic means of expression could he see the realization of his idea of a genuine musical drama.

Wagner made his orchestra the exponent of the dramatic action. By means of highly individualized, reminiscent *leading motives*, used sometimes singly in bold relief, sometimes subtly intertwined and varied, he clearly presented the ever changing moods and emotions of the characters, elucidated the plot, and achieved a broader organic connection between various parts of the dramatic situation. All of Wagner's leading motives are remarkable for their realism and the exactness with which they fit that emotion, person, or situation which they are meant to represent.

Growth of Wagner's Art.—Of Wagner's first operas, "Die Feen," "Das Liebesverbot," and "Rienzi," it may be said briefly that they represent his immature, formative period. The real Wagner begins with "The Flying Dutchman." In "Tannhäuser" his melody becomes more pliable and expressive, and he shows strength in handling the orchestra, which is very significant in view of future results. In "Lohengrin" he makes still more consistent efforts to merge the poetic and musical factors; the music is written, not to exhibit the beauty and dexterity of the singers' voices, but to follow the drama into its smallest details. The customary set pieces (arias, duets, *ensembles*, recitatives, etc.) are thrown aside in the attainment of a continuous and flexible musical current.

The music dramas "Tristan und Isolde" and "Die Meistersinger" represent twin peaks of an elevation of sustained dramatic energy; poetically they are Wagner's most consistent and perfect works. "The Ring of the Nibelung" was developed by Wagner out of the dramatic ballad on Siegfried's death. In individual scenes Wagner rises to the highest pitch in this colossal work. By the power which he displays in expressing every shade of human emotion, and by the surpassing skill with which he forms, develops, and directs his vast and otherwise overwhelming material, he has constructed a masterpiece that stands alone and without equal in the entire history of music.

Like "The Ring of the Nibelung" and "Lohengrin," "Parsifal," Wagner's last work, is an allegory and shares the weaknesses of allegories. It is a sacred musical drama in which the curious blend of religious mysticism and sensuousness is represented musically with wonderful skill, the religious element being presented with utmost reverence and artistic seriousness. The panoramas in this opera are perhaps the most beautiful in the history of the modern stage.

In richness, variety, and novelty of orchestral effects, in chromatic and enharmonic modulations, in rhythmic contrast, and in the fertility and originality of contrapuntal combinations and thematic exploitation, Wagner is wholly without parallel. The supreme greatness of Wagner's musical genius is now almost universally acknowledged. His works, both literary and dramatic, are an inexhaustible storehouse of instruction and suggestion to composers. Speaking in the broadest sense, Wagner's conception of the mutual relations of music, poetry, and action will henceforth remain the basis of all opera.

Dramatic Works.—"Die Feen" 1833; "Das Liebesverbot" 1836; "Rienzi" 1838–40; "Der Fliegende Holländer" 1841; "Tannhäuser" 1844-45; "Lohengrin" 1846–48; "Das Rheingold" 1853-54; "Die Walküre" 1856; "Siegfried" 1869; "Die Götterdämmerung" 1874; "Tristan und Isolde" 1859; "Die Meistersinger von Nürnberg" 1867; "Parsifal" 1882.

Orchestral and Choral Works.—"Symphony in C"; "Faust" Overture; "Siegfried" Idyl; "Kaiser" March; "Das Liebesmahl der Apostel," for chorus and orchestra; a few piano pieces and songs.

After Wagner the principal 19th century German composers of opera were *Karl Goldmark* (1830–1915) with "The Queen of Sheba" and "Merlin," and *Engelbert Humperdinck* (1854 - 1921) with "Hänsel und Gretel" and "Königskinder."

England during the 19th century was noted chiefly for light operas. It is true that "The Bohemian Girl" by *Michael Balfe* (1808–70) is performed in grand opera houses, but it is distinctly a comic opera. The most distinguished of all British composers of opera

was *Arthur Sullivan* (1842–1900) who in collaboration with *William S. Gilbert* produced the most delightful series of satirical comic operas the world has ever known; among them "Trial by Jury," "H.M.S. Pinafore," "The Pirates of Penzance," "Iolanthe," "The Mikado," "The Yeoman of the Guard," "The Gondoliers," "Ruddygore," and "The Sorcerer." Sullivan was also the composer of a serious opera, "Ivanhoe," and of a considerable amount of sacred music.

Russian operas of the latter 19th century include many works of nationalist significance: "Russlan and Ludmilla" and "A Life for the Czar," by Glinka; "Prince Igor" by Borodin; "Boris Godounoff" by Mussorgsky; "L'Coq d'Or" and "The Snow Maiden" by Rimski-Korsakov; and "Eugene Onegin" and "Pique Dame" by Tchaikovsky—composers who are discussed under Nationalist and Post-Romantic headings.

POST-ROMANTICISM

After the middle of the 19th century the Romantic movement continued with composers who wrote both absolute and program music, and who carried romantic ideals almost to decadence, some of them making romanticism verge on the over-sentimental or neurotic, and others, like Richard Strauss, applying more advanced harmonies and instrumental techniques to writing descriptive, or program music.

Anton Rubinstein (1829–94). A Russian pianist, one of the greatest virtuosi of all time, who had enormous ambitions as a composer. He was most prolific and wrote in almost every form and for every medium. His music was facile and melodious, but it is not performed often today, partly because it lacked finish and technical skill, and principally because its musical content was shallow and superficial.

Peter Ilyitch Tchaikovsky (1840–93). A great Russian composer, whose 4th, 5th, and 6th symphonies have for years been among the most popular works on orchestral programs. As a composer, Tchaikovsky expressed his emotions intimately and unashamedly. His was a neurotic nature and he never hesitated to move his listeners profoundly by voicing his moods of sadness and even despair. He was able to make his audiences experience his own feelings through his command of modern instrumentation and his genius for writing luscious melodies and warm, mellow harmonies. In addition to his six symphonies Tchaikovsky composed several tone-poems for orchestra, two concerti for piano and one for violin, a number of overtures, 11 operas, of which "Eugene Onegin" and "Pique Dame" are best known today, several string quartets and a trio, many songs, numerous piano pieces, and choral works.

Gustav Mahler (1860–1911). One of the world's great orchestral conductors. As a composer he wrote 9 symphonies, and other large works utilizing all the resources of the modern orchestra, often with choral groups added. His musical conceptions were on a grand scale, sometimes grandiose.

Richard Strauss (1864–1949). One of the great composers of the late 19th and early 20th century. In his early works he composed in a classic-romantic manner derived directly from the Schumann-Brahms school. Then, from 1887, he produced a series of tone-poems which expanded the form that Liszt had developed and used modern dissonances and the increased resources of the symphony orchestra to achieve realistic effects which described vividly the characters and narratives he chose for his subjects. These tone-poems include "Don Juan," "Tod und Verklärung," "Till Eulenspiegel," "Also sprach Zarathustra," "Don Quixote," "Ein Heldenleben," as well as the "Sinfonia domestica." As an opera composer Strauss wrote "Salome" and "Elektra," which contemporary music lovers hailed as being at the outposts of modernism, and also the delightful "Der Rosenkavalier."

Jean Sibelius (1865–). A Finnish composer whose symphonies have become enormously popular in recent years. At first Sibelius composed in the manner of Tchaikovsky, but he later developed an idiom of his own which is highly individual and typically Scandinavian in character. In spirit he is distinctly a romanticist, heroic and epic, expressing with rare eloquence the aspirations of his Finnish countrymen. He has composed 7 symphonies, a violin concerto, and many tone-poems, of which "Finlandia" has become a concert favorite.

Sergei Rachmaninov (1873–1943). An eminent Russian composer-pianist, who in his compositions carried on the traditions of Tchaikovsky. His early fame was spread by a piano piece, the Prelude in C Sharp Minor, which became so famous that it obscured the other far greater works he was composing. He possessed a splendid command of the technique of composition and a finely developed sense of tonal beauty. He avoided the contemporary trends of impressionism and futurism and his genius for haunting melodies and warm harmonies have made his works prime favorites in the concert hall. He composed several piano concerti, of which the second is the most popular; several symphonies; a number of orchestral tone-poems; and a vast body of piano works.

Others of the 19th century composers who have lived into the 20th century are the French *Vincent d'Indy* (1851–1931), who continued the traditions of César Franck, and *Paul Dukas* (1865–1935), composer of the orchestral scherzo, "The Sorcerer's Apprentice;" *Xavier Scharwenka* (1850–1924), born in East Prussia and composer of the still popular "Polish National Dance;" *Moritz Moskowski* (1854–1925), who, like *Cécile Chaminade* (1861–1944), supplied the world with sparkling salon pieces, or light classics; and *Ignace Paderewski* (1860–1941), the great pianist and one-time premier of Poland who composed in many forms, including an opera, "Manru," and many works for piano. *Hugo Wolf* (1860–1903) carried the German *lied* to a more modern expression. In writing his songs he identified himself closely with the poets of the texts, and vitalized the true meaning of the poems. A 20th century composer who is distinctly a post-romanticist and not a modernist is the Hungarian *Ernst von Dohnanyi* (1877–), composer of orchestral works, chamber music, and piano compositions.

NATIONALISM

Nineteenth century political and economic upheavals resulted not only in the Romantic movement in the arts but also in nationalistic tendencies. With old barriers abolished and with small duchies overthrown, it became apparant that people speaking the same language should be politically united as nations. As these nations were formed their racial and cultural traditions and the underlying temperaments of their peoples were expressed in folk-songs and in the more cultivated art of certain of their writers and composers. Particularly in cases where the people of a nation were oppressed, either by their own rulers or by foreign conquerors, music and art were a poignant expression of nationalistic feelings and aspirations.

In Russia, Tchaikovsky, although typically Slavic, was too universal in his appeal to be considered merely as a nationalist, for in his style he combined certain Russian traits with much that he had learned from the Germans and Italians. There was, however, a group of Russian composers who were highly nationalistic, and who often used in their works the folk songs of the Russian people. The pioneer of this Russian nationalistic school was *Michail Glinka* (1804–57) whose opera "Russlan and Ludmilla" was so true to the life of the lower classes of Russian society that some of the aristocrats sneeringly called it "the music of coachmen." Among the followers of Glinka was *Mili Alexeyevich Balakirev*

(1837–1910), composer of a number of orchestral works, including the Oriental Fantasia "Islamey." He gathered about him a group of younger musicians and inspired them with his own enthusiasm for a typically Russian music. His pupils included *Alexander Borodin* (1834–87), composer of the opera "Prince Igor" and many instrumental works; *César Cui* (1835–1918) and the famous Mussorgsky and Rimski-Korsakov.

Modest Mussorgsky (1839–81). A great natural genius who was somewhat musically uncouth, but who was a rugged pioneer, primarily concerned with writing music that would be natural and sincere. His music represented a complete break with the Wagnerian tradition, for he escaped the German and Italian influences that dominated the late century romanticists, including Tchaikovsky. His works seem to grow directly from Russian folk songs. His disregard of the rules of harmony resulted in a harmonic freedom which set a precedent for the modern composers of the 20th century. Mussorgsky is known most widely for his operatic masterpiece, "Boris Godounov," but he composed other operas, among them "Khovanstchina," and "The Snow Maiden," as well as orchestral works, including "A Night on Bare Mountain," and numerous choral works, songs, and piano pieces.

Nicholas Rimski-Korsakov (1844–1908). One of the most brilliant of Russian composers, who combined Slavic traits with Oriental background and coloring. Through study with Balakirev and by rigid self-training he acquired complete mastery of the technique of composition and instrumentation, and was thus able to express to the full his fertile imagination. His works include many symphonic poems and suites, such as the highly popular "Scheherazade" and the "Capriccio Espagnol;" operas, including "L'Coq d'Or," "The Snow Maiden," "Sadko," and "The Czar's Bride;" and numerous chamber music works.

Others of the Russian school at the turn of the century included *Michail Ippolitov-Ivanov* (1859–1935), composer of the popular "Caucasian Sketches;" *Anton Arensky* (1861–1906); *Alexander Glazounov* (1865–1936), composer of the ballet "Raymonda;" *Reinhold Glière* (1875–); and *Alexander Gretchaninov* (1864–), who is now living in the United States.

Igor Stravinsky (1882–). One of the leading composers of modern times. He could logically be discussed in the section on 20th century experimentalists, but he was at one time so much a disciple of his teacher Rimski-Korsakov that he belongs definitely to the Russian group. In his earliest works Stravinsky was somewhat academic, but starting with his ballet "The Fire Bird," he became a true disciple of Rimski-Korsakov and an exponent of the Russian national school. With "Petrouchka," another ballet, he became more advanced harmonically and introduced *polytonality*, or the sounding of two or more tonalities, or keys, simultaneously. With the "Rite of Spring," ("Le Sacre du Printemps"), Stravinsky abandoned all traces of romanticism and carried the realism he had used in "Petrouchka" to an absolute primitivism. This music was so dissonant that it caused a riot when it was first performed in Paris (1913). Stravinsky next became interested in Russian folk-lore, and then in American jazz. In 1920 he changed his style to what is known as neo-classicism, and returned to classic ideals treated in modern fashion.

Serge Prokofieff (1891–1953). Another pupil of Rimski-Korsakov, who with his "Classical Symphony" was at one time distinctly a neo-classicist. Unlike Stravinsky, who had no sympathy with the Russian Revolution and the Soviet, Prokofieff has lent his talents to advancing the Communist cause. His works include an opera, "The Love of Three Oranges," a ballet "The Age of Steel," the musical fairy tale, "Peter and the Wolf," and many purely instrumental works—five piano concerti, 2 violin concerti, a cello concerto, and four symphonies.

Dmitri Shostakovich (1906–). One of the most discussed of the 20th-century composers, who ranks with Stravinsky and Prokofieff as one of the three most important of modern Russian composers. Shostakovitch is particularly interesting as a creative artist who has adapted his work to social and political change, to the tastes of a mass public, and to the requirements of a totalitarian state. Most of his works have political significance, particularly his 7th symphony, which was dedicated to the struggle against Fascism. Up to 1946 Shostakovich had composed 9 symphonies, an opera "Lady Macbeth of Mzensk," a piano concerto, chamber music, and numerous piano works.

Czechoslovakia was typical of oppressed countries whose composers produced highly nationalistic music. Under the rule of the Austrian Habsburgs the Czechs were forbidden to speak their own language, but national feeling was kept alive, and when the restrictions were eased in 1859 creative artists filled their works with the national spirit of their countrymen. *Friedrich Smetana* (1824–84) was one of the leaders, and his opera "The Bohemian Girl" was filled with the songs and dances of his homeland. He was followed by *Antonin Dvořák* (1841–1904) whose "Slavonic Dances" picture the life and temperament of the Czech people. During his few years residence in the United States in the 1890's Dvořák tried to show Americans how they could become nationalists and composed his "New World" symphony as an example. In the 20th century *Jeromir Weinberger* (1896–) continued the Czech tradition with his opera "Schwanda."

In Spain the leaders of the modern nationalists have been *Isaac Albéniz* (1860–1909), *Enrique Granados* (1867–1916), *Manuel de Falla* (1876–1946), *Carlos Pedrell* (1878–), and *Joaquin Turina* (1882–1949).

Edvard Grieg (1843–1907) belonged to the late romanticists, yet his work was so filled with either actual Norwegian folk songs, or else the spirit of native Norwegian music, that he was distinctly a nationalist. Grieg is most widely known for his smaller pieces, but such major works as his Piano Concerto and his "Peer Gynt" suite are concert favorites the world over.

In Italy a group of modern composers has been more preoccupied in symphonic music than in the operatic tradition of their earlier countrymen: notably *Ottorino Respighi* (1879–1936), composer of the symphonic poems "Fountains of Rome" and "Pines of Rome;" *Ildebrando Pizzetti* (1880–); *Gian Francesco Malipiero* (1882–); and *Alfredo Casella* (1883–1947).

Others of the modern nationalist composers are the Polish *Karol Szymanowski* (1883–1937) and *Alexander Tansman* (1897–); the Rumanian *Georges Enesco* (1881–1955); and the Hungarian *Zoltán Kodály* (1882–) as well as his countryman *Béla Bartók*, who is discussed in the section on 20th century innovations. Likewise, the modern French composers, from Debussy and Ravel.

In England the Anglo-Saxon tradition has been carried on by such typically British composers as *Edward German* (1862–1936), whose incidental music to "Henry VIII" contained several charming dances which have been popular on light programs. Arthur Sullivan is discussed in the section on Opera. His younger colleague, *Sir Edward Elgar* (1857–1934) composed 2 symphonies, a concerto for violin and one for cello, many orchestral and chamber music works, choral music, songs and instrumental pieces. *Frederick Delius* (1862–1934) had an exquisite talent and wrote somewhat in the delicate style of the impressionists. Other British composers who have bridged the 19th and 20th centuries were *Gustav*

Holst (1874–1934), *Frank Bridge* (1879–1941), *John Ireland* (1879–), *Ralph Vaughn Williams* (1872–), *Josef Holbrooke* (1878–), and *Sir Arnold Bax* (1883–1953). Of more recent date is *Benjamin Britten* (1913–), with his operas "Peter Grimes," "Rape of Lucrece," "Billy Budd," and "Gloriana," composed for the coronation of Elizabeth II.

Latin-America has produced many nationalistic composers, largely because the folk songs and dances of the Central and South American republics are highly individual and lend themselves to incorporation in larger works. In Brazil *Heitor Villa-Lobos* (1881–) is the leader in perpetuating the national heritage and traditions; in Mexico *Carlos Chavez* (1899–) concerns himself with the ancient lore and musical customs of the Aztecs; in the Argentine there are the *Castro* brothers—*Jose Maria* (1892–), *Juan Jose* (1895–), and *Washington* (1909–)—and the older *Alberto Williams* (1862–); while Cuba has produced *Ernesto Lecuona* (1896–), who has written serious compositions as well as many popular songs.

20TH CENTURY INNOVATIONS

Radical changes have occurred in the music of modern times, to such an extent that much of it seems inexcusable noise to conservative ears. Just as the social and political conventions of the 19th century have been overthrown, so have the academic and romantic traditions of music given way to freer idioms which more vividly express the increasing complexity of human existence, the advance of science and invention, and the turmoil of political and social upheavals.

In the last decades of the 19th century the increasing use of dissonance by Richard Strauss was considered "modern," even though Strauss was actually a post-romanticist. Today these works of Strauss are looked upon as almost conventional. What the 20th century considers modern music actually began with the impressionist movement which started in France at the end of the century.

Claude Achille Debussy (1862–1918). Generally acknowledged the founder of the impressionist school in music. His association with the impressionist painters Monet, Manet, Degas, and Renoir, and such symbolist poets as Mallarmé, led him to create a similar style in music and to compose works of shimmering beauty, characterized by vague, filmy, atmospheric effects, and marked by delicate tints rather than by solid tonal colors.

Debussy's impressionism was a reaction against realism and the soaring romanticism of Wagner. It is sentimental, yet it avoids the grand manner and substitutes veiled, mystic half-shadows for the heroics of the Germanic composers. Harmonically, Debussy was most influenced by the work of the Russian Mussorgsky and, like Mussorgsky, he rebelled against the rules that forbade the use of consecutive fifths and octaves and which insisted on the conventional resolution of dissonances. He used the whole-toned scale and chords of the 9th and the 11th, and he reveled in dissonances that could be explained by no other reason than that they expressed what the composer wanted to say.

Debussy's major works include the opera "Pelléas et Mélisande," the ballet "Prélude à l'Aprèsmidi d'un faune," the orchestral "Nocturnes," the symphonic poems "La Mer" and "Images," a String Quartet, and many piano pieces and songs. He was important not only for the works he composed but also for his influence on other composers. Among his contemporaries in France *Erik Satie* (1866–1925) was a companion who helped Debussy clarify his ideas and who himself composed unorthodox pieces which were satirical and ironic. *Florent Schmitt* (1870–) was an impressionist in his Quintet for piano and strings.

Alexander Scriabin (1872–1915). A Russian composer who started as a follower of Chopin and Liszt, but who like Debussy became dissatisfied with harmonic restrictions. Under the influence of theosophists he grew into something of a mystic. His works include many piano pieces in romantic vein and, later, the more advanced "Poem of Ecstasy" and "Prometheus" for orchestra.

Maurice Ravel (1875–1937). A French composer who used many devices of the impressionists and who also made experiments of his own, particularly in the field of polytonality. Ravel's "Bolero" has enjoyed a vogue comparable to that of a popular song and his "Pavane pour une enfante defunte" was actually adapted to sentimental words and sung nightly on the radio and in night clubs. His major works include the orchestral "Rapsodie Espagnole," and the ballet "Daphnis et Chloé," two piano concerti, much chamber music, and a long list of piano pieces and songs.

The use of polytonality which was developed by Ravel was actually foreshadowed in the earlier works of Richard Strauss, and even very sparingly by such classicists as Beethoven, but it is only in the music of more recent composers that the composing of a piece in several keys or tonalities simultaneously has become common practice. Among those who have made extensive use of polytonality are the French composers *Darius Milhaud* (1892–), *Arthur Honneger* (1892–1955) whose "Pacific 231," described vividly the night journey of a locomotive, *Francis Poulenc* (1899–), and *Georges Auric* (1899–). In Hungary, *Béla Bartók* (1881–1945) used polytonal harmonies as early as 1912.

More radical than polytonality is atonalism, which means literally the absence of any key, or tonality, in music. Starting with the twelve tones of the diatonic scale, the atonalists set up a system which is elaborate and complex, based on almost mathematical principles. In tonal music a passage in the key of C revolves around the tone of C and the ear finds satisfaction and completion when that tone and the chord on which it is based are sounded at the close of a composition. In atonal music all tones of the scale are considered of equal value and importance. Instead of one central key-tone, all of the twelve tones are independent tonal centers, each having a separate relation to each of the other eleven tones. The result is highly dissonant, and the atonalists have made a conscious attempt to eliminate consonant combinations, as well as repetitions.

Arnold Schoenberg (1874–1951). The Vienna-born composer, who at one time lived in America, is acknowledged to be the chief exponent of atonalism. In his early years he was a combination of romanticist and impressionist, as exemplified in his "Verklaerte Nacht" for strings and his symphonic poem "Pelleas und Melisande." In his Opus 23, "Five Piano Pieces," Schoenberg began to develop his atonal ideas, as well as in his "Pierrot Lunaire" (1912), for voice and chamber orchestra. His works include four String Quartets, a Violin Concerto, orchestral music, songs, and choral works.

Aside from Schoenberg, the most significant atonalist was his pupil and disciple, *Alban Berg* (1885–1935), composer of the atonal operas "Wozzeck" and "Lulu" and a violin concerto. Others of Schoenberg's followers include *Anton von Webern* (1883–1945), and *Egon Wellesz* (1885–).

Still another group of 20th century composers are concerned with a more minute division of the musical scale than the traditional division into twelve semitones. These men hold that music can be made more expressive if there are more tones available within the octave. To this end they have devised instruments which will produce quarter-tones; third-, sixth-, eighth-, and even sixteenth-tones. One of the pioneers in using smaller intervals was the pianist *Feruccio Busoni* (1866–1924), who experimented with third-tones. More recently *Alois Hába* (1893–), a Czechoslovakian, has written many quarter-tone compositions, and the Mexican *Julián Carillo*

(1875–) has composed music for especially constructed instruments which play quarter-, eighth-, and sixteenth-tones.

The neo-classic movement has already been discussed in the section on Russian nationalist composers, particularly in regard to Stravinsky and Prokofieff. In Germany during the 1920's an allied movement concerned itself with what came to be known as "Gebrauchsmusik," or "music for use." Led by *Paul Hindemith* (1895–) these composers determined that instead of writing for the relatively small audience of the concert hall and opera house they would compose for the larger field of movies and radio, amateurs and school children. Others identified with the movement were *Ernst Křenek* (1900–) and *Kurt Weill* (1900–1950), both of whom are now living in the United States, Křenek as a teacher and Weill as a composer for motion pictures and for Broadway productions.

AMERICAN MUSIC

The Psalm singing of the New England Puritans and Pilgrims was the earliest music of European settlers on the North American continent, of which we have adequate record. During the 17th century, from 1620, the singing of Psalms was practically the only music activity of the Colonists. Records exist which show that there were a few musical instruments in the Colonies toward the close of the century, but it was not until the 1700's that secular music activities grew to any perceptible proportions.

For the singing of Psalms the Pilgrims in Plymouth brought with them the "Ainsworth" Psalter and the Puritans in Massachusetts Bay the "Sternhold & Hopkins" collection. In 1640 the Boston Puritans published a Psalter of their own, popularly called the "Bay Psalm Book." In its early editions this work contained no music, and for a full half century the tunes were sung from memory. In 1698 a new edition of the book contained the music for thirteen tunes, and early in the 18th century the more progressive churchmen urged that the congregations learn to sing by note. Overcoming the opposition of the reactionaries, those who advocated improved singing published instruction books which gradually led to the formation of "singing schools" and eventually to church choirs.

The earliest of the printed music collections to contain original compositions by American composers were the "Urania" by *James Lyon* (1735–94) published in 1761, and a series of six books compiled by *William Billings* (1746–1800), the first issued in 1770. Lyon was the second native composer of whom there is record, and Billings the third. Billings, however, was the first native American to make the composing of music his profession. Dissatisfied with the simple cadence of Psalm-tunes, he ambitiously attempted what he called "fuguing pieces," which were pioneer attempts at imitative counterpoint. In his own time Billings became well known and his music was widely performed. During the late 19th and early 20th centuries it fell into disuse and was considered altogether primitive and inexpert. In recent years it has been rediscovered and recognized as rugged and vital, and altogether representative of our early days as a nation.

The New England Puritans were opposed to the use of pipe organs in church services. The earliest organ to be imported was installed in a Swedish church in Philadelphia, 1703. In 1711 Thomas Brattle of Boston imported an organ from England and bequeathed it to the Brattle Square church, which rejected it, and in 1713 it was installed in the Episcopal King's Chapel. This instrument is still extant, in playable condition, at St. John's church, Portsmouth, N. H. Although Episcopal churches welcomed organs, the Puritan congregations were so opposed to them that as late as 1800 there were only twenty church organs in New England, and no more, in proportion to the population, in other parts of the country.

Secular music activity and the giving of concerts started in the early 18th century. The earliest concert of record was presented in Boston in 1731; the second in Charleston, S. C., in 1732; the third in New York, 1736; and the fourth in Philadelphia, 1757. From these dates each of these cities enjoyed an increasing number of musical affairs, with programs similar to those given in London, from whence the latest music published was sent regularly to the Colonies. At Bethlehem, Pa., the Moravian colony, established in 1741, was a music center from its earliest days. The settlers brought their music and instruments with them and they formed an orchestra, chamber music groups, and a choral society. A number of the Colonists were composers and wrote music which was performed by the settlers.

The first known native-born composer of music was *Francis Hopkinson* (1737–91), a signer of the Declaration of Independence, and a judge of the Admiralty. He composed a number of songs in the current English manner of Shield, Storace, and Arnold. The manuscript of his first known song, "My Days Have Been So Wondrous Free," is dated 1759. Hopkinson was a leader in a group of music amateurs who met in each other's homes to play together, and who joined with professional musicians in giving concerts.

After the Revolutionary War foreign musicians came to America in large numbers. They were better trained than the native Americans and for many years they took over the musical life of the nation and became its principal concert artists and teachers. By the early 19th century these foreign artists had themselves become Americans, and gradually native-born musicians began again to take part in the musical life. The most widely known of the native-born American composers in this period was *Lowell Mason* (1792–1872), a composer of hymn-tunes and a pioneer in music education.

Some of our early composers began to have a national consciousness and were eager to write music which would stem from American soil. While the formal music of the concert hall was slowly developing along the lines of European models, the popular balladry of the day was producing several musicians, principally song writers, who were actually writing something which seemed at the time to have only passing value, but which was far more expressive of American life than the more ambitious attempts of the so-called serious composers. Many of the songs of this period were popular songs written for the minstrel shows, a type of entertainment which began in the 1830's and 1840's in imitation of the singing, dances, and humor of the Negro. These white-men's songs of the minstrel show were influenced somewhat by actual Negro singing, but they were shaped also by Scotch and English popular songs.

Stephen Collins Foster (1826–64). Composer of dozens of songs which have become American folk-songs, most of them written for the minstrel shows. Foster's songs were based on several phases of American life: the Southern plantations ("Old Folks at Home," "Massa's in de Cold, Cold Ground"); rollicking good humor and nonsense "Oh! Susanna," "Camptown Races"); and a 19th century nostalgic sentiment which seemed the American counterpart of the romantic movement in Europe ("Come Where My Love Lies Dreaming," "Jeanie With the Light Brown Hair").

The Central Europe revolutions of 1848 caused another wholesale influx of foreigners, mostly Germans. They settled not only in the seaboard cities but inland as well, and they became the principal musicians and teachers of nearly every American community. They saturated the country with German ideas and idioms so that German music became the model on which most American composers of the day based their own work. Americans studied at

home with German trained teachers and to complete their studies went to Germany to work with German masters.

In the latter half of the 19th century there was an increasing number of American composers who had success in writing in the larger forms. Among the first was *John Knowles Paine* (1839–1906), who studied at home and in Germany, and whose first symphony was performed in 1876 by the Theodore Thomas orchestra. Contemporary with Paine was *Dudley Buck* (1839–1909), whose music was largely written for the Church and for choruses. In Boston Paine was the eldest member of a circle of composers which became known as the "Boston Group," and which included *George W. Chadwick* (1854–1931), *Arthur Foote* (1853–1937), *Horatio Parker* (1863–1919), *Mrs. H. H. A. Beach* (1867–1944), *Edgar Stillman Kelley* (1857–1944), and others. These composers were extremely talented and wrote music which was individual to a considerable degree, but they were influenced largely by European music.

Edward A. MacDowell (1861–1908). A contemporary of the Boston Group, but distinct from its members by being very much an individualist. Although he studied in Germany and lived there in the early years of his creative career, MacDowell developed a style of his own which showed his Celtic ancestry and his fondness for romanticism. His melodic and harmonic idiom was so distinctive that it became almost a mannerism. His piano pieces have been widely played ("Woodland Sketches," "Sea Pieces") and his orchestral "Indian" suite and his Second Piano Concerto are still favorite works in the concert repertoire.

In the 1890's, the Bohemian composer *Anton Dvořák*, an intense nationalist, spent four seasons teaching at the National Conservatory in New York. Deeply impressed by the native folk material he heard in America, particularly the "spirituals" of the Negro and the songs of the American Indian, he urged his American pupils to turn to these sources for melodic material. This advice caused many young composers to follow Dvorák's example by incorporating the spirit if not always the actual themes of these folk-sources in their own works. With the 20th century, and particularly with World War I, there came an increased desire on the part of Americans to make their own music less dependent on Europe and the older cultures, and to make it something which would express the peculiarities of the American temperament.

The older composers of the 20th century include *Frederick S. Converse* (1871–1940), *John Alden Carpenter* (1876–1951), *Henry Hadley* (1871–1937), *Daniel Gregory Mason* (1873–), *Charles Wakefield Cadman* (1881–1946), *Deems Taylor* (1882–), *Charles T. Griffes* (1884–1920), and others whose works have been widely played. Somewhat younger than these are many who have succeeded in adopting a contemporary viewpoint without experimenting with extreme radical departures from accepted tradition; among them are *Roy Harris* (1898–), *Howard Hanson* (1896–), *Walter Piston* (1894–), *Aaron Copland* (1900–), *Virgil Thomson* (1896–), and *William Grant Still* (1895–). Still a younger group, including those who were born since 1900 and who are imbued with a typically 20th-century point of view, numbers such men as *Paul Creston* (1906–), *Otto Luening* (1900–), *Vittorio Giannini* (1903–), *Normand Lockwood* (1906–), *Boris Koutzen* (1901–), *Marc Blitzstein* (1905–), *William Schuman* (1910–), *Samuel Barber* (1910–), *Gian Carlo-Menotti* (1911–), *Bernard Herrmann* (1911–), *Leonard Bernstein* (1918–), *Morton Gould* (1913–), *David Diamond* (1915–), *Paul Bowles* (1911–), and *Robert McBride* (1911–).

A number of American composers have been radical experimenters. The dean of this group is *Charles E. Ives* (1874–1954), who started to use polyharmonies, atonalism, and rhythmic intricacies long before Stavinsky and Schoenberg had dropped more conservative patterns. In recent years Ives has won considerable recognition and his works have been frequently played. The French-born Edgar Varese has experimented with rhythmic complexity which sacrifices melody and harmony. *Joseph Schillinger* (1895–1943) worked out mathematical formulae for composing and taught them to many of our American composers, including *George Gershwin*. *Leo Ornstein* (1895–) and *Henry Cowell* (1897–) have separately experimented with so-called tone clusters, or groups of notes sounded simultaneously. *Adolph Weiss* (1891–), a pupil of Schoenberg, has been an atonalist.

In the field of light music the United States has made one of its most important contributions to the music of the world. In the 19th century Stephen Foster wrote songs which are sung in every nation of the globe, and at the turn of the century the stirring marches of *John Philip Sousa* (1854–1932) became so well known abroad, as well as at home, that many foreigners thought that his "Stars and Stripes Forever" was the American National anthem. Starting in the late 19th century and continuing until the early 1920's, the Irish-born *Victor Herbert* (1859–1924) composed music for operettas which was so individual and melodious that it is still widely played. In more recent years the American operetta tradition has been continued by such composers as *Jerome Kern* (1885–1945), whose "Showboat" is a masterpiece, and by *Richard Rodgers* (1902–), composer of the music for "Oklahoma" and "Carousel." Also, the Russian-born *Irving Berlin* (1888–) has written not only the scores for musical comedies but also individual popular songs which have inaugurated new styles in music of this type.

During the 1890's writers of popular music started borrowing from the Negros a form of syncopation which became known as "ragtime". In the 20th century this developed into "jazz" and later into "swing" music. Jazz music is distinguished by the instrumentation of the orchestra that plays it, by definite melody and melodic traits ("blue" notes, dissonant chords, etc.) and by the complexity of its rhythm. It is generally supposed that jazz originated among the Negroes in New Orleans and beginning in 1915 spread rapidly throughout the nation. At first it was largely extemporized and distinctly of the "hot" variety. Then such bandleaders as *Paul Whiteman* (1890–) and such composer-arrangers as *Ferde Grofe* (1892–) developed the "sweet" variety of jazz, with mellow, softer effects. In the 1930's the extemporized, or "hot" variety became popular again, played by such popular bandleaders as Louis Armstrong and Benny Goodman. Its new name was "swing"

Present-day jazz follows two main streams: one directly derived from the folk art of Negro musicians and from the "blues" of the untrained colored singer, and the other a commercialized Broadway product, more formalized and cut to definite patterns.

Jazz has exercised a tremendous influence on the serious art-music of both American and European composers. In the United States it produced the works of *George Gershwin* (1898–1937), who started his career as a composer of highly individual popular songs and of scores for musical comedies. Then he composed his "Rhapsody in Blue" (1924), for piano and orchestra, which immediately became recognized as a work of symphonic proportions definitely based on a native American idiom. This was followed by a Piano Concerto using jazz patterns, by a symphonic poem "An American in Paris," and by an opera, "Porgy and Bess," Other American composers who have experimented with jazz in larger works include John Alden Carpenter, Aaron Copland, William Grant Still, *Louis Gruenberg* (1884–), and many others. The European composers who have based works on its patterns include Igor Stravinsky, Erik Satie. Darius Milhaud, Alexander Honegger, Ernst Křenek, and Maurice Ravel.

MUSICAL ORGANIZATIONS IN THE UNITED STATES

The singing schools which resulted from the desire to improve Psalm singing in 18th century New England were among the earliest musical organizations in the United States. After these came choral societies, one of the oldest being the famous Handel and Haydn Society, founded in Boston in 1815. This is still active, as is the Musical Fund Society of Philadelphia, founded in 1821. There were also early orchestral societies in the 18th and 19th centuries, but the oldest in existence today is the New York Philharmonic Society, organized in 1842.

The formation of orchestras and *ensemble* groups followed in all parts of the country. In 1864, Theodore Thomas organized his Symphony Soirées in New York, while Chicago produced both the Philharmonic Society (1860) and the Apollo Club. The Harvard Musical Association, established in 1865, became the firm foundation upon which the Boston Symphony Orchestra was built (1881). (Existing symphony orchestras in the United States are listed under *Development of the Orchestra.*) The New York Symphony Society (founded in 1878 and merged with the Philharmonic Society in 1928), the Oratorio Society of New York (1873), and the Cincinnati Festival Association (1873) exerted a very significant influence in elevating the knowledge and appreciation of the public, and presently became potent factors in the formation and success of the musical festival idea. The first experiments along this line were probably those in Boston in 1857 and in Worcester in 1858. A choral festival was inaugurated in 1865 by the Handel and Haydn Society of Boston to commemorate its fiftieth anniversary, and this led to the formation of a triennial festival. The festival at Worcester about this time became an annual affair. The great, unwieldy peace jubilees, organized at Boston (1869) by Patrick Gilmore, and repeated in 1872, were other notable instances indicating that the festival desire had crystallized into something more or less stable.

Cincinnati, for many years the Mecca of German singing societies, held a festival in 1873, conducted by Theodore Thomas, and the festival idea thus engendered led to the regular biennial May festivals held there since that day. The success at Cincinnati led to similar enterprises in Chicago in 1882 and 1884. Portland and Bangor, Maine, have held festivals since 1897, while Springfield, Mass., inaugurated its successful series in 1903. The famous Bach Festival Association of Bethlehem, Pa., started its glorious work in 1900, but omitted its festivals from 1905 to 1911 to permit similar festivals to be given at Berkeley, Cal. The Bohemian Club of California has supported since 1902 a splendid series of festivals called "Grove Plays."

Other important American festivals, with date of founding, are: Ann Arbor May Festival of the University of Michigan (1879); Evanston Music Festivals of Northwestern University (1909); Berkshire Festivals of Chamber-music (1924); Westchester Music Festival, White Plains, N. Y. (1925); Coolidge Festivals, Library of Congress, Washington, D. C. (1925); Festival of American Music, Eastman School, Rochester, N. Y. (1931); Westminster Festival, Princeton, N. J. (1936); Berkshire Symphonic Festivals, Tanglewood (Stockbridge), Mass. (1934).

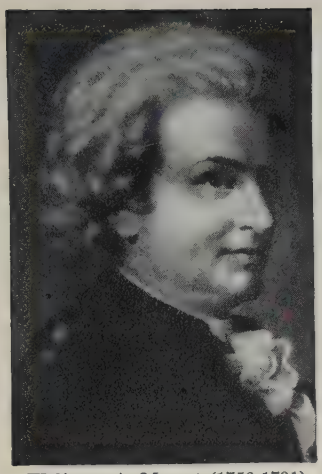
Music education in the United States has developed widely in the 20th century. World Wars I and II shifted the world's music centers to the cities of the United States, for hundreds of the finest musicians and teachers of Europe settled in this country, either as refugees or voluntarily. In addition, native Americans are now themselves so well trained that they have become the equals of the best that Europe had to offer. Not only in conservatories, but in academic institutions as well, music courses are offered as part of the curriculum. In public schools scholastic credit is given for participation in school orchestras and glee clubs, and for private or class lessons in playing instruments and singing. As a result there are thousands of well trained orchestras in the high schools and colleges of the country, in addition to glee clubs which are actually highly capable choral societies. This interest in group playing in schools and colleges has encouraged the formation of hundreds of adult amateur orchestras in the United States, and the revived interest in group singing has encouraged the growth of choral societies throughout the nation.

It is not possible to list even the most representative conservatories and professional music schools of the nation, for there are several in almost every large city. In recent years several large institutions have been founded through bequests or through the generosity of philanthropists, notably the Eastman school of music in Rochester, N. Y., founded in 1919 and endowed by George Eastman; the Juilliard school of music in New York, established in 1920 through a bequest of Augustus D. Juilliard, and merged in 1926 with the Institute of Musical Art which had been founded in 1904; and the Curtis Institute of Music in Philadelphia, founded in 1924 by Mrs. Mary Curtis Bok.

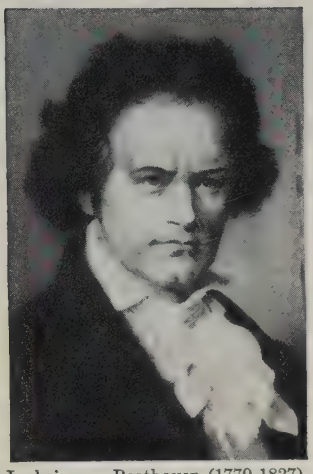
The leading opera company of the nation is the Metropolitan opera association of New York, which was founded in 1883. This plays a full season in New York, from November to April, gives weekly performances in Philadelphia and Brooklyn, and makes a spring tour of twelve cities. Shorter seasons of varying length are offered by San Francisco opera company; Chicago opera company; Boston grand opera company; St. Louis municipal opera; Cincinnati summer opera association; and Philadelphia La Scala opera company. In addition to tours of the Metropolitan, San Francisco, Boston, and Philadelphia companies, nationwide tours are offered each season by the La Scala opera company and the Charles L. Wagner opera company.

One of the most significant features of American musical life is the increased audience for good music. Listener-training has become a major educational field, with so-called music appreciation courses offered in grade schools, high schools, colleges, and for adults. This training has been largely made possible by the recording and reproducing instruments (phonographs and sound pictures) and by radio broadcasting. These mediums have brought music to millions of homes and have enabled people to hear the finest music who would not have been able to attend concerts regularly or often. When radio broadcasting was first developed in the 1920's it was feared that it would prove a serious competitor to concerts and opera performances; in other words, that people would not make the effort to go to concert halls if they could sit at home and hear their favorite artists. The reverse has proved to be the case, and an entirely new audience has been created and added to the veteran music lovers. Millions of people have become acquainted with good music who had rarely or never heard a symphony orchestra.

The phonograph has enabled music lovers to own permanent collections of their favorite selections and to hear these works at their convenience, rather than at such times as they are broadcast on the radio. From 1903 the leading recording companies have engaged leading operatic and concert stars to make records. At first the selections were of the light classic variety, then came short arias and instrumental pieces, and finally with the improved medium of electrical recording, the companies began to offer major works in their entirety, with as many separate records as are required encased in convenient albums. Today almost the entire literature of music is available, even works of such a special nature that they would seem to appeal to only a limited group of connoisseurs.



Wolfgang A. Mozart (1756-1791)

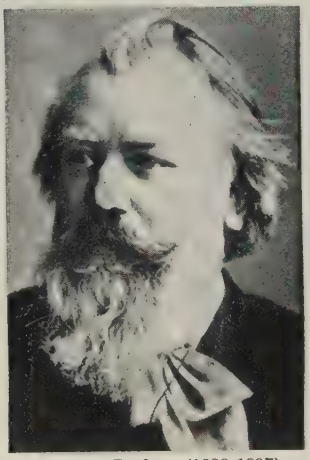


Ludwig van Beethoven (1770-1827)

Johann Sebastian Bach (1685-1750)

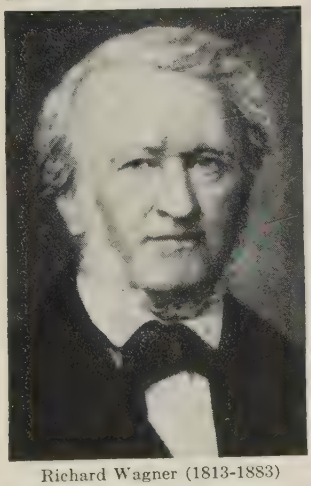
Robert Schumann (1810-1856)

Franz Peter Schubert (1797-1828)



Johannes Brahms (1833-1897)

Frédéric Francois Chopin (1810-1849)

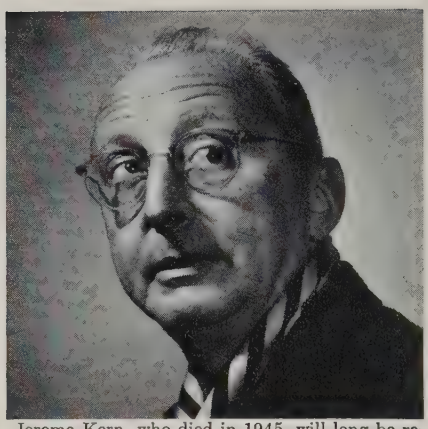


Richard Wagner (1813-1883)

Guiseppe Verdi (1813-1901)

WORLD COMPOSERS

Richard Rodgers, composer, and Oscar Hammerstein, II, lyricist, have gained eminent success as a musical team. A hit show of theirs was "Oklahoma," another was "South Pacific."



Jerome Kern, who died in 1945, will long be remembered for his many light operatic compositions. Among popular hits were "Showboat" and "Sally."

George Gershwin wrote his history making "Rhapsody in Blue" in 1924, and his last major work was the negro folk opera "Porgy and Bess."

Victor Herbert and John Philip Sousa are great names in music. Sousa was the composer of 100 marches, including the thrilling "El Capitan". Herbert composed more than 40 light operas.

AMERICAN COMPOSERS

Stephen Foster is America's best-loved composer. His simple, naive songs, with their homely sentiment and unpretentious melodies, are now considered to be a part of American folk music.

Doctor Walter Damrosch is known for his compositions "Cyrano de Bergerac," "Man Without A Country," and "Scarlet Letter." For 24 years he was director of the New York Symphony and later for N.B.C.

Deems Taylor is a renowned and respected name in American music. His compositions include "The King's Henchman" and "Peter Ibbetson." He is famed as a radio and television musical commentator.

FOLK MUSIC

Folk music may be loosely defined as the music (songs, dance tunes, etc.) of communities and peoples, in contrast to art music composed by musically trained individuals. Most often folk songs are of anonymous origin. Sometimes they are composed by groups, with several individuals having a part in the development of a song, each making his own contribution. In rare instances they are of known authorship (i.e. the songs of Stephen Foster), and in such cases the song becomes so much a part of the people who sing it that it becomes far better known than its author. Folk music differs from primitive music in that folk songs are originated and sung by civilized, though rural, peoples, and generally show some influence of art music. Primitive music belongs to races which have no tradition or background of art music.

Nearly every race and nation in the world has had its folk songs, and they generally reveal racial or national characteristics. It is significant also that similar melodies exist among widely separated peoples, showing no doubt the effects of migrations and racial intermingling.

In Germany the folk songs of the nation, the "Volkslieder," many of them dating from the 14th century, have affected the art music of nearly every German composer. Bach, Haydn, Mozart, Beethoven, the romanticists, and Wagner, all used folk melodies in their compositions. In the 15th and 16th centuries Martin Luther adapted folk songs to sacred texts and started the development of the chorale.

In Italy gay romantic songs and colorful dance tunes reflect the sunny Latin climate. These have had an important part in developing the typical Italian music of the 19th century, while in Spain the folk dances and songs are so characteristic of the Spanish peoples that they have helped the art composers of the nation to write a typically nationalistic music. Moreover, Spanish folk music found its way to the Americas, particularly Latin America, where it blended with native elements and produced something that reflected both the mother country and the New World. In France the folk music is grounded on the 12th century songs of the troubadours and trouvères. The songs of southern France are gay and sentimental, while in the north they are more religiously inclined, and more serious.

Russian folk songs are largely modal in character and are based on modes that probably came directly from the ancient Greek modes through the medium of Byzantine priests. Russian folk songs were first written down and collected in 1782. In the section on Russian nationalist composers it is pointed out that many of the Russian composers (Mussorgsky and others) have been influenced by Russian folk songs.

Hungarian folk music has attracted many of the great composers, largely because of its gypsy elements. Franz Liszt and Brahms used Hungarian gypsy tunes in many of their compositions, and before them Haydn, Schubert, and Beethoven showed their fondness for the highly accented dance rhythms which they marked "all' ongarese." At the beginning of the 20th century, Béla Bartók and Zoltán Kodály conducted exhaustive research into the backgrounds of Hungarian folk music, and found that it may be divided into three classes: the old, or archaic, which is based on scales that can be traced back through the Near East to central Asia; newer songs which originated in the 18th century; and a mixed class of songs which contain elements of art music. It was further established that Hungarian gypsy music was merely the gypsy's manner of performing the popular Hungarian art music of the 19th century. The several Balkan nations have colorful folk songs, particularly Yugoslavia and Rumania, while Czechoslovakia is a veritable treasure house of distinctive folk songs and dances.

The Scandinavian countries have produced folk music which has had a profound effect on the composers of those nations. The National Library of Norway contains between three and four thousand melodies which have been written down and collected. Many of them have been preserved for all time by the characteristic transcriptions of Edvard Grieg. In Finland there are more than 15,000 known songs and dance tunes, many of which have been arranged by such Finnish composers as *Selim Palmgren* (1878–) and *Robert Kajanus* (1856–1933). Sibelius has been greatly influenced by the folk songs of his native country but has rarely used them for actual themes in his compositions.

The British Isles have produced a wealth of folk songs. The oldest known English folk song is the 13th century "Sumer is icumen in," which is interesting in being a perfect round, or canon. The balladry of England is very old, but although collections were made of them as early as 1650 it was not until the 19th century that collecting the songs for preservation became a scholarly project. The English ballads were generally conceived in narrative form, and dealt with love, sailors and the sea, hunting and poaching, bandits, and other subjects typical of English life and experience. There were also thousands of lyric songs about the green fields of England, the open air, and lovely ladies.

Irish music became widely known throughout England and the world through the publication of *Thomas Moore's* (1779–1852) "Irish Melodies." The first volume of the series was published in 1808, and others continued to be issued until 1828. Moore reduced many of the modal tunes to the modern minor scale and perhaps changed their character materially and sacrificed some of their native beauty. Irish music dates back to several centuries before the Christian era and there are records of harp-playing as early as 1800 B.C. The ancient Irish held their minstrels in high esteem and the bards ranked next to chiefs and kings. Contests of harpers at Tara Castle date from the 6th century and during the 13th century the harpers visited Wales and Scotland and spread the fame of their playing.

Scotland has produced two general types of folk song. The first is the music and balladry of the Lowlands, which has an affinity with the songs of England. The other includes the songs of the Highlands and the Hebrides, which have a relationship with Irish songs. It is believed that the Highland songs are of great antiquity. Some of them are similar to ancient Arabian and Greek tunes, and others are of a Viking flavor, indicating they may have come from the days of the Norse occupation of Scotland. Many Scotch songs are characterized by the so-called "Scotch Snap," a form of syncopation. A number of the old tunes were perpetuated by Robert Burns, who adapted verses of his own to traditional music

It is known that bards existed in Wales as early as 60 A.D., but it is not certain what tunes they sang and played. It is evident, however, that the ancient Welsh songs are related to the Irish and Scotch Highland songs. The earliest published collection of Welsh folk songs was issued in 1844.

The North American continent has had both primitive and folk music. The primitive music was that of the Indians, of whose songs there is record from the 17th century. It was not until 1880, however, that serious study was undertaken by scholars and scientific tabulation was made of the various types of melodies. Although there are certain characteristics common to the entire body of American Indian music, which are shared also with the music of other primitive peoples, it is inaccurate to refer to Indian music as a unified body of folk material The government office of Indian affairs dealt at one time with 342 separate tribes, each of which had its own customs, religion, and music. The songs and dances of most of these tribes were related to tribal customs and generally were intended for practical

purposes—treating the sick, to win success in battle, for playing games, and to accompany ceremonies. The Indians had their own musical instruments—flutes, whistles, rattles, and drums. Although many American composers have attempted to use Indian themes in their compositions, some with noteworthy success, such use has been limited by the fact that the exotic nature, the interval and rhythmic structure, is so far removed from European scales and idioms that the primitive songs lose their character in formalized treatment.

The folk music of the United States may generally be divided into two main classes—that of European origin, and that developed by the African Negroes who were brought to this country as slaves. Each of these elements has had its effect on various types of American folk songs—the cowboy songs, frontier ballads, etc. Anglo-American folk music embraces the many Scotch, Irish, and English ballads which were brought to this country by the early settlers. Some of them are still sung in versions close to the originals, while others have been altered by various groups in different sections of the country. As a consequence countless versions of the same songs exist today. The isolated mountaineers of the Appalachians have continued the singing of these ballads for generations, sometimes in little altered versions and sometimes with the words adapted to the mountain peoples' own experiences.

Although there were references to Negro music as early as 1784, and though the minstrel shows of the early 19th century caricatured the singing and dances of Negroes, it was not until after the Civil War that native Negro singing became known to the country at large. In the 1860's and 1870's colored singers from the several institutes that had been founded for the training of freed Negro slaves travelled through the country, singing their own songs to raise funds for their schools. These tours acquainted other sections of the country with Negro songs, mostly religious in character and called "spirituals." The Negro's religious fervor found a ready response among the church groups for whom the Institute singers performed and large sums were raised in voluntary contributions.

It has never been determined where the melodies came from which the Negro adapted to his spirituals. It is claimed that some of them were brought from Africa in the slave ships, and comparison is made between certain of the Negro spirituals and songs of African primitives. Several traits are common to both: complex rhythmic structure, the use of the pentatonic scale, and constant syncopation. There are others who claim a white origin for the Negro songs, for white evangelists and "revivalists" travelled among the Southern Negroes and sang the songs from their gospel song books. The Negro undoubtedly imitated these songs and adapted their tunes to his own words, yet while it is most likely that the Negro did appropriate many of the white spirituals, he certainly changed them to the idiom he inherited from his African ancestors.

The religious songs, or spirituals, of the Negro form only one part of his folk song literature, even though for many years after the Civil War they were the principal songs which were collected. In recent years there has been an awakened interest in the Negro's secular songs—his work songs, for cotton picking, stevedoring, shucking corn; steamboat songs; and the bad man's songs which include ballads of the prison and the rock pile. Another type of Negro song is the "blues," a song of self pity, generally voicing a carefree philosophy which keeps it from actual despair. The "blues" are characterized rhythmically by syncopation and melodically by a flat seventh and often a flat third. These have become known as "blue" notes. The "blues" have played an important part in jazz music, and in modern times there has come a commercialized variety which is more stereotyped than the unsophisticated and altogether naive folkblues.

Another class of folk songs which has been collected in modern times is that of the Western cowboy. This literature includes songs connected with the cowboy's occupation—cattle lullabies to quiet the animals at night, "dogie" songs to halt stampedes, and rhythmic calls to stir up lagging cattle—as well as sentimental songs and ballads about desperadoes and heroes. Frontiersmen generally have had their own songs—lumberjacks and shantyboys, rivermen, miners, and the pioneers who opened the West in mid-Century.

Although distinct groups in the United States have their own individual folk songs, there is much inter-relation between the groups and between various geographical sections of the country. Certain cowboy songs are similar to songs of the Negroes, some of the Negro songs have their counterpart in the Appalachian mountain songs, and the lumberjacks sing ballads that are similar to certain seachanties. And while hundreds of American folk songs may be traced to foreign origins, they have been so altered and adapted to American surroundings that they are thoroughly expressive of various phases of American life.

MUSICAL ACOUSTICS

Acoustics is that branch of physics which deals with sound: its production, transmission, and reception. The Greek philosopher and mathematician Pythagoras is considered to be the founder of the science of acoustics, for in the 6th century B.C. he discovered the basic ratios for the octave, the fifth, the fourth, the twelfth, and the double octave. In modern times *Herman von Helmholtz* (1821–94) developed a theory of dissonance and consonance which relates the art of music to the science of acoustics.

The Nature of Musical Sound. Sound is produced by vibration. The difference between musical tones and mere noise is that a musical tone is produced by vibrations which are exactly alike, and which follow one another at regular intervals of time, while noise consists of vibrations which are irregular.

A musical tone has three properties,—pitch, intensity or loudness, and timbre or quality. *Pitch* is that property of musical tones which we recognize when we speak of them as high or low. It depends upon the frequency of the vibrations; the greater the number of vibrations, the higher the pitch, etc. *Intensity*, or loudness, of a tone depends upon the amplitude of the vibrations, in other words, upon the distance the vibrating body swings. In the case of a piano string, the loudness of the sound depends upon the force with which the string is struck. The tone producing agency may also consist of an air column, as in an organ pipe, flute, trumpet, oboe; of metal, as in bells, gongs, cymbals; or of stretched skins or parchments, as in the drums and the timpani. *Timbre* or quality is that characteristic of musical tones by which we distinguish from each other the tones which, for instance, are produced by violin, clarinet, cornet, piano, or human voice, although they may be of the same pitch or loudness. It was Helmholtz who discovered that the timbre of a sound depends upon the relative loudness or actual absence of the various partials or overtones which are comprised in any one tone. Helmholtz called this *Klangfarbe*, or "tone color." Tyndall called it "clang tint." Present day English writers usually call it quality.

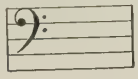
The Perception of Sound. Vibrations of a tone producing body cause air waves to radiate in all directions. Some of these waves strike the eardrum, which in human beings is a thin membrane about two-thirds the size of a dime. From the eardrum the vibrations are transmitted through the bones and fluid of the inner ear to the wonderful "lute of 3000 strings," otherwise known as the organ of Corti, named after its discoverer. The

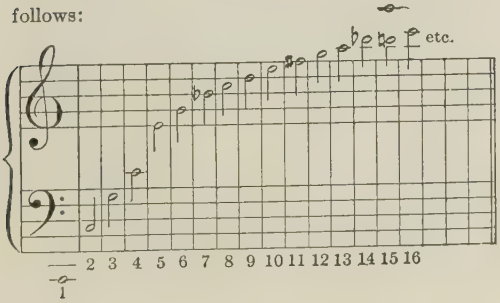
organ of Corti consists of innumerable rods or fibers. It is situated in the cochlea, a bony structure resembling a snail in form, which is part of the inner ear. The sympathetic vibrations of the rods of Corti excite the auditory nerve, which carries the message to the auditory centers of the brain. There the vibrations are transformed, or interpreted as what we call sound.

The ear is a wonderful recording instrument. We are capable of distinguishing tones, not only as pitch vibrations, but as acoustic structures. In other words, we can clearly differentiate between tones of the same pitch but of different timbre. Even though the ability to discern several simultaneous tones varying in pitch and intensity is remarkable in itself, the faculty of differentiating between timbres, as indicated by numberless overtone effects of different strength, really borders on the wonderful. The eye possesses no such power of discernment. If we throw a pebble into a pond a ring of wavelets represents the vibrations. If we throw a handful of pebbles into the water the wavelets caused by the many pebbles cut into each other, conflicting in such a manner that the individuality of each is lost.

Not so with tones. The vibratory frequency (pitch) of each of several tones is received and recorded separately by the ear; the vibrations of every overtone also are separately received and recorded. When we endeavor to conjure up a conception of the complexity of vibratory activity discerned and analytically separated into units or partials by the ear while listening to a simple chord sounded by the different instruments of an orchestra, we realize the marvelous ability of the human ear. Not only is the pitch of the fundamental tones recorded, but the quality-giving overtones of each instrument are vibrating in the labyrinthine waters of the inner ear. A similar composite function is unknown to the eye. Two colors covering each other are not perceived by the eye as separate colors; they are blended to form one compound color. Red and yellow added together are perceived as orange, but the tones C and E do not combine to form a mixture called D, nor do the tone qualities of the clarinet and French horn combine to form the timbre of the saxophone. Each is recorded by the ear as an entity by itself.

Overtones. The ear, affected by perfectly even, periodic vibrations, hears, not only the tone whose pitch is accepted as the standard for the whole tonal effect, but also its *overtones*. The combined sensation Helmholtz has called "Klang." These overtones are due to the fact that tone-producing bodies vibrate, not only as a whole, but also in segments, the halves, thirds, fourths, fifths, etc. producing tones which sound with the fundamental tone produced by the whole vibrating body. The lowest of this series of tones, usually also the strongest, is called the generator or fundamental.

The series of overtones for  is as follows:



Therefore, the total effect produced by periodic vibrations is called "tone" and is composed of a series of separate impressions called partials or overtones. The number which each partial tone has in the above series indicates the ratio of its vibratory frequency to that of the generator, and also, inversely, the size of the section or segment which produces it. For example,— is the fourth partial tone in the series which comprises the full tonal effect known as the tone , has four times as many vibrations as its generator, and is produced by one-fourth of the vibrating body.

It is this analytical separation of a compound vibratory effect, known as tone, into its integral parts which lays the foundation for the theory of music. It explains the relationship of tones to each other, and reveals the principle of consonance and dissonance. Two or more tones are called consonant or dissonant according to the strength of the conflict caused by the generators and the respective overtones. Actually there is no absolute consonance—only a comparative proportion of more or less dissonance.

At (a), in the two tones forming the interval of a perfect fifth, the partials conflict but little. At (b), in the interval of a major third, the conflict is greater, while at (c), in the interval of a major second, conflict is experienced almost throughout the entire range of overtones. Therefore, the relationship between the tones at (a) is closer than that of either (b) or (c), since the consonance is greater. It is seen from this that the theories of tone relation and consonance (or dissonance) go hand in hand.

Musical Acoustics and Musical Effects. For musical acoustics only the simpler overtones (1-10) of a given generator need be considered. The higher, weaker ones (also partly nonharmonic), though perceived and recorded by the ear, merely exert an influence upon the color or timbre of the tone.

It is true that the fundamental alone is strong enough to be distinguished as a tonal entity. If, however, we were to intensify these overtones so that their dynamic strength equaled that of the generator, then we would obtain the real chord—Nature's Harmonic Chord. This, however, is not possible because of the so-called tempered scale. Tempering a scale means tuning it so that the intervals deviate slightly from the acoustically correct intervals used in the system of Pythagoras. In that system the intervals remain perfect within a small

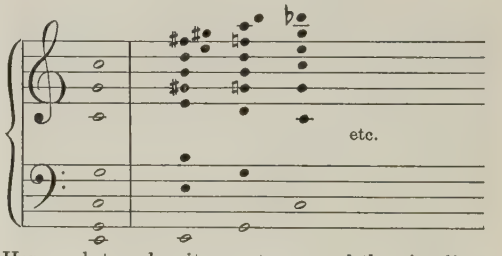
range, but as chromatic tones are introduced the intervals do not add up satisfactorily to produce a perfect octave. Accordingly in equal temperament the octave is divided into twelve equal divisions, and as a result no interval within that octave is acoustically correct or pure. The ear, however, becomes accustomed to these imperfections. Before the tempered scale was perfected it was not possible to modulate satisfactorily from one key to another. It is because keyboard instruments are tuned to the tempered scale that unaccompanied singing or string instrument playing sounds differently from accompanied singing or playing. When a chorus is accompanied by a tempered instrument it follows immediately the interval adjustments of the accompanying instrument. When it sings a capella, or without accompaniment, it is apt to use the true intervals and achieve a natural intonation.

To return to Nature's pure chord, it is because of the fact that we have adopted the tempered scale of equidistant half steps that we can only approximate this absolutely pure chord. In other words, we may substitute for the lightly intoned partials the real tones of the scale, which approximate their pitch values, and so obtain a chord which contains a root, major third, perfect fifth, minor seventh, and a major ninth, our dominant ninth chord, C E G B♭ D. If, optionally, only part of this structure is desired, the incomplete forms, C E G B♭ or C E G would be available. From this it is obvious that the dominant ninth, the dominant seventh, and the major triad are all acoustic entities. Practice has long ignored the slight pitch variation which is known to exist between these chords, as formed from the materials of the tempered scale, and Nature's own chords. Even upon tempered instruments, as, for instance, the pianoforte, experiments reveal the fact that all diatonic tones respond to acoustic tests by sympathetic vibration clearly enough to justify the assumption that they approximate the overtones of the nature chord. In other words, they are the tempered representatives of the pure overtone chord, much in the same manner as our scale tones are all the tempered representatives of the pure scale tones. Thorough investigation of the more complicated phenomena of partial tones and the manner in which they blend with their fundamental has led modern composers, notably R. Strauss and C. Debussy, to the discovery of many of their characteristic harmonic and orchestral colors. Following are a few elementary points of influence exerted by acoustics over musical effects, which the reader may ascertain for himself.

The influence of overtones is great in completing chords in which certain tones are omitted, for the ear unconsciously selects the softly sounding overtones as the natural substitutes for the missing tones. In the following chords the missing third will always be determined by the ear as being major, not minor, for the overtone third is major, and is faintly sensed by the ear in place of the omitted tone (*).

Acoustics clearly points the principle underlying the natural resolution of suspensions. On a well tuned piano the quarter note (C) in the following illustration will be heard to progress to (B), the overtone third of (G), on the last beat of the measure.

In much the same manner acoustics influences the effect of chords which are "inverted," that is to say, chords in which the root is not in the bass. In the fundamental chord form, the blending of the chord tones with the actual overtone series is of natural consequence. In chord inversions, the natural degree of consonance of each integral tone is sacrificed because the tone which is assigned to the bass becomes the lowest and most powerful generator, and its own overtones cause a more or less serious conflict with the chord tones.



Here each tone has its overtones, and the visualization of the chord tones and their respective overtones reveals that the overtones of (E), the bass note, present considerable conflict with the higher tones of the chord and their overtones.

In short, the fundamental nature chords (major triad, dominant seventh chord, and dominant ninth chord) represent in themselves the strengthening of the natural overtones of the root or principal tone of the chord, and show a minimum of conflict by blending with these overtones. The inversions are more dissonant because the bass note is doubled. The traditional rule to avoid the duplication of the third of a chord in first inversions is thus acoustically explained.

MUSICAL NOTATION

Musical scripts have been of three kinds: (1) pitch notation, mostly in the form of figures, letters, or syllables, to indicate the position of individual notes; (2) finger notation or tablature, to indicate what fingers should be used regardless of absolute pitch; (3) notation of melodic movement, or neumes, to indicate whether the melody goes up or down or rests on the same level, again regardless of pitch and even of the sizes of intervals.

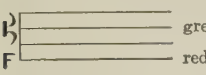
Neumes were derived from the accents used in rhetoric in the early centuries of the Christian era. An upward stroke from left to right indicated that the voice should rise. A similar downward stroke indicated that the voice should fall. A combination of the two, forming a circumflex, indicated that the voice should rise and fall on one syllable. These signs were taken over into Church music in connection with the use of selections from prose Scripture.

A system of such signs had gained acceptance by the 9th century. It consisted of a series of dots and short strokes, also combinations of these, forming markings, the upward or downward swing of which indicated the rise or fall of the melody. Two signs used in modern ornamentation, the trill ∿, and the turn ∾, are remnants of this system of

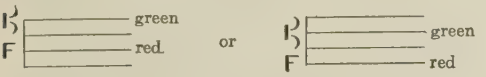
signs. The signs were called *neumes*, from the Greek word *νεῦμα*, meaning "nod" or "sign." While more sightly than the old letter system, the neumes failed to indicate exactly how much the melody should rise or fall and were used largely as an aid to memory. Nor did they indicate a rhythmical value of the tones. Efforts to improve upon this unreliable system of signs led to further experimentation. Quite happy was the thought of the monk Hermanus Contractus (1013-54), who superimposed Latin letters above the text, to indicate the distance of a tone above or below the preceding. For instance, the letter *T*, above a given syllable of the text, indicated that the melody should rise a whole tone (*tonus*). A dot after the letter *T* indicated that the melody should descend a whole tone. Similarly, other intervals were designated by other letters: *S* (*semitonium*), a half tone, and *TS* (*tonus cum semitonio*), a tone and a half. The monk Hucbald of St. Amand in Flanders placed the text syllables between lines and indicated at the beginning where the half steps were to appear.

The Staff. But none of the above efforts assumed the importance of those of the Benedictine monk Guido of Arezzo (995-1050). Being conscientious and exact, he used the simple expedient of drawing a red line to guide him in placing his neumes neatly and accurately above the text. This purely accidental device he soon turned to account as a means of fixing the pitch of the tones. The thicker part or head of the neume was placed so that it rested either upon the line, or just above or below. These three positions, in reference to the line, indicated the relative pitch values of three adjacent tones. This red line was first fixed to represent middle F of the bass register and was identified by the corresponding letter (F or 𝓕). From this our present sign of the F or bass clef (𝄢) has been derived. Some time later a green or yellow line was added to represent the fifth above, (C). This C line was also indicated by its letter (𝓒), which was the original sign for the C clefs. A black dotted line was soon placed between the others to mark the position of the tone A. The dotted line then gave way to a continuous line, the colored lines also being replaced by black lines. In this manner the musical staff was gradually formed. The letters F and C were consciously chosen because they directed the attention of the singer to the half step progression of the tones below F and C. This ultimately led to the use of the G clef when the half step F♯ was desired below G.

The blending of the two elements was a happy idea, and the new system was soon popular. The number of lines grew to 10 and even to 25, but was later reduced to 4 and 5.



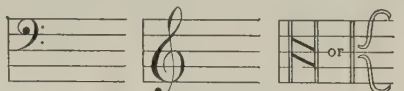
The little thicknesses on the neumes were transformed into squares, with the evident intent of indicating note values. The 5-line staff was universally adopted with the spread of printed music toward the beginning of the 16th century. Prior to that time a 4-line staff was in common use for the Church liturgy, one of 5 lines for other vocal music, and one of 6 lines for organ music. Guido always used the 4-line staff; either



He was also the first to transform the neumes so as to give them a headlike thickness, which was to show the exact location of the note on the staff.

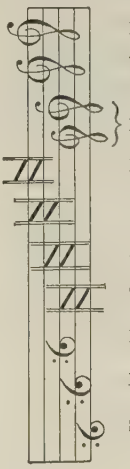
The success of Guido's innovation was rapid and complete. This is shown in the fact that Pope John XIX called Guido to Rome in 1026 in order to satisfy himself as to the excellence of the new form of notation. The pope then ordered all churches and cloisters to accept the notation of Guido.

The Clef. The word clef is derived from the Latin *clavis*, meaning "key." During the 16th century no fewer than five clefs were in common use, and many more had been tried for various purposes. They were evolved from the practice of using Roman letters at the beginning to indicate the relative position of the tones of the scale with reference to the lines and spaces of the staff. The clefs now in common use are the F or bass clef, which indicates that the fourth line represents F below middle C; the G or treble clef, also called the violin clef, which indicates that the second line represents G above middle C; and the C clef.



(F) Bass Clef (G) Treble Clef C Clef

All clefs were originally movable. When the C clef was placed upon the first line it was called the soprano or descant clef; on the second line, the mezzo-soprano or high alto clef; on the third line, the alto clef; upon the fourth line, the tenor clef. In each instance the line upon which the clef sign appears is middle C. Similarly, the treble or G clef sign, when placed upon the first line, was called the French violin clef; on the second line, the violin clef; on the third or fourth line, the low or deep violin clef. The bass clef was transferred, for indicating the baritone and the sub-bass by placing the clef upon the third and fifth lines respectively. The following tabulation will present them all in a clear manner.



French Violin Clef.

Violin Clef.

Low Violin Clefs (uncommon).

Descant or Soprano Clef.

Mezzo-Soprano or High Alto Clef.

Alto Clef.

Tenor Clef.

Baritone Clef (very uncommon).

Bass Clef.

Sub-Bass Clef (very uncommon).

Of the above, the violin clef, bass clef, alto clef, and tenor clef are in use today. The clef signs are corruptions of old Gothic forms of the letters F, C, and G.

Notes. It has been seen that there was a tendency to transform the thicker part of the neumes into little squares. These *nota quadriquarta* evolved naturally though gradually from the neumes. They were not the result of a special innovation. Franco of Cologne, a monk of the 13th century, is given the credit of having invented the idea of assigning a definite time value to each of the several forms adopted. His book on measured music, *Ars Cantus Mensurabilis*, led to the establishment of an entire system, with elaborate rules for composition, called *mensurable music*, which was in vogue for 300 years. In the "perfect rhythm," each note was the equivalent of three of the next lower note values.

This triple rhythm typified the Holy Trinity and was marked by a circle, ○. Double rhythm, considered less perfect, was marked by the broken circle, C. Bar lines did not appear until after 1500, and not until the beginning of the 18th century do we find the method of writing eighth or sixteenth notes in groups, .

Several ways of writing notes sprang up. That which finally gained general acceptance in the 13th century was: , *maxima* or *duplex longa*, meaning greatest or double; , *longa*, meaning long; , *brevis*, short; and , *semibrevis*, half of a brevis. To these were added later: , *minima*, meaning the shortest possible; , *semiminima*; , *fusa*; and , *semifusa*.

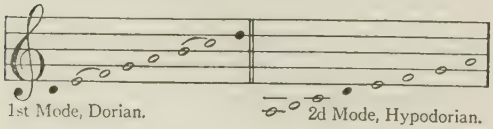
By the 15th century these forms had all become established, though the method of writing differed slightly from that used in 1300. For purposes of comparison the following table shows the notes used in the middle ages as well as those in use today.

Notes used 1700	American names	English names	Notes used 1500	Notes used 1100	Names used 1100
	Double Note	Breve			Maxima
	Whole Note	Semibreve			Longa
	Half Note	Minim			Brevis
	Quarter Note	Crochet			Semibrevis
	8th Note	Quaver			Minima
	16th Note	Semiquaver			Semiminima
	32d Note	Demisemi-quaver			Fusa
	64th Note	Hemidemi-semiquaver			Semifusa

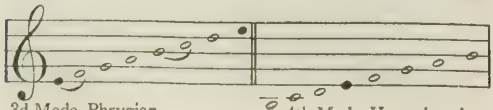
The Church Modes. The Christian Church organized its melodic material in 8 octaves of different structure, called the Church modes, four of which, standing on their *finals* or principal notes, were *authentic*, and four, suspended from the finals, so to speak, *plagal*.

The monks of the 11th century modeled this system on Greek theory but, misunderstanding their sources, misnamed the scales, so that what they called, and we call, Dorian, had actually been Phrygian in Greece, and vice versa. A somewhat miscarried attempt of the 16th century to give the major and minor modes their places in this system, led theoretically to the following 12 scales:

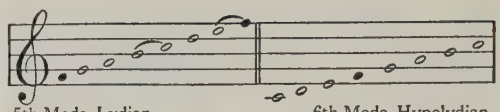
Table of Ecclesiastical Modes, or Gregorian Tones.



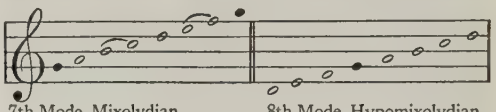
1st Mode, Dorian. 2d Mode, Hypodorian.



3d Mode, Phrygian. 4th Mode, Hypophrygian.

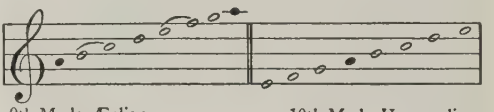


5th Mode, Lydian. 6th Mode, Hypolydian.

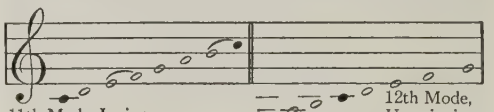


7th Mode, Mixolydian. 8th Mode, Hypomixolydian.

To the above were added four more in the course of time.



9th Mode, Æolian. 10th Mode, Hypoæolian.



11th Mode, Ionian. 12th Mode, Hypoionian.

In all the above the black note is the initial and final tone.

Solmisation. However, the singer, who had to grope his way through the maze of the modes was all the time in danger of misplacing the two semitones that the octave contained. As a remedy, Guido of Arezzo (d. 1050) established an ingenious system of three hexachords and adapted to it the age-old oriental solmisation. A hexachord was the largest possible group of notes with only one semitone, provided that this semitone was in the middle, as in C D E F G A. In the series of singing or solmisation syllables on which such hexachord was performed, ut re mi fa sol la, mi-fa invariably marked the semitone. There were three semitones in the whole system to be true, not only E-F, but also B-C and, in some special cases, even A-B flat. These were considered to be mi-fa's in two other hexachords, similar in structure but at different pitches. One of them was F G A B flat C D, and the other one, G A B C D E; and both, again, were sung on the syllables ut re mi fa sol la.

G A B C D E
C D E F G A
F G A B♭ C D

As a consequence, the singer, performing any melody exceeding a hexachord, had to shift into one of the other two hexachords in order to sing the second semitone of his melody once more on mi-fa. This procedure was known as mutation. Whoever learned a melody, learned, with it, the proper syllables and knew that all mi-fa's, and only mi-fa's, were semitones.

The slow process in which the modern scales evolved from the Gregorian octaves and the hexachordal conception, shall not be described here. The semitones, no longer dependent on solmisation, are unmistakably indicated by written symbols.

In our modern *key signature* the required number of sharps or flats is placed at the beginning of the composition in the order in which they accumulate in successive keys. Thus it is found that the key of C major requires no accidentals; that G major requires one sharp (F♯); D major, two sharps (F♯, C♯); A major, three sharps (F♯, C♯, G♯); etc. This points to the fact that the keynote of each progressively sharper key is the 5th step of the preceding key, also that the added sharp is in every instance the 7th step.

Inasmuch as flats are the opposite of sharps in effect, it is logical to find the order of the flats to be that of the sharps reversed. Also, since the next sharper keynote was found upon the 5th step, the next flatter keynote is necessarily the *fifth step in a downward direction*, therefore the fourth step. The proper succession of whole and half steps requires the flatting of the fourth step.

Rhythm and Time Signatures. Musical rhythm is engendered by the onward flow of the tonal effects, and manifests itself in the association of pulsations, their multiples and fractions. In short, while it embraces the division of time into regular and equal units, and the grouping of these units into symmetrical measures, the units may also be subdivided or added together. These units

SHARPS

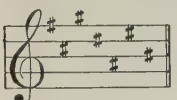
KEYS	SIGNATURES
C major and A minor	Nothing
G major and E minor	One sharp,—f
D major and B minor	Two sharps,—f, c
A major and F sharp minor	Three sharps,— f, c, g
E major and C sharp minor	Four sharps,—f, c, g, d
B major and G sharp minor	Five sharps,— f, c, g, d, a
F sharp major and D sharp minor	Six sharps,—f, c, g, d, a, e
C sharp major and A sharp minor	Seven sharps,—f, c, g, d, a, e, b

FLATS

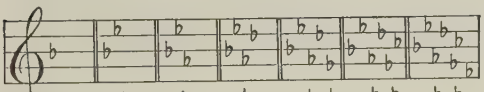
F major and D minor	One flat,—b
B flat major and G minor	Two flats,—b, e
E flat major and C minor	Three flats,—b, e, a
A flat major and F minor	Four flats,—b, e, a, d
D flat major and B flat minor	Five flats,—b, e, a, d, g
G flat major and E flat minor	Six flats,—b, e, a, d, g, c
C flat major and A flat minor	Seven flats,—b, e, a, d, g, c, f

Note that the order of the flats is the reverse of the sharps.

Key of C.a.G.e. D.b. A.f♯. E.c♯. B.g♯. F♯.d♯.

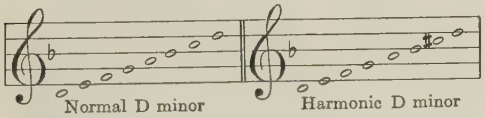


C♯.a♯.



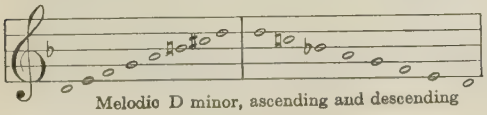
Key of F.d. B♭.g. E♭.c. A♭.f. D♭.b♭. G♭.e♭. C♭.a♭.

There are three forms of the minor scale. That which is constructed according to the signature is called *normal minor*. We expect a half step between 7 and 8 however. Raising the 7th step to meet this demand results in the *harmonic minor* scale. As indicated by its name, the harmonic minor is the one most used as a basis for the harmonies of the minor mode.



Normal D minor Harmonic D minor

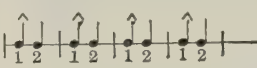
Normal minor has half steps between 2 and 3 and between 5 and 6. Harmonic minor has half steps between 2 and 3, between 5 and 6, and between 7 and 8, also a step and a half between 6 and 7. The awkward and unmelodious skip from the 6th to the 7th step in harmonic minor may be obviated by raising the 6th step, chromatically, as well as the 7th. This is done for certain melodic effects in ascending passages, but, to re-establish the integrity of the minor mode, the scale descends according to the signature. This scale is called the *melodic minor*.



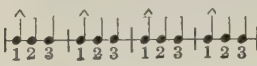
Melodic D minor, ascending and descending

are called "beats," the grouping of which is effected by a regularly recurring emphasis, called "accent," always laid upon the first beat of a group.

Rhythmic groups consist of either *two* or *three* beats. When there are two beats in a group, heavy and light in alternation, the rhythm is *duple*:

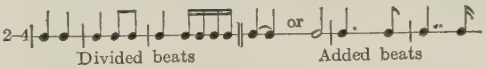


When three beats constitute a group, one heavy and two light, the rhythm is *triple:*



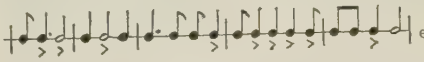
Simple Rhythm consists of measures, each containing but one group, and therefore but one accent, 2–4, 3–8, 3–16, 2–2, 3–2, 3–4. Time is said to be compound when the measures contain multiplications of the simple groups, therefore as many accents as there are groups, 6–8, 9–8, 6–4, 12–8.

Diversity of time value is obtained by adding or dividing beats.

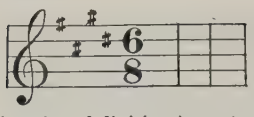


Rests represent the silences in music and are indicated with the same accuracy as the tones. There is, therefore, a rest sign corresponding in length to each note.

Syncopation. Where arbitrary metric accentuations do not conform to the natural accent, that is, the heavier notes occupy lighter beats or fractions, such shifting of the natural rhythm is called syncopation.



The *Time Signature* is a sign placed upon the staff, after the key signature, to indicate the rhythm in which the composition is to be played. The lower figure indicates the value of each of the time units, or beats, employed, while the upper indicates the number of such beats which constitute each and every measure. Bar lines are used to separate the measures.

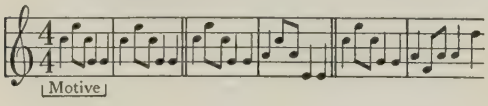


This signature is a complete indication, therefore, that six beats, each an eighth note in length (or its equivalent in subdivisions) are to constitute each measure in a composition written in four sharps. In modern compositions, unusual time signatures (5–4, 7–4, 7–16) have appeared, and also the tendency to change the time frequently by alternating several measures in a given time with one or more in unusual time.

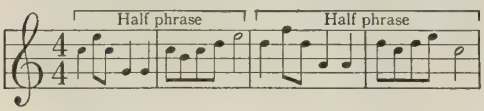
MUSICAL FORM

Musical Form is the frame which encloses the musical design and establishes the relationship between its parts. *Repetition, contrast,* and *balance* are its guiding principles. A fragment of melody that is reiterated, or transformed and developed into a phrase or period, is called a *motive.* Larger musical germs are called *themes.* In fugue forms they are called *subjects.*

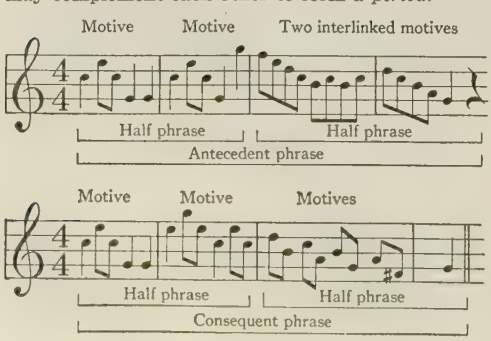
Structural Evolution of Homophonic Forms. A *phrase* is a short musical thought. There are many methods of developing embryonic musical germs into phrases. Provided the composer has a musical idea, a motive or fragment, rhythmically and melodically interesting, then the simplest form of growth is that of exact repetition. Although this method of development is often applied, a sense of *progressive* development is first aroused by a recurrence of the motive upon a different scale step, or by reversing the direction of the various melodic intervals (inversion).



However, this sort of form fragment would become monotonous if continually repeated by itself. To develop this motive, or phrase member, into a complete thought, it is necessary to add a second phrase member, the motive of which does not imitate the first, but complements it. Two dissimilar motive measures, for instance, may be followed by a second pair, arranged in such a manner that Nos. 1 and 3 correspond, also 2 and 4. This is analogous to the 4-line stanza in poetry, in which alternate lines rime with each other.

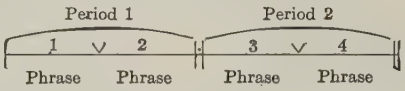


A *period* consists of two phrases, called respectively *antecedent* and *consequent,* and having the relationship of question and answer (thesis and antithesis). In a manner similar to that in which half phrases combine to form a phrase, so two phrases may complement each other to form a *period.*



This is but one of many ways in which musical thoughts may be completed, and often the arrangement of the musical motives is neither as regular nor as consistent as the above.

The *double period* results from the conjunction of two periods (and consequently four phrases) so conceived that the period relation between phrases 1 and 2 and between 3 and 4 is apparent, as is the relation on a broader scale between these two pairs.

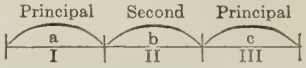


The Song Forms. A so-called "form" in music consists of a connected and related series of phrases or periods, more or less contrasted with a following homogeneous and well-closed group (where two or more such groups are used). A *phrase, period,* or *double period* may be used as an example of a single form. If consisting of but one such group, a piece may properly be said to be in a *one part form.*

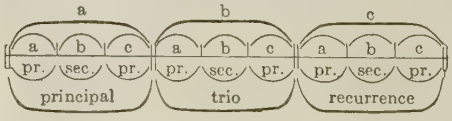
Two Part Forms.—These are composed of two *one part forms,* which stand in the relation of *principal* and *second.* It is not necessary that both "parts" be of equal length.

Three Part Forms.—When the *principal,* which is at the beginning, is repeated after the *second,* for the sake of unity and symmetry, the *three part song form* results. A recurrence of the *principal* becomes a real "*return,*" however, only when it succeeds an equally distinct "*departure.*" In the *two part form,* the *second* complements and co-operates with the *principal,* a certain parallelism of thought being present. It shows further that it completes the group by closing with a perfect cadence in the principal key.

In the *three part form,* however, the *second* is more in the nature of a digression than a mere continuation, its object being to represent real contrast or opposition. As middle one of three parts, it has no tendency toward a definite sense of finality, but, after giving the impression of a distinct digression, its closing strain should lead back into part III, which is the *repetition* or *recurrence* of the *principal.*



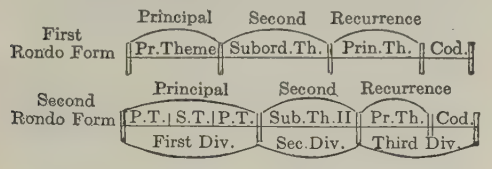
The Compound Song Forms. *Song Form with Trio.*—This larger form results when the *principal* is in itself a complete *three part song form,* possibly with a short transition leading into the middle section, called *trio.* The name trio is handed down from the time when the *principal* and its recurrence were two-voiced, the middle section three-voiced,—hence trio. The form of this *trio* or middle section is generally *three part,* although it may also be *two part.*



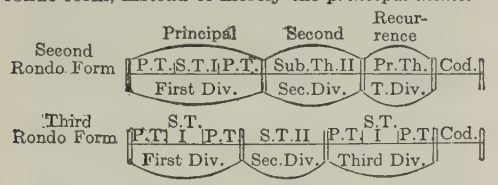
Song Form with Two Trios.—The next form evolving itself in the natural order of growth is the *song form with two trios.* The first trio is usually similar in style to the *principal,* the second may be contrasted as much as desirable.

The Rondo. The *First Rondo Form* is a direct offshoot of the *song form*. It contains a *principal theme*, one *subordinate theme*, and the *recurrence* of the *principal*. Introduction, transition, and *codetta* (a short closing group) may be added at option.

If the *principal* is enlarged into a complete first rondo form, then the *Second Rondo Form* is created.

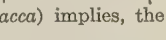


The Third Rondo Form.—This largest rondo form is obtained by making the *recurrence* a complete repetition of the *first division*, as found in the second rondo form, instead of merely the *principal theme*.



Marches and Dances. The simplest and oldest art forms include the dances, among which the march is to be included, inasmuch as it, like the dance, serves the purpose of regulating the movements of persons in large numbers. The rhythm of marches is generally duple (2–4 or 4–4).

Marches usually have a simple construction, often paralleling that of a three part form. The middle section, the *trio*, is usually quieter and more melodious than the preceding section and in another key, often the subdominant. Longer movements in march style may be found in the oratorio (Handel's *Judas Maccabeus*) and in the opera (Wagner's *Tannhäuser*). The funeral march is a special type well exemplified by the celebrated *Marcia funebre* which serves as the second movement of Beethoven's Third Symphony (*Eroica*).

The *polonaise* of modern times has the character of a stately march. It is written in triple time, moderate tempo, with following characteristic rhythm in the accompaniment, 3–4  .

As the name polonaise (Ital. *polacca*) implies, the dance is of Polish origin.

Other present-day dance forms whose names imply either the country of their origin, their original function, or some characteristic stylistic feature may be cursorily described in terms of their rhythm and tempo. Among them may be listed the Polish *mazurka* (3–4, moderate), the Bohemian *polka* (2-4, lively), the Spanish *bolero* (3–4, moderate), the French *galop* (2-4, quick), the Italian *tarantella* (6–8, very fast), the Italian *saltarello* (6–8, quick), the Austrian *waltz* (3–4, moderate).

The Suite. A popular form of the Baroque period was the *suite* or *partita*, a collection of several pieces in dance forms, usually in the same key. Bach's English and French Suites and his Partitas, all written for the harpsichord, represent the finest flowering of the form.

At least four dances usually appeared in the suite: the *allemande*, *courante*, *sarabande*, and *gigue*. Between the sarabande and gigue any one of a large number of other forms might be inserted at the composer's discretion.

As found in Bach's works the dance forms of the suite possess these characteristics:

The *allemande*, originally a German dance, was later taken up and developed by the French. It is in 4–4, moderate tempo, usually displaying short running figures. It begins, as a general rule, with a short upbeat.

The *courante*, of French origin, is in 3–2 or 6–4, occasionally with these rhythms in combination, and in a moderate tempo. The Italian analogue, the *corrente*, is in quick 3–4, often with running figures.

The *sarabande*, initially a quick, frenzied dance popular in Spain, had by the time of Bach and Handel become a slow, stately dance in 3–4 time.

The *gigue*, a descendant of the English *jig*, is characterized by the use of a triple rhythm (3–8, 6–8, 6–4) and a lively tempo. It often is polyphonic in texture and inversions of thematic material occur frequently.

Among the many forms which may be interpolated between the sarabande and the gigue are:

The *gavotte*, a French dance in moderate tempo and in duple or quadruple rhythm. It usually begins with an upbeat of half a measure. Gavottes may often be found in pairs, gavotte II alternating with gavotte I to produce a three-part form. Gavotte II may possess a bagpipe-like drone bass and will then be called a *musette*.

The *minuet*, of French origin, is in moderate tempo and in triple rhythm, usually alternating with a *trio* section. The minuet enjoys the distinction of being the sole baroque dance form to survive its epoch and appear in music of a later day, i.e., in the sonatas and symphonies of Haydn, Mozart, and the early Beethoven.

The *bourrée*, a lively dance of French origin, is usually in 4–4 rhythm with a short upbeat. Syncopation occurs frequently. Like the gavotte, the bourrée may be paired with a companion piece of the same type.

The *loure*, ostensibly named after a French instrument, is in rather slow tempo and 6–4 rhythm. Dotted figures predominate.

The *siciliano*, of Sicilian origin as its name indicates, is a quiet dance in 6–8 or 12–8. It usually has a pastoral character.

The *passepied*, an old French dance, in triple rhythm (3–4 or 6–8), is quite animated and usually begins with a short upbeat.

The *anglaise*, of English derivation, is in lively duple rhythm, usually beginning on the beat.

The *aria* (English: *air*), song-like in style, and devoid of dance characteristics, may occasionally appear in the suite. A famous instance is the Air which occurs in the third of Bach's orchestral suites. In a transcription for violin solo (not by Bach) it has become misleadingly known as *Air on the G String*.

Two forms which appear from time to time in the baroque suite, the *chaconne* and the *passacaglia*, are in reality variation forms, in this instance on a constantly repeated bass figure, the *basso ostinato* or *ground bass*. The ground bass, a brief melody of four or eight measures, may be altered during the course of the work. The ground bass as an organizing device for a larger work, improvisational in style, has been revived in contemporary music under the name *Boogie-Woogie*.

The Modern Suite. Since the latter half of the 19th century composers have used the term suite as a label for any succession of short movements of a miscellaneous character. Extracts from incidental music for plays, such as Grieg's *Peer Gynt* suite, from the music for ballets, i.e., Stravinsky's suite from *The Firebird*, are typical, as is also the sequence of short descriptive pieces which comprises Mussorgsky's *Pictures at an Exhibition*.

The Song. The song may be divided into two classes,—the *folk song* and the *art song*. A folk song is either one whose author and composer are no longer known, taking its rise among the people, or

one by a known composer, which has been widely adopted by the general populace because it was folk-like in its appeal, simple in melody, and easy of comprehension. An art song, on the other hand, makes greater demand upon the voice and accompaniment.

A song is either a *strophic song*, in which each verse is sung to the same melody, perhaps with slight modifications, regardless of possible mood changes, or a *through-composed* song, in which the melody and the accompaniment are governed by and changed to fit the needs of the text.

The Overture. This form has gone through many phases of development. As its name implies, it has always been an *opening* or *introductory* composition, serving as a preface to a dramatic presentation.

The so-called "French" overture was written by the French composer *Jean Baptiste Lully* (1633–87). It comprised two sections, a pompous slow movement as beginning, followed by a livelier movement in a polyphonic style.

Alessandro Scarlatti (1659-1725), the important Italian composer, developed the "Italian" overture, called *sinfonia* by him, beginning it with an *allegro* followed by a slower second section, and closing with a spirited *allegro*. The term *sinfonia* at that time expressed nothing more than a short instrumental composition of an introductory nature.

Christoph Willibald Gluck (1714-87), The great "Reformer" of the opera, must be credited with having given the overture a greater significance as an individual composition as well as in its connection with the opera.

In modern times we distinguish between three different kinds of overtures: (1) Overture in the *sonata form* (explained elsewhere) with two themes, a development section, and a recapitulation, and with more or less elasticity of form; in short, the so-called *concert overture*, splendid examples of which are Mendelssohn's *Fingal's Cave* and Tchaikovsky's *Romeo and Juliet*. (2) Overtures which, after the style of *potpourris*, are formed by the loose conjunction of selected melodies of the whole opera such as most modern operetta overtures. (3) Overtures which are formed by a systematic working out of the thematic materials of the opera into a logical composition, characterizing and creating a proper "atmosphere" for the works which they precede, for instance Von Weber's Overture to *Der Freischütz* or Wagner's overture to *Die Meistersinger von Nürnberg*.

The Sonata. By the middle of the 17th century, the *sonata* emerged as an instrumental work in three movements in contrasting styles. Brief adagios between the movements were of frequent occurrence. A later four movement type, Adagio-Allegro-Adagio-Allegro, became popular under the name *sonata da chiesa* (church sonata) and may be encountered in many of the sonatas of Arcangelo Corelli. The companion *sonata da camera* (chamber sonata) is practically identical with the suite.

The sonata as referred to today is almost exclusively the form brought to a peak of perfection by Haydn, Mozart, and Beethoven. Available to these masters was the rich legacy provided by the numerous composers who had brought the form from its initial phase as a short polyphonic movement up to the series of essentially homophonic movements which are now associated with the name *sonata*. Among the more immediate of these predecessors may be mentioned the Italians *Giovanni Battista Sammartini* (1701–75) and *Domenico Scarlatti* (1685–1757), the Germans *Johann Sebastian Bach* (1685–1750), his son *Karl Philipp Emanuel Bach* (1714–88), and *Johann Stamitz* (1717–57).

The term *sonata* is slightly ambiguous in its connotations. Strictly speaking it describes a work for a solo instrument in three or four movements, the first and often the last of which is in sonata form. If, however, a composition employ the identical form and be written for two instruments it will also be called a sonata. From this point on, compositions in sonata form are named from the number of performers: *trio*, *quartet*, *quintet*, *sextet*, etc. If an orchestra be the instrumental medium, the composition will be called a *symphony*. Purely from the standpoint of form, then, a symphony may be regarded as a sonata for orchestra.

The general outline of the classical sonata, string quartet or symphony may be described as a sequence of three or four quasi-independent movements exhibiting some system of key-relationship. The first movement will usually be an *allegro* in sonata form, occasionally prefaced by a short *adagio*. The second movement, usually song-like in character and in a slower tempo, may be in a variety of forms: sonata form, three-part song form or variation form being the most common. The third movement will be lively and dance-like, a minuet in the works of Haydn and Mozart, the vigorous, boisterous *scherzo* in most of the works of Beethoven. The last movement, again an allegro, may appear in sonata, rondo, or variation form.

Sonata form as found in a typical first movement consists of four large sections: *Exposition*, *Development*, *Recapitulation*, and *Coda*, all suitably connected. The Exposition presents the various themes of the movement in two well-defined groups differing in key. The dominant-tonic relationship is the most common. The musical potentialities of the thematic material are exploited in the Development. Here the composer can give his fancy free rein. Hence the alternative name *free fantasia* for this section. Ultimately the Development will lead into the Recapitulation which with some alterations of key relationships and some other minor deviations constitutes a repetition of the Exposition. The Coda serves as a summing up or peroration. Here again the composer enjoys considerable freedom in the manipulation of his material.

A *sonatina* is a shorter type of sonata, usually in two or three movements. The development sections are considerably abbreviated, and in the works of older masters such as Clementi, technical demands are slight. The best-known modern sonatina, that of Ravel, is a mature and technically difficult work.

The Symphony. The symphony may be defined as a sonata for orchestra. But the great dynamic range and the almost infinite number of timbres which the orchestra possesses as well as the fact that orchestral music is designed for performance in large halls have combined to make the symphony a form of far greater expressive scope than the sonata.

The modern symphony came into its own late in the 18th century thanks to the contributions to the form made by Joseph Haydn and his younger contemporary Wolfgang Amadeus Mozart. Works of these masters are habitually in four movements—usually an *allegro* in sonata form prefaced by a slow introduction; an *andante* or *adagio* in three-part form, sonata form, or variation form; a minuet; and lastly an allegro in sonata or rondo form. Beethoven's nine symphonies, the world's greatest collection of works in the form, show a marked advance over those of Haydn and Mozart, through highly original use of the orchestra, intensification of development, expansion of dimensions combined with increased economy of thematic material and the substitution of the vigorous and dynamic scherzo for the minuet.

Romantic composers such as Schubert, Schumann, and Mendelssohn have written beautiful works of lesser stature than those of Beethoven. An important symphonic product of the Romantic period is the "programmatic" *Symphonie fantastique* of the Frenchman, Hector Berlioz.

But it was not until the end of the 19th century that composers capable of dealing with the demands of the symphonic style appeared to carry the tradition of Beethoven forward. Outstanding are Brahms, Tchaikovsky, Franck and, more recently, Sibelius.

Since the day of Beethoven the term *scherzo* has been used for various types of rapid movements. Mendelssohn, for example, has written scherzi of a uniformly light texture, colorfully instrumentated. Chopin has labeled four impetuous and dramatic piano pieces scherzi. Dukas has used the term as a designation for a long orchestral movement, *The Sorcerer's Apprentice*, based on a *ballade* by Goethe.

The Symphonic Poem. The term *symphonic poem* was coined by Franz Liszt to describe an orchestral work which, although it may contain many changes of tempo, is played as a single movement. Strictly speaking, the symphonic poem is not a musical form at all for it exhibits no specific arrangement of its materials, i.e., no two symphonic poems will possess the same form. The symphonic poem is "program" music, and its form is determined by some poetic concept either implied in its title or given in detail in a prefatory "program." Typical of Liszt's symphonic poems is his *Les Préludes* with a quotation from a work of the French poet Lamartine. Among those who have followed in Liszt's footsteps may be mentioned Richard Strauss, Bedrich Smetana, Tchaikovsky, Saint-Saëns, and Sibelius. The symphonic poems of Smetana and Sibelius have decidedly nationalistic implications.

The Concerto. The *concerto* has been succinctly described by Donald Francis Tovey in these words: "The primary fact that distinguishes all works that have in them the character of the concerto style, is that their form is adapted to make the best effect expressible by opposed and unequal masses of instruments of voices."

The Baroque concerto, best exemplified in the works of Cornelli, Vivaldi, Bach, and Handel, is usually written for a large nucleus of string instruments called the *concerto grosso* or *ripieno* and a small group of either strings, strings and winds, or occasionally a solo string or keyboard instrument known as the *concertino* or *solo*. The underlying principle of the Baroque concerto is that of contrast between alternating passages of *tutti* and *solo*. Players of the solo sections were usually expected to be superior performers and difficult display passages were written for them. But while the texture of the Baroque concerto rapidly became traditional in its day, the number and nature of the movements into which it was divided, varied.

Another type of concerto, an adaptation of the sonata form to the concerto style, attained a high degree of perfection under the hands of Mozart and had remained a conventional form to this day. This concerto-symphony is a work usually in three movements closely resembling those of the symphony, and calling for a single soloist for whom a difficult and elaborate part is written. In almost all concertos the soloist is provided with at least one *cadenza*, a section in which the performer, totally unaccompanied, has an opportunity to display his virtuosity. Cadenzas are usually improvisational in style. Up to the day of Beethoven they were actually improvised by the performer. Since Beethoven, however, almost every composer except Brahms has written out the cadenzas for his concerti.

Although display of technical proficiency is one of the avowed aims of the concerto, it has not been permitted to obscure the larger expressive purposes of the composer. Profound works in the form, fully equivalent in content to a symphony, have been written by Mozart, Beethoven, Schumann, Brahms, Tchaikovsky and others.

Variations. The *Theme and Variations* as an art form may be traced back to the keyboard music of the 16th century. Here short pieces, often dance forms, were stated and then modified, i.e., "varied" in different ways, many of them quite elaborate. Particularly brilliant variations were written by the English virginalists.

Variation forms were assiduously cultivated during the Baroque period and appear frequently in the suite. Characteristic of the epoch are the variations on a short recurring bass figure, the *basso ostinato*, which make up the *passacaglia* and *chaconne*. Outstanding among them is Johann Sebastian Bach's *Passacaglia and Fugue* for organ. A 19th century revival of the form is the remarkable passacaglia for orchestra which concludes the Fourth Symphony of Brahms.

A particular type of variation for the organ, the *chorale-vorspiel* (chorale-prelude) played an important part in the Lutheran service. The chorale-vorspiel employed as its theme the melody of the chorale which was to be sung by the congregation during the service. While many ways of treating the chorale-melody are to be found, the most impressive is the "interpretive" type of variation which finds its inspiration in some feature of the chorale text and proceeds to elaborate upon it.

Many of the variations which occur in the works of Haydn and Mozart are fairly simple elaborations of a song-like theme. A typical set may be encountered in almost all of the later symphonies of Haydn. Beethoven, however, brought the variation form to an extraordinary level of expressiveness through his ability to exhaust the musical potentialities of the theme. Formal procedures are abandoned by him, variations are of unequal length, merge one into the other and exploit every aspect of the theme. Two of his symphonies, the Third (Eroica) and the Ninth conclude with a gigantic variation series. Many other instances in his piano and chamber music might also be mentioned.

Romantic composers such as Schumann or Mendelssohn wrote many attractive sets of variations. The former was quite fond of utilizing themes based on musical letters of the alphabet, i.e., his *Carnaval*, a set of twenty variations on the musical letters (in German) of the composer's own name. The finest variations since those of Beethoven occur in the works of Brahms. Franck has combined the variation and the concerto in his Symphonic Variations for piano and orchestra.

The Variation form has been successfully fused with the basic principle of the symphonic poem by Richard Strauss in his *Don Quixote*. In this work the various adventures of the Spanish nobleman are described in a set of variations. Similarly Sir Edward Elgar describes some of his friends in his *Enigma Variations*.

It must be emphasized that in the writing of variations composers are free to utilize any aspect of the theme—its melody, bass, harmony, rhythm, form, or some distinctive motive. Hence the relationship between the theme and its many metamorphoses may not be at all apparent on first hearing.

The Mass. The term *mass* is used to designate the principal liturgical ceremony of the Catholic Church. The mass as a musical art form is very old, the culmination of its development having been reached in the 15th and the 16th century, while Pope Gregory the Great regulated the musical part of the Eucharistic service as early as the 6th century. The songs of this period were sung in unison, and, along with the development of polyphonic music, it was particularly in connection with the molding of an artistic mass form that the masters of the 15th and the 16th century made themselves deserving of immortal praise. No composer of note during that period missed the opportunity of writing several masses, for these particular musical forms were at that time the most ostentatious display pieces of the composer's art.

The principal parts of the *mass* as a musical form are named after the various sectional beginnings of the Latin or, as in the case of the first, Greek text.

I *Kyrie*—Three parts; "Kyrie eleison."
II *Gloria*—"Gloria in excelsis Deo," etc. (Luke II: 14).
III *Credo*—"Credo in unum Deum," etc.
IV *Sanctus*—"Sanctus Dominus Deus Sabaoth," etc.
Benedictus—"Benedictus qui venit," etc.
V *Agnus Dei*—"Agnus Dei, qui tollis peccata mundi," etc.

We distinguish between *missa solemnis*, "solemn high mass" (called also *missa cantata* when sung by the priest unattended by deacon or subdeacon), and *missa brevis*, "low mass." The former is celebrated on great festivals of the Church, the latter on lesser feast days or when a moderate time is required for the musical rendition, in which case only the *Kyrie*, *Gloria*, and sometimes the *Benedictus* are sung.

Missa Pro Defunctis or *Requiem* is a mass in memory of the dead. It may contain: I, *Requiem Æternam—Kyrie*; II, *Dies Iræ*; III, *Domine Jesu Christe*; IV, *Sanctus* and *Benedictus*; V, *Agnus Dei, Lux Perpetua.*

The *Gloria* and *Credo* are omitted, and in their place are sung the *Requiem* (a prayer for the repose of the souls of those departed this life), which is rendered before the *Kyrie*; the *Dies Iræ* (the wondrous threnody of the last judgment); and the *Lux Perpetua* (perpetual light).

The most frequently performed of the world's large store of masses are of comparatively recent origin—*The Mass in B Minor* of Bach and the *Missa Solemnis* of Beethoven. This is also true of the Requiem Mass, here represented by the great settings of Mozart and Verdi.

The Oratorio. In 1551, Saint Philip Neri established in Rome a series of biblical lectures or discourses, held at first in the chapel of the monastery of San Girolamo and in Santa Maria. He introduced music into these *congregazione dell' oratorio* (chapel assemblages), and Animuccia, Palestrina, Nanini, and others wrote the music to biblical texts—so-called *laude*, "songs of praise." Accompanied by these songs, certain scenes were presented. Cavalieri's (about 1600) *Rappresentazione di Anima e di Corpore*, "Representation of Spirit and Body," is considered to be the first *oratorio*. It consisted of choruses and solos, though the latter were really more in the character of recitatives than vocal solos, and were constructed upon a foundation of figured basses to indicate the harmonies, which proceeding was in itself a novelty for that period. The orchestra consisted of strings and a harpsichord—while characters representing biblical personages performed upon a stage. This style was adhered to for some time by the followers of Cavalieri, and it was not until *Carissimi* (1604–74) that the scenic representation was dropped and the reciting voice substituted.

Handel (1685–1759) built upon the foundation laid by these predecessors and created his immortal oratorios, which will serve as a standard for all time. *Haydn*, *Mendelssohn*, *Schumann*, *Berlioz*, and others turned to this art form, without altering it in any important particular. According to the character of the text we distinguish between *sacred* and *secular oratorio*; the former is based upon a biblical or religious text, the latter upon some exalted secular text. The modern oratorio has an overture, and consists of solo arias, recitatives, solo-ensemble parts, and choruses. Since a scenic representation does not take place, dramatic moments are conveyed by the music alone, in so far as this is possible and plausible.

The Passion. The name of a musical dramatic presentation of the narrative of Christ's sufferings, which came into vogue in the early middle ages. These performances were usually given during Holy Week, though it is not now known just in how far the music supported or alternated with the action of the play. The culmination of a development, started by *Johann Walther* (1496–1570) and forwarded by *Heinrich Schütz* (1585–1672), is to be found in Johann Sebastian Bach's dramatic settings of the *St. John's Passion* and the *St. Matthew Passion.*

The Cantata. The *cantata*, like the opera, the concerto, and many other forms, is a product of the Baroque period. As its name indicates, it was a work designed to be sung, and like its analogue, the *sonata*, it exhibited two well-defined types during its early history: the liturgical *cantata da chiesa* (church cantata) and the secular *cantata da camera* (chamber cantata). Eventually the cantata became an extensive vocal composition consisting of a series of movements in the diverse styles of aria, recitative and, in the case of the church cantata, polyphonic chorus. The church cantata reached a remarkable stage of development in the some 300 *Kirchenkantaten* written by Johann Sebastian Bach for the service of the German Evangelical Church. (About 195 have been preserved.) The typical Bach cantata calls for soloists, chorus, and orchestra. It opens with an impressive polyphonic chorus followed by recitatives, arias, and vocal ensembles and closes with a single setting of a chorale.

Latterday composers have often called a short secular oratorio a cantata.

The Motet. The *motet*, one of the most widely cultivated of polyphonic forms, traces its ancestry back to the *motetus* of the 13th century. This early form of motet, written for two, three, or four voices was characterized by the simultaneous use of several texts and the assigning to one voice, the *tenor*, of some already existent melody. It might be either sacred or secular. With the emergence of the great Flemish school of composition, the motet became an exclusively liturgical, unaccompanied vocal form employing a Latin text and designed for performance as part of the Catholic ritual. Its organization was determined by its text, each clause of which was usually set in imitative polyphony. With the advent of the new idioms of the Baroque, instruments and solo voices figured in the motet and increased use was made of texts in the vernacular. Six unaccompanied motets with German texts by Johann Sebastian Bach bring the history of the form to a triumphant close.

The Aria. An *aria* is an orchestrally accompanied vocal solo of larger dimensions, forming a part of an opera, oratorio, mass, or cantata. It may also be a separate composition conceived for concert purposes, and is then called *concert aria.* A so-called *bravura* or *coloratura aria* is one which is written with a certain regard for the vocal technique of the soloist.

An aria of short duration is called *arietta* or *cavatina*, agreeing for the greater part with the three part song form. The *aria* served as the characteristic vocal form of the opera until the great reforms brought about by Richard Wagner in his music dramas. Here the expression-restraining formal demands of the aria were eliminated by the use of melodious declamation free in form and designed solely to amplify and intensify the meaning of the dramatic poem.

Recitative (Lat. *recitare*, "to relate"). This term refers to that vocal manner which is characteristic of the singing analogue of the natural speaking voice, its inflection and accent, during the declamation of a spoken text. It is an adjustment of pitch and cadence to text; no rigidly confining tempo or rhythm are found, as in melodic phrases. The sole task of the music is to afford an impressive and suitable delivery of the words. The accompaniment consists only of simple chords. This style admits of great expressiveness. Handel affords, in his "Messiah," a fine example in the tenor recitative "Thy rebuke hath broken his heart." The first upward in-

flections upon the word "rebuke" followed by the downward sweep of an octave in "hath broken his heart" are wondrously expressive. The style might well be designated by the term speech-song. Any composition or section which is contructed according to these principles may have conferred upon it the name recitative.

The Contrapuntal Forms,—Canon, Fugue. The contrapuntal style is one in which several melodies (voices or instruments) are used simultaneously to form a euphonious combination without sacrificing the melodic individuality of any voice.

The first attempt to sound two distinct melodies was the so-called *organum*, in which a second voice sang along in parallel fourths or fifths with the first. Reference is first made to part music under the name *organum* by Regino of Prüm in his *Epistola de harmonica institutione* (9th century). Many other theorists and church dignitaries of the Middle Ages refer to singing in parts. Among them may be listed the Venerable Bede, Bishop Aldhem, and Johannes Scotus. But the first detailed account of organum sufficiently specific to afford an idea of what the practice really constituted is the *Musica Enchiriadis*, a famous work of the 9th century. Its author remains unknown, although the tract was for a long time attributed to the monk Hucbald (ca. 840–930). The *Musica Enchiriadis* describes organum as a kind of two-voiced polyphony in which the parts moved in substantially parallel fashion, removed from each other by an interval of a fourth or a fifth.

The practice of polyphony at once creates several vital issues: what are the laws underlying the simultaneous sounding of pitches? How may simultaneously sounding melodies be synchronized? The first question is answered in terms of *harmony*, the second in terms of *rhythm*. A significant part of the history of music deals with one aspect of harmony—standards of consonance and dissonance.

By the end of the 11th century much independence of movement of the voices could be found in *organum*. The Englishman John Cotton (12th century) writes in his *Musica* that crossing of the parts is desirable. From this point on, organum tends to become more and more free and culminates in the great works of the Notre Dame school.

Canon.—Imitative counterpoint, in which one voice repeats the melody of the preceding voice, while the latter goes on independently, was known and used as early as the 13th century. However, the term counterpoint was not applied to the combination of melodies until the 14th century. *Philippe de Vitri*, an important theoretician of the 14th century whose name is associated with the isorhythmic motet and *ars nova*, made important contributions to rhythmic notation. Other developments followed until *Giuseppe Zarlino*, in his *Institutioni Harmoniche* (1558), gave the various kinds of counterpoint (single and double) and *canon* in their complete form.

Canon is the name of a contrapuntal style of writing, in which the voices present the same melody, successively, each in imitation of the preceding voice. The strict manner of doing this results when each melodic interval of the original melody is exactly adhered to during the imitation; a freer style is obtained by modifying the intervals by accidentals.

When the second voice introduces the imitation (repetition) so that the entire tone series is either of the same pitch as that of the first voice, or optionally a second, third, fourth, fifth, or octave above or below the initial appearance, then the canon is accordingly called a canon in the unison, upper or lower second, third, fourth, fifth, octave, etc. For instance: *canon in the lower octave*, in which the second voice presents an exact repetition of the melody one octave below the first.

There are many different kinds of canon, each of which is minutely described in older textbooks on the subject, yet few have achieved a great importance because of outstanding distinctiveness.

When a canon is so contructed that its final tones lead back into the beginning (so that it may continue indefinitely) it is called a *circle* or *endless canon*. The circle canon is popularly called a *round*. The earliest and probably most celebrated example of the round is the English *rota* (wheel), *Sumer is icumen in*, dating from the 13th century. Rounds were especially cultivated in England during the lively Restoration Period. They were called *catches*. Numerous short and amusing rounds were tossed off by Haydn, Mozart, and Beethoven. A *canon pertonos*, or spiral canon, is one in which the ending leads back into the recurrence at a given interval higher or lower, this to be continued indefinitely.

Puzzle or *riddle* canons are written in an obscure notation provided with a cryptic or enigmatic key often humorous.

Double Counterpoint.—This species of counterpoint, doubtless the most important of all, makes use of a fixed or principal melody (*cantus firmus*) in opposition to which the second independent melody is so applied that the two melodies may change places (as upper and lower melody respectively) without impairing the euphony of the combined voices or violating the laws of counterpoint.

The Fugue (Lat. *fuga* "flight").—In this form the theme or subject is introduced in a given voice, then taken up in turn by the other voices, later being artfully developed. The term fugue was applied, as early as the 16th century, to the strict imitative style of counterpoint, especially the canon, while compositions conceived in a freer contrapuntal manner were designated *ricercare* (Ital. *ricercare*, "to seek again") or even more commonly, *toccata*, *sonata*, or *canzona*. It was much later (18th century) that the term *ricercare* or *ricercata* was restricted to designate the especially learned fugue.

In classifying fugues the three following styles of workmanship are determining factors: We name them (a) according to the interval upon which the imitating voice occurs, for we speak of *fugues in the unison, second, fourth, fifth*, etc.; (b) according to the species of movement, for we distinguish between *fugues in parallel motion and contrary motion*; (c) lastly, the relative value of the notes of the imitation as compared with the initial announcement is considered. If the note values upon the second entrance of the theme are greater than those of the first (for instance, quarter notes as compared with eighth notes) then we speak of it as a "fugue in augmentation," or *fuga per augmentationem*; under reversed conditions (lesser values upon the second appearance of the theme) it is called a "fugue in diminution," or *fuga per diminutionem*.

In the model fugue the following general thematic resources and sections may be distinguished:

1. The *Subject*, the short melody with which the fugue begins and upon which it is constructed.

2. The *Answer*, in the second voice, a reply to the subject and similar to it.

3. The *Countersubject*, another melody often derived from figures of the subject, entering together with the answer and forming two-voiced counterpoint with it. In strictly constructed fugues, the countersubject is present at each entrance of the subject or answer.

4. The *Exposition*, the first section of the fugue, during which there are as many entrances of subject and answer, respectively, as there are voices in the fugue, each voice enunciating the theme once.

5. *Episodes*, passages which serve to continue the movement while the subject or answer rests, and which lead into renewed announcements of the thematic materials. An episode is generally inserted after the answer, as a means of modulating back to

the original key. Episodes are more freely used in later sections of a fugue to afford some relief from the monotony that might result from the incessant use of subject and countersubject.

6. *Stretto* (Lat. *stringere*, "to draw close"), that contrapuntal condition which arises when one entrance of the subject or answer occurs before another is finished, the two thus overlapping.

In the fugue, all the contrapuntal varieties of workmanship—contrary motion, augmentation, diminution—may be applied to the two, three, four, or five voices which are used.

A *double fugue* is one with two subjects, each of which may be developed separately, but in which a third development is found, making use of Subject Number One as countersubject or principal counterpoint for Subject Number Two. There are also *triple fugues*. A *fughetta* is a small fugue. A *fugato* is a contrapuntal section of any composition; for instance, the development part of a sonata or symphony, in which the fuga style is applied for a certain period without extending itself into a regular fugue.

The entire technique of fugal composition has been summarized for all time in Johann Sebastian Bach's monumental *The Art of Fugue*, a series of fugues and canons on one theme, and hence in reality a set of variations as well.

MUSICAL INSTRUMENTS

The instruments of ancient times are discussed in the music history section under the headings: *Primitive and Prehistoric Music*, *Music of the Orient*, *Hebrew Music*, and *Greece*. In the Middle and Later Ages, the instruments of the West were all imported from Asia or Mohammedan North Africa and only in centuries transformed to serve the needs of later European music. This is particularly impressive in the case of the organ.

The Pipe Organ, a compound of one-tone pipes mechanically blown, seems to have originated in Egypt in times B.C. as the combination of panpipes, a windbag, and a bellows, as it is evidenced on a clay figure from Alexandria. Ktesibios, the famous "inventor" of the organ, can only have been the inventor of an ingenious hydraulic device to provide and equalize the necessary wind.

Though the organ in both forms, with bellows and with water pump pressure, was spread all over the Roman Empire, its chief development came only when the medieval Church had overcome its opposition against the "heathenish" instrument and given it a place in the singing classes of monasteries and, at last, in the service itself.

The medieval organ differed in many respects from the modern organ. In the first place, the organ builders were not aware that the pipes, decreasing in length up-scale, should also decrease in diameter, and therefore obtained a roaring sound in the lower part of the range and a mellow one in the upper part. In the second place, the organ had no keys in the modern lever form; horizontal sliders, preventing the wind from entering the pipes, had to be pulled forward in order to open the way and cause a tone. Such clumsy device excluded any fluency in playing. Only in the 13th century were the sliders replaced by levers, which then led to the modern keys.

In the third place, the organ was a compound or, in later terminology, a mixture of furniture: the pressure on one key was not answered by the sound of one pipe, but of a whole set of pipes, sometimes from ten to twenty, sounding the note itself, its fifth, its octave, its twelfth, and so on. It was not before the end of the 14th century that solo stops with one pipe to the key were introduced to serve alongside with the compound, which still was the body proper of the organ. Again, it was not before the 16th century that two or more such solo stops were mixed in order to create new colors. The momentous end of the 14th century, when the poet and composer Guillaume de Machaut could call the organ the queen of all the instruments, saw the introduction of a second manual or keyboard for the hands, and even of a pedal or keyboard for the feet, though this latter, invented in the North, was for centuries used in the North but not in the South of Europe.

The organ had an almost steady evolution, until in the 19th century decisive turns led to a crisis. In 1827, an Englishman, Booth, devised the earliest action in which the purely mechanical connection between the key and the pipe was improved by a partly pneumatic pressure to facilitate and equalize playing. But the successful system, half mechanical, half pneumatic, was created in 1832 by Charles Spackman Barker in London. Much later, in 1868, Barker even combined a pneumatic with an electric action, in which the key closed an electric circuit, while the pallet below the pipe was opened by wind pressure. At the same time, the organ became more and more motley in its dizzying number of solo stops; swell boxes deprived the instrument of its majestic, monumental character; the wind pressure and therewith the thunderous, shrieking effect was continually augmented; and the size grew from year to year. About 1850, large organs had already 100 stops; in 1932, Emerson L. Richard's and Midmer-Losh's organ in the Convention Hall at Atlantic City, N. J., was given 1,233 stops with 32,882 pipes on seven manuals and a pedal under a wind pressure of 100 inches as against the 3 or 4 inches in earlier centuries.

This appears to be an end. A reaction has set in with the goal to rid the organ of its superromantic traits and to re-establish its unification, limpidity, and noble grandeur. Archaistic in their beginnings, the so-called Bach-, Baroque-, and Praetorius-organs are leading the way to the organ of the future.

Predecessors of the Pianoforte. We do not know at what time the Greek and medieval test monochord was given more than one string and keys that allowed to play in chords; nor do we know when the oriental zither became a plucked keyboard instrument. Both devices are mentioned early in the 14th century.

The monochord with a keyboard was usually called a clavichord. It had a moderate number of strings running from left to right in a small and shallow box, and keys that carried, on their rear ends, upright metal tangents to strike the string gently and to produce a weak but charming tone, which allowed the instrument to last for more than five hundred years and even to have a belated bloom in the sentimental days of the mid 18th century.

The oriental zither, provided with a keyboard, resulted in what was called a harpsichord when it had the form of a grand piano; and a virginal or spinet, when it had the square form of the clavichord. In both cases, the key had, on its rear end, a free, upright wooden jack, in which a projecting pointed piece of quill plucked the string when the key was being pressed down. In this plucking action, the tone was metallic, argentine, and rigid, notwithstanding the greater or lesser pressure of the key. From the 16th century on, a certain amount of variety was given the harpsichord (not the spinet) by assigning several strings and jacks to the individual key, which yielded different timbres and could be opposed or combined by the use of a second keyboard, to be played separately or else coupled to the first one. An invention, made in London about 1650, to act on the stops by means of foot levers in order to grant a change of stops in the middle of a piece without removing a hand from the keys, was rejected and ignored as being contrary to the style of the times.

The spinet disappeared at the end of the 17th century and the harpsichord, at the end of the 18th. The pianoforte, called to replace both of them and

the clavichord as well, had been invented in 1709 and played for the first time in a public recital in London, 1768, by Bach's youngest son Johann Christian.

The Modern Pianoforte. Although this instrument is familiar to most music lovers throughout the world, its importance is such, both as a solo instrument and in *ensemble* work, that a brief review of its effects is justified. It adapts itself to all styles of music and, viewed by itself, is practically an orchestra in miniature. For this reason, we find all kinds of vocal and instrumental compositions arranged for the pianoforte. As solo instrument it stands in a class by itself, and the great tone-heroes, —Mozart, Beethoven, Weber, Mendelssohn, Schumann, Liszt, and Tchaikovsky,—have shown in their works for this universal instrument the manifold effects of which it is capable.

Aside from its use as a solo instrument, the pianoforte finds its greatest usefulness in association with other instruments—either in *ensemble* works or merely in accompaniments of vocal or instrumental solos. It has found a place in the orchestra as an instrument on equal terms with other instruments in the third symphony in C minor of Saint-Saëns, where, in association with the organ and the strings, it has produced a charming and characteristic effect. Berlioz, in a chorus of airy sprites, has used the instrument for four hands, in accompanying the voices. No other instrument could produce the sort of harmonious quivering required by the composer to express the sylphlike movements of the characters.

Early Bowed Instruments. It is not true that the family of the violin developed from the family of the viola da gamba. The two of them crystallized alongside at the beginning of the 16th century out of the experimental chaos in which the medieval stringed instruments of the North and the South, of the West and the East had found themselves thrown together, mingled, and mixed.

The *viola da gamba*, leg viol, abbreviated viol or gamba, had generally six strings, much thinner than the modern ones, furthermore frets on the fingerboard, a deeper body, and a flat back. It was mainly built in three sizes, treble, alto or tenor, and bass, though the latitude within these sizes was great enough to provide special models for playing in "consorts" or chamber ensembles, in melodic solos, and in chordal solos. All of them were held upright upon or between the legs. Bowing was done the other way around, palm upward and the accented strokes pushed with the tip of the bow. This and the argentine sound of the strings gave the instrument a delicacy that more or less excluded playing in orchestras and accompanying the figured bass.

Meantime, the family of the violin, or *viola da braccio*, arm viol, had come to the fore. At first with three strings only, it existed in Italy early in the 16th century, replacing the *gamba* family inside Italy early in the 17th, but had in France and Germany to fight for recognition until well into the 18th century.

Modern Bowed Instruments. *The Violin.*—The effects which may be produced on this most marvelous instrument are practically inexhaustible; they meet every subtle shade of expression. The use of the bow is a great factor in the production of the manifold effects. The manner in which the bow stroke is made and the distance from the "bridge" at which the bow touches the strings serve to influence the tone quality and the mode of expression. It may be of interest to note that of the four strings on the violin, each possesses its own peculiar color, similar to the timbre of certain wind instruments. Thus, the first, or E, string approximates the color of the flute, in part also that of the piccolo flute. The second, or A, string has a timbre like that of the oboe; the third, or D, string, like that of the bassoon; while the fourth, or G, string is similar to the horn. The *sordino* or mute, produces a tone color of veiled, suppressed, beclouded, mysterious quality. The *pizzicato* is produced by plucking the string with the finger.

When used in the modern orchestra, the violin adapts itself especially to the lyric song passage, figuration, ornamental melodies, filling and coloring. The *tremolo*, by many violins, produces some excellent effects; it expresses trouble, agitation, terror, in the respective shades of piano, mezzoforte, and fortissimo, when placed on the G, D, or A string. It has a somewhat stormy, violent character in fortissimo on the middle of the first or second string. It becomes, on the contrary, ethereal or angelic, when employed in several parts and pianissimo on the high notes of the first string. *Harmonics* are those sounds which are generated by touching the strings with fingers of the left hand so as to divide them in their length, yet not with sufficient pressure to place them in contact with the finger board, as is the case for ordinary tones. These harmonics possess a singular character of mysterious softness and delicacy, and their crystalline quality renders them appropriate to chords that may be called fairylike, evanescent.

The Viola.—As a solo instrument, in or out of the orchestra, the viola offers wonderful coloring material; its soft, noble, rich, "affectionate" quality is of dreamy magic. The song of the viola on its higher strings is strongly religious in effect. The timbre of the strings is as follows: the first, or A, string resembles the oboe; the second, or D, string has a bassoon-like quality. The third, or G, string and the fourth, or C, string have a soft, tender, earnest, and agreeable quality, which, in the middle registers, suggests the horn tones. What has been said about *pizzicato*, *sordino*, bowing, tremolo, harmonics, etc., in respect to the violin is throughout applicable to the viola—considered as a violin a fifth lower. The viola is no less agile than the violin, the sound of its low strings is peculiarly telling, its upper notes are distinguished by their mournfully passionate accent, and its quality of tone, profoundly melancholy, differs altogether from that of the other instruments played with the bow.

The Violoncello.—An instrument particularly well adapted to express pathetic scenes and conditions, broad melodies being better than superficial. However, it possesses such versatility of expression that it can reflect almost any sort of condition. In general, the color of its tones is serious, the middle range full and sonorous, the depths very agreeable, while the higher registers are of a virility and tense quality which, in song passages, is of tremendous effectiveness. The four strings of the violoncello are tuned an octave lower than the four strings of the viola. That which has been said of the violin and viola, in regard to arpeggios, bowing, etc., applies equally to the violoncello. Nothing is more voluptuously melancholy, or more suited to the utterance of tender, languishing themes, than a mass of violoncellos playing in unison upon the first string. They are also excellent for airs of a religious character.

The Contrabass.—This instrument forms the bass of the string group in the orchestra. There are two kinds,—those with three and those with four strings. Those with three strings are tuned in fifths—G D A—and those with four are tuned in fourths—E A D G. The tremolo is of good effect, also the sordino. The *pizzicato* is intensely dramatic in tense moments, picking its way, like an anxious heartbeat, under a pathetic melody of the cellos, the deep, sustained tones of the clarinets, and the convulsive shuddering of the violins. In a dark, threatening tone color, the *pizzicato* of the basses is of fear creating effect.

The Harp. This poetic instrument is found in very many modern orchestral scores. The effect of several harps in unison is imposing. The harp tone

blends very well with the various color registers of the orchestra, especially with the horns, and also with the human voice. It is suitable for march scenes, for prayer, and for idealistic, elegiac, or religious moments. Its deep tones are rich and full of unction and pathos; its higher tones, fine, clear, and bell-like. Nothing can be more in keeping with the ideas of poetic festivities or religious rites than the sounds of a large body of harps ingeniously introduced. The crystalline sound of the strings of the last upper octave, of voluptuous freshness, renders the harp fit for the expression of graceful, fairylike ideas, and for giving utterance to the tender secrets of exquisite melodies.

The Stringed Instruments Combined. A few effects of the combined stringed instruments are here cited to indicate briefly the emotional and objective conditions suggested. (a) With the use of *sordini* (mutes), a splendid effect of secrecy is suggested or the veiled light of the moon is depicted. (b) For reverie-like conditions there is nothing more beautiful than a lovely adagio passage played by all the strings muted. (c) Deep, strong tones of the basses and cellos may portray the heavy, coarse, powerful, insolent, clownish tendencies in life, while the higher, lighter tones of the combined basses, pianissimo and staccato, fairly rival the high tones of the flute or violin in shadow-like mobility or ghostly evanescence. (d) Also of beautiful effect but a trifle more virile than (b) is a broad, songlike melody in the first violins, accompanied by the second violins, violas, and cellos muted. (e) The strings muted and combined with some of the softer wind instruments, like the flute, clarinet, horn, and bassoon, blend in rich colors for corresponding modes of expression. (f) *Pizzicato* by certain stringed instruments may be used to imitate the harp effects, as in serenades, prayers, etc.

(g) In dramatic or mysterious moments, the basses and cellos may play songlike passages *pizzicato*, an effect which is highly characteristic, especially in minor. (h) Contrasts of a tense character may be produced, and the color effects of the instrumentation greatly heightened, if *pizzicato* tones are more or less alternated with tones produced by the bow (*arco*). (i) A beautiful lyric effect is produced by a slow melody in the first violins, accompanied by arpeggiating seconds, with sustained tones in the violas, and *pizzicato* in the cellos and basses. (j) *Pizzicato* by the entire string orchestra produces an effect like a huge guitar; especially in pianissimo it is full of grace and charm. (k) If the strings are played upon very near the bridge (*sul ponticello*), a rough, somewhat disagreeable tone quality results, which, however, is often the very effect desired for dramatic moments, fear, horror, etc. (l) With strong, sustained tones for all the strings the effect of an organ may be approximated. (m) Of tremendous effect is the unison passage played by all strings in powerful strokes. (n) The *arpeggio* for all the strings would doubtless produce some splendid effects at the proper time. This effect, to the knowledge of the writer, has not as yet been used by any composer.

The Wood-Wind Instruments. The *piccolo flute* has all the shrill brilliancy associated with the highest pitch levels, and may depict great mobility, light intensity, the whistle of the wind, flash of lightning (objectively), or piercing pain, agony, shrill demonic joy. (subjectively).

The Flute.—Its lower range has a color characteristic of lonesome sadness, weakness, humility, resignation, soft lament, etc. In its higher range, it is bright, sharp, incisive; good for simplicity, innocence, joy.

The Oboe.—The color of the oboe tones is suitable for all wailing effects or in depicting pastoral scenes. In minor passages, it voices tediousness, pain, sadness, suffering.

The English Horn.—The alto oboe is splendid for expressing pain, moral suffering, tragic thoughts. It is especially good in minor for a soft emotional wailing or deep religious feeling. It has a melancholy, dreamy, and rather noble timbre, the tone of which possesses a vague, "remote" quality that renders it superior to all others in exciting regret and in reviving images and sentiments of the past. The lowest register is well suited to color, with its menacing impression, ideas in which fear and anxiety predominate.

Clarinets.—Instruments of sympathetic, stately colors suited for pastoral or religious effects. It has been said that the clarinets have four registers, each of a distinct tone quality. The high register is somewhat tearing, and should be used only in fortissimo for rough joy, boisterousness, gayety, lightning flashes, etc. The medium registers are suited to melodies and *arpeggios*, or to melodies expressing *naïveté*, simplicity, innocence, purity, pastoral effects, etc. The lower register is earnest and sad and may be used for religious, melancholic, dramatic, or threatening, terrorizing moments. The "A" clarinet has a soft, melancholy coloring, better for pathetic, earnest religious effects than the "B flat" clarinet, which is of a more brilliant tinge, and is suitable for passionate longing, etc.

The Bass Clarinet.—A glorious instrument, round, full, majestic in tone quality, which may borrow the wild effects that distinguish the lower notes of the clarinet, or the calm, solemn, sacerdotal accent belonging to certain registers of the organ. It is well adapted for elegiac expression, or to depict religious feelings or those of sadness, and is especially suited for dramatic moments, horror, scenes of dread, pain, sinister prophecies, etc. The character of the instrument demands the song style.

The Bassoon (Fagott).—This instrument represents the bass of the oboe, even as the English horn represents the alto. Its low notes form excellent basses to the whole group of wood-wind instruments. When playing *legato arpeggios* it may depict waves of emotion or of the sea. The low tones are splendid for expressing humor, and are very comical in effect, especially staccato. The middle-upper register has a color similar to the human voice. In minor it portrays pain, complaint, depression, fear.

Brass Instruments with Mouthpieces. *The French Horn (corno).*—This beautiful instrument has a color peculiar to itself, noble, pure, and poetic, suggesting the fragrant hills, meadows, forest (objectively); or nobility, self-reliance, trust, generosity, simplicity, purity, etc. (subjectively). The middle register, in broad tones, reflects the unknown, suspense; in short, detached tones, mystery. The "stopped" tones, forte, have a color suggestive of awakening fear, and are effective for arousing horror, revenge, fright, distress, danger, terror, demonic rage, passion, etc. In pianissimo the stopped tones reflect pain, discomfort, depression, and the like. The horns, usually four in number, in the symphony or opera orchestra, are splendidly adapted for hunting fanfares or forest scenes. Some tones are quite similar to the human voice.

The Trumpet.—An instrument which adapts itself for march effects, defiance, battle, attack, challenge. In objective music, rhythmically detached passages in punctuated notes, forte, depict scenes or conditions of confusion, turmoil, struggle. Subjectively, the trumpet reflects expressions of joy, trust, generosity, victory, boldness, ambition, courage, masterfulness. In pianissimo its effect is beautiful, and of soft melting quality. The muted tones are sad.

The Trombone.—This instrument possesses a noble, heroic quality or, if desired, a tremendous tone of majestic proportions. Formerly there were four kinds of trombones, each of which bore the name of the human voice to which it had the nearest

resemblance,—soprano, alto, tenor, and bass. Of these, the tenor and bass are now most commonly used in orchestras. The tenor trombone has a tone of powerful sonority, which, in the middle and lower registers, can express energy, power, grandeur, brutality; in broad lyric passages, piano, it reflects earnestness or religious feeling. In fortissimo it is very effective for horror, terror, or for demonic, dramatic conditions. It is common to use three tenor trombones. In broad chords they have an effect of power, majesty, sublimity, grandeur, and are splendid for religious moments. The pianissimo is full of deep feeling. In fortissimo, three trombones can produce terrifying, overpowering effects. The greatest expressive power of the trombone lies in the effectiveness of the simplest triad passages.

The Bass Tuba.—This colossal instrument possesses an earnest, penetrating tone of rough quality, which is well adapted to furnish the necessary bass for the trombones and trumpets. Combined with the trombones, it is capable of expressing the most overpowering effects,—heavy, gruff, and forceful. The brass instruments combined are used in driving toward a great climax or in producing great volume.

Brass Instruments Played with Reeds. The *Saxophones* are a family of brass instruments created by Adolphe Sax, which have a single reed, with a clarinet mouthpiece, and which give new voices to the orchestra or the band. The quality of tone of the high notes of low saxophones is somewhat plaintive and sorrowful, while that of their bass notes is, on the contrary, of a calm, earnest dignity. Saxophones are seven in number; the high, the soprano, the alto, the tenor, the baritone, the bass, and the double bass.

Instruments of Percussion. *The Kettledrums* or *Timpani.*—These are the most valuable of all the percussion instruments. In most modern orchestras there are but two timpani, the larger one of which is used for the lowest sounds. There are three kinds of drumsticks, the use of which so changes the nature of the drums' sound that the composer often indicates which one he wishes the performer to use. Drumsticks with wooden ends produce a harsh, dry, hard sound. Drumsticks with wooden ends covered with leather are less hard, but still very noisy. Drumsticks with ends made of sponge or felt are the best, and give to the kettledrum a grave, velvety quality of tone, which suits a large number of gradations, soft or loud in execution. The general character of the kettledrums is nerve-racking, from its dimly menacing piano throughout the entire dynamic range up to the most terrific crescendo and fortissimo. They adapt themselves to all conditions, but are especially appropriate for stormy scenes, dirges, and dramatic moments. They splendidly exemplify the heartbeat in anxiety, or add much to the characterization of terrifying scenes. The muted timpani have a color very appropriate for requiems or similar sad occasions.

The Drum.—The so-called "bass drum" (*gran cassa*) is used in descriptive and symphonic music, forte, to aid in characterizing the approach of a climax of volume, also to imitate thunder or cannon. When used softly it is of fine effect.

The Small Drum (*tambura*).—Mostly used in music of a military or warlike character, although Halévy, Donizetti, Meyerbeer, and Rossini have incorporated it in their opera scores.

The Cymbals.—Employed usually for fantastic or characteristic effects. They have a sharp, penetrating, almost shrieking tone if struck with a wooden hammer, of good effect for dramatic climaxes.

The Tam-Tam.—Used forte, this has a terrifying tone, useful in characterizing scenes or conditions of horror, terror, or wildness. In piano it suggests dire prophecy or mystery.

Instrumental Combinations. Every resonant body employed by a composer is a musical instrument. The following groups may be noted:

- **Stringed Instruments**
  - Tones produced by use of a bow
    - Violin
    - Viola
    - Violoncello
    - Double Bass
  - Played by hand
    - Harp
    - Guitar
    - Mandolin
  - Played with keys
    - Pianoforte
- **Wind Instruments**
  - Played with reeds
    - Oboe
    - English Horn
    - Bassoon
    - Double Bassoon
    - Clarinet
    - Basset Horn
    - Bass Clarinet
    - Saxophone
  - Played without reeds
    - Piccolo Flute
    - Flute
  - Played with keys
    - Pipe Organ
    - Melodian
    - Concertina
  - Brass instruments played with a mouthpiece
    - Horn
    - Trumpet
    - Cornet
    - Bugle
    - Trombone
    - Ophicleide
    - Bass Tuba
  - Voices of men, women, and children.
- **Percussion Instruments**
  - Of definite sonorousness (pitch)
    - Kettledrum
    - Sets of Bells
    - Glockenspiel
    - Keyed Harmonica
    - Bells
  - Of indefinite sonorousness and producing various characteristic noises
    - Drum
    - Tambourine
    - Cymbal
    - Castanet
    - Triangle
    - Gong
    - Tam-Tam

Instruments often reflect emotional shadings in a very definite manner. A sustained violin tone is much like a major chord in suggesting or reflecting contentment or equanimity. A tone on the English horn approaches the melancholy effect of a minor triad. On the other hand, the general serenity of a major triad may be tinged with the contradictory doubt of sadness reflected by the producing instruments. Thus it is that instruments give color lines against a background of harmonic shading, color within color, as it were, giving music its miniature tints. These few simple illustrations of the elementary musical effects and the conditions they reflect will serve to point the way to the more complex combinations of harmony, rhythm, and instrumental color which faithfully portray the details of a more involved and complicated experience or condition.

DEVELOPMENT OF THE ORCHESTRA

The modern orchestra has developed from a collection of ill-assorted and poorly understood instruments into one large composite instrument of almost infinite possibilities. Its compass reaches from the profoundest depths to the most piercing heights. Its almost exhaustless tonal shades include the various timbres of a vast array of instruments, capable of expressing, either singly or in manifold grouping, every shade of human emotion. It may speak in the faintest whisper or swell to the thunderous power of its combined resources.

The development of the opera in the early 17th century necessitated the extemporization of some sort of orchestra. Whatever instruments were at the time available were made to serve the purpose. Not until Monteverde began to explore the resources and expressional characteristics of each instrument were any definite experiments in instrumental combinations made. He discovered some of the familiar effects now used, such as the tremolo, *pizzicato*, etc., and his discoveries were quickly taken up by his successors.

Gradually composers began to write for small groups of instruments, and it was not long before the orchestra found its way from the playhouse into the church, and thus orchestral accompaniment to the liturgy of the mass came to be evolved. The existing sonata form was the natural one for composers to use in the overtures to their operas, and this soon led to the composition of complete sonatas for the orchestra, independent of the opera. Thus arose our symphony, for a sonata written for the orchestra is a symphony. We find Stammitz, Gossec, Sammartini, and later Haydn, producing their thinly concerted sonatas for the orchestra, and so developing the trend of independent orchestral composition.

Mozart produced many new combinations, and is recognized by many as the father of what we know as tone color. Beethoven's instrumentation did not depend for its effects upon unusual combinations, nor upon unusual instruments. But he did employ the different instrumental groups in conversation, letting a single voice announce the return of the theme, or causing the whole orchestra to rage violently and then stop suddenly to listen to a far-off voice. Weber furthered the art of instrumentation materially by his study of instrumental timbre. The most striking feature in his treatment of the orchestra is the emancipation of the wood-wind choir.

Liszt, Berlioz, and Wagner each lent mighty aid to the development of the orchestral resources, and are the true exponents of the vast color schemes of the modern orchestra. New instruments were introduced, and a richer orchestration with greater variety of color resulted. The English horn, the bass clarinet, the contrabassoon, the trombones, the family of tubas, and the bass trumpet—all contributed innumerable colors to the palettes of modern composers.

We find Richard Strauss, Tchaikovsky, and other modern artists standing upon the vantage ground of these three mighty colorists and ready to avail themselves of the fullest resources of every instrument. Their handling of the orchestra is the natural outgrowth of the researches of Berlioz and Wagner. The former left nothing untouched which pertained to the capacity and expressiveness of any individual instrument, while Wagner developed to an extraordinary degree the use of many voice parts and the colorful and striking combinations of timbres. He completed the group of wood-wind instruments by writing three parts for the flutes, three for the oboes, three for the clarinets (instead of two), by which proceeding he was enabled to obtain a complete chord in one timbre. He distributed the violins into as many as 15 parts. Strauss continues this method of obtaining many parts, using three or four each of the wood winds and subdividing his string section into many parts. He weaves and interweaves them in marvelous contrapuntal labyrinths, rising often to overwhelming crashes of dynamic power. He requires every orchestral player to be a virtuoso. This attitude has been adopted by many of the modern virtuoso writers like Dukas, Rimsky-Korsakov, and others. No concessions are made to the technical difficulties of the instruments.

The development of the modern concert orchestra since the time of Haydn may be visualized briefly as follows:

Haydn	Mozart	Beethoven	R. Wagner	H. Berlioz
Timpani	Violino I	Large Drum	(Lohengrin)	(Tuba mirum. Requiem.)
Trompeten	Violino II	Triangle	3 Large Flutes	3 Flutes
Tromboni	Viola	Cymbals	Piccolo Flute	2 Oboes
Klarinetten	Flutes	Flutes	3 Oboes	2 Clarinets
Corni (Horns)	Oboes	Oboes	English Horn	8 Bassoons
Oboes	Clarinets	Clarinets	3 Clarinets	12 Horns
Flöten	Bassoons	Bassoons	Bass Clarinet	4 Cornets
Fagotte	Horns	Horns	2 Bassoons	4 Trombones
Violino I	Trompets	Trompets	4 Horns	1 Ophicleide
Violino II	Trombones	Timpani	3 Horns on the stage	4 Trompets
Viola	Timpani	Trombones	3 Trompets	4 Trombones
Vocal Parts	Vocal Parts	Violine I	4 Trompets on the stage	4 Trompets
Violoncello	Violoncello	Violine II	3 Trombones	4 Trombones
Organ	Organ	Viola	3 Trombones on the stage	4 Trompets
Contrabasso	Contrabasso	Vocal Parts	Bass Tuba	4 Trombones
		Violoncello	Timpani in the orchestra	4 Ophicleides
(Exceptional)	(Exceptional)	Organ	Timpani on the stage	16 Timpani
Bariton	Piccolo	Basses	Cymbals	1 Bass Drum
Lyra	English Horn		Drums	1 Bass Drum with two drumsticks
English Horn	Bassethorn	(Exceptional)	Violins (divided)	50 Violins
	Contrabassoon	Contrabassoon	Violas	20 Violas
	Harp	English Horn	Organ	70 Sopranos, 60 Tenors, 70 Basses } Vocal Parts
	Glockenspiel	Posthorn	Vocal Parts	
	Large Drum		Harp	18 Violoncellos
	Small Drum		Violoncello	18 Contrabasses
	Triangle		Contrabasses	
	Mandolin			

With the music of Gustav Mahler and Richard Strauss the tendency to write for immense orchestras continued, but with the modernist composers of the 20th century there had been a reaction against mere size and a trend toward employing an instrumentation suited to the nature of the music rather than using instruments merely because they are available. Thus Stravinsky in his most recent works composes often for a relatively small orchestra, and other composers have achieved their most telling effects through judicious restraint and by the selection of smaller combinations which effect an instrumental coloring that best expresses the peculiar character of various passages.

FAMOUS ORCHESTRAS

In Europe World War II disrupted the music life of many cities and nations and it is difficult to make an accurate list of existing organizations. The following tabulation is therefore perhaps incomplete.

Holland

Amsterdam.—Concertgebouw Orchestra.

Germany
Berlin.—Philharmonisches Orchester.
Dresden.—Orchester der Staatsoper.
Leipzig.—Gewandhauskomzerte.
Munich.—Konzertverein or Philharmoniker.
Bayrisches Staatsorchester.

Austria
Vienna.—Wiener Philharmonische Konzerte.

France
Paris.—Concerts du Conservatoire.
Concerts Colonne.
Concerts Pasdeloup.

Italy
Rome.—Concerti dell Augusteo.

England
London.—Philharmonic Orchestra.
British Broadcasting Company Orchestra.

Russia
Moscow.—State Symphony Orchestra.
Leningrad.—Leningrad Philharmonic.

While in Latin America the only orchestra that dates back to the first decade of the 20th century is the Teatro Colon Orchestra of Buenos Aires, recent years have witnessed the formation of many new organizations. The following list gives the date of founding of each orchestra:

Colombia
Bogota.—Orquestra Sinfónica Nacional (1936).

Argentina
Buenos Aires.—Orquestra del Teatro Colon (1908).

Venezuela
Caracas.—Orquestra Sinfónica (1935).

Guatemala
Orquestra Progesista (1936).

Cuba
Habana.—Orquestra Filharmonica (1924).

Peru
Lima.—Orquestra Sinfónica Nacional (1938).

Mexico
Orquestra Sinfónica de Mexico (1928).

Uruguay
Montevideo.—Orquestra Sinfónica der Servicio Oficial de Dufusión Radio Electrica (1931).

Brazil
Rio de Janeiro.—Orquestra del Teatro Municipal (1940).
Orquestra Brasileira (1940).

Chile
Santiago.—Orquestra Sinfónica de Chile (1922).

The major symphony orchestras of the United States are the finest in the world and are supported for the most part by a combination of paid subscriptions and admissions and by contributions from philanthropists. In many cases payment for radio broadcasting has added materially to the income of symphony societies. During the season of 1944–45, 18 of the major orchestras of the country played a total of 1479 public concerts to a total attendance of 3,473,628 persons. The gross operating expenses of the combined orchestras was $5,558,589, and the income from admissions and radio broadcasting privileges was $3,827,639. Philanthropists donated $1,758,502, which yielded a combined surplus of $27,552. Some of the orchestras enjoyed state or municipal grants, but none of them received a subsidy from the Federal government. In 1945–46. 23 major orchestras of the United States and Canada gave a total of 1812 concerts to nearly 5,000,000 people. The combined financial statements of 22 of them showed earned income of $5,049,117.90 and operating expenses of $7,458,875.34. The operative deficit of $2,409,757.44 was again met by contributions.

The following list includes orchestras which had a budget of $100,000 or over in the season of 1944–45, with dates of founding:

Baltimore.—Baltimore Symphony Orchestra (1917).
Boston.—Boston Symphony Orchestra (1881).
Buffalo.—Buffalo Symphony Orchestra (1928).
Chicago.—Chicago Symphony Orchestra (1891).
Cincinnati.—Cincinnati Symphony Orchestra (1895).
Cleveland.—Cleveland Orchestra (1918).
Denver.—Denver Symphony Orchestra (1933).
Detroit.—Detroit Symphony Orchestra (1914).
Houston.—Houston Symphony Orchestra (1913).
Indianapolis.—Indianapolis Symphony Orchestra (1930).
Kansas City.—Kansas City Philharmonic (1933).
Los Angeles.—Philharmonic Orchestra (1919).
Minneapolis.—Minneapolis Symphony Orchestra (1903).
New Orleans.—New Orleans Symphony Orchestra (1935).
New York.—Philharmonic-Symphony Society (1842).
Oklahoma City.—Oklahoma Symphony Orchestra (1937).
Philadelphia.—Philadelphia Orchestra (1900).
Pittsburgh.—Pittsburgh Symphony Orchestra (1927).
Rochester.—Rochester Philharmonic (1923).
St. Louis.—St. Louis Symphony Orchestra (1880).
San Antonio.—Symphony Society (1939).
San Francisco.—San Francisco Symphony Orchestra (1910).
Washington.—National Symphony Orchestra (1931).

INSTRUMENTS OF THE MILITARY BAND

Although most of the instruments used in a military band are found also in the orchestra, and so have already been discussed, yet it should be borne in mind that some groups are treated in a radically different manner in the band than in the orchestra. Very proficient artists are required for the wood-wind and the brass instruments in the concert orchestra, where tone quality and careful execution are highly essential. In the military band this is not so great a requisite. Inasmuch as the band usually plays in the open air, the effects to be attained are more in the nature of a bright, sonorous, and purely sensual musical beauty than fine *nuances*, tone quality, exquisite phrasing, carefully weighed contrasts, and dynamic balance.

The Piccolo Flute. This instrument has a wider application than in the orchestra. In march music it is common practice to employ the shrill little instrument in unison with or an octave above the E flat clarinet. If two are used, they are apt to play in thirds or sixths, or possibly in unison.

The Flute. In compositions written for concert purposes the flute is more apt to appear than in works of a military character. There are usually two parts for flutes in such compositions.

The Clarinets. These instruments constitute the most important group used in military music. In the military band they occupy the same position as the violins in the orchestra. The following kinds of clarinets are used:

The *E Flat Clarinet*, the *B Flat Clarinet*, and the *Alto Clarinets in F and in E flat.*

The Oboe. This instrument is employed precisely as in the orchestra.

The Bassoon. It is customary to write for two bassoons, although more may be used if it is the desire of the composer to strengthen the basses or to take over parts similar to those of the viola or cello. The treatment of the bassoon in the band is much the same as in the orchestra.

The Contrabassoon. This instrument is seldom found in the military band. The *Tritonicon*, or metal contrabassoon in E flat, is often found in the military music of Austria, Russia, Holland, etc.

The Horn. A very important factor in good military music. From two to four horns are used, commonly in rhythmical accompaniments, or for sustained chord tones.

The Trumpet. Only the chromatic trumpet is used in military music. There are generally several parts written for the trumpet, the first of which takes the solo passages of this group, also counter melodies or fanfares.

The Piccolo Cornet in E Flat. This instrument takes in the brasses a position analogous to that occupied by the piccolo flute in the wood section of the military band.

The Cornet (a Pistons). The cornet plays a most important part in most military music, and is often assigned the most beautiful solo melodies, cavatinas, variations with double and triple tonguing, etc. In the brass band, together with the flügelhorn, it is the chief melody carrier. There are generally two parts written for the cornet, both in B flat.

The Flügelhorn.—An instrument of a trifle larger construction than the cornet, its tone, therefore, fuller and more sonorous. Its tone quality is sympathetic, soft, and rich, and adapts itself splendidly to the execution of broad, earnest, religious melodies. The tonal attack is more difficult than upon the cornet, therefore it should not be given passages requiring lip execution. Like the cornet, it is generally in B flat, and has two, sometimes three, parts written for it. The first part takes the melody in conjunction or alternating with the solo trumpet, or with the cornet. Parts 2 and 3 take the accompaniment or passages moving in thirds, sixths, or octaves, with the melody. In some rapid and difficult passages it is customary to let the instruments alternate in taking the short groups or motives comprising the passage.

The Alto Cornet or **Alto Horn.** Used in cavalry bands in place of the horns, often also in other band organizations. Its parts are written in the treble clef, and cover a range intermediate between the flügelhorns and the tenor horns. There are generally two parts, the principal function of which is to produce the accompanying harmonies, together with the second tenor horn and possibly the E flat trumpets 3 and 4. It is, however, capable of a fine, rich, penetrating tone for melodies in the lower registers, or for the support of the same. The alto horn is an E flat instrument.

The Tenor Horn in B Flat. This is a most important instrument for both brass and military bands, and sounds one octave lower than the flügelhorn or cornet. Two parts are usual: the first serves for strengthening the melody of the cornets or the basses, or for counter melodies; the second takes the accompaniment. In bass melodies, or in the upward continuation of passages which are too high for the basses, the tenor horn may play in unison with the first part.

The Baritone (Euphonium or Euphonion). This instrument is a sort of tenor horn of larger structure, has the same register as the latter, but possesses a fuller, more sonorous, and more powerful tone, especially in the depths. It is notated in the bass clef, and has a function analogous to the cello of the orchestra. Its tone is always to be heard clearly above a mass of instruments; therefore it is essential that only independent parts and passages be assigned to it.

The Trombone. Used almost as in the orchestra. There are generally three trombone parts, which take sustained tones, or expressive, majestic, or religious song passages, etc. The first trombone is used as a solo instrument. For triumphal marches, or any music of a warlike character, the trombones are of powerful effect. However, the piano tones of the trombones are also very beautiful.

The Saxophone. There is a choice among six of these instruments, differing in size and register, but quite alike in tone quality: (1) high soprano, in E flat; (2) soprano, in B flat; (3) alto, F or E flat; (4) tenor, C or B flat; (5) baritone, E flat; (6) bass, B flat. These are all alike available for military music, although composers generally use only the soprano B flat, alto E flat, tenor B flat, and baritone E flat.

The Bass Tuba. There are several bass tubas in use,—in F, E flat, C, and B flat. Passages of any degree of rapidity should not be assigned to this powerful instrument, for a clear execution of such passages would require an artist.

The *Helikon* or *Contrabass Tuba* is a bass instrument like the bass tuba, but it has a full, soft, agreeable, although powerful tone, for which reason it is often given the preference over the former. There are helikons in F, E flat, C, and B flat.

The Percussion Instruments. All the instruments of this group already mentioned in the orchestra may be used with similar results in military music. They form a characteristic and indispensable expressional factor in martial music, and are therefore more likely to be found in military music than in symphonic.

The Instrumental Groups in Military Music

Instruments of a soft, gentle, sympathetic yet sonorous timbre.—

High register	The large Flute
Middle register	Flügelhorn, Horn, Alto Horn, Tenor Horn, Baritone, Saxophone

Instruments of a bright, sharp, brilliant, penetrating timbre.—

High register	The Piccolo Flute
High and middle register	The Clarinet
Middle register	Cornet, Trumpet
Middle and lower register	Trombone
Lowest register	Bass

Instruments of a whining, nasal timbre.—

High register	Oboe
Lower register	Bassoon

The Instrumental Groups in Brass Bands

The brass instruments are divided into following groups:

Instruments of a bright, sharp, brilliant, penetrating timbre.—

Piccolo Cornet
Soprano Cornet
Trumpet
Trombone
Bass

Instruments of a softer, more sympathetic timbre.—

Flügelhorn
Horn
Alto Horn
Tenor Horn
Baritone

Instruments of a soft, mellow, yet sonorous timbre.—

Saxophone quartet

Arranging Music for Bands. In arrangements of orchestral music for military or brass band, the following general suggestions may be of value.

For Military Band.—The first violins are represented by the first clarinets; the second violins, by the second clarinets; the violas, by the alto and tenor horns; the violoncellos, by the baritones (or tenor tubas); the bass violins, by the tubas or helikons.

For Brass Band.—The first violins are represented by the piccolo cornets, the first cornets, and the first flügelhorns; the second violins, by the second cornets and second flügelhorns; the violas, by the alto horns and tenor horns; the violoncellos, by the baritones or tenor tubas; the bass violins, by the bass tubas or helikons.

The flutes, horns, trumpets, trombones, and the percussion group nearly always retain the same parts which they have in the original orchestra score.

ELECTRONIC INSTRUMENTS

Although little change has been made in the basic construction of traditional musical instruments for almost a century, a new class of instruments has been developed in the electrical age which may prove important in revolutionizing the production and transmission of music. The familiar older instruments operate on mechanical principles; in other words, the vibrations of their strings or air columns are produced by striking a key, by bowing, by blowing, or, in the case of the pipe organ, by bellows. The sounds produced by these vibrations are then amplified mechanically by sounding boards and resonators. The modern electronic instruments amplify sounds, not with the aid of sounding boards, but by means of electrical devices similar to those used in radio receivers. In some of them the tones do not originate as vibrations of matter but as electrical impulses.

In all of the electronic instruments, electricity is the primary factor, either in amplifying the tone or in actually producing the vibrations. One type of instruments may be termed semi-electronic, for in these the actual vibrations are produced mechanically, generally by strings or reeds, and are then transformed into electrical oscillations which are made audible and are amplified by electric loudspeakers. Thus the electronic piano uses strings and an accustomed piano action and hammers, but no sounding board. The string vibrations are converted into electrical impulses by either electromagnetic or electrostatic systems. In the electromagnetic types a small coil with a magnetic core is placed near the string. The vibrations of the string generate an alternating current in the coil. These are amplified and converted into sound waves by a loud speaker. In the electrostatic type the string itself is charged with electricity. As the string vibrates an alternating current is generated between the string and a nearby conductor. This current is then amplified and made into sound waves as in the electromagnetic type. The amplification of vibrations in both systems makes it possible to produce a great volume of tone and also to determine its quality and timbre. By controlling, altering, and even omitting overtones, the piano may be made to sound like an organ, or a string or wind instrument. The duration of tone may be prolonged and the percussive sound of the striking hammer may be blocked out altogether. The electronic pianos that have been developed include one invented by Benjamin F. Miessner; the *Neo-Bechstein*, invented by W. Nernst of Berlin; and the *Elektrochord*, invented by H. Vierling.

Up to the present time electronic organs have had a wider commercial use than electronic pianos. These organs require far less space than large pipe organs, and are convenient in providing organ music in places where the installation of a large instrument would be impractical. Electronic organs are widely used in radio stations and in studios. Some of the electric organs operate on the electrostatic system used by the electronic pianos, in which the initial vibrations are produced by reeds and are then converted into electric impulses. Some of the organs, notably the *Hammond Organ*, eliminate vibrating reeds or pipes altogether and produce vibrations by means of rotating discs about the size of a silver dollar. Each of these discs has a number of humps which pass a magnet at regular intervals and induce an alternating current in the coil at a frequency to produce the desired number of vibrations per second. Harmonic controls vary the tone quality to correspond with the various stops on the pipe organ, and the volume of tone is regulated by the amplifiers.

In the *Novachord*, another instrument developed by the Hammond Instrument Company, the vibrations are produced by vacuum tube oscillators. Twelve of these produce the twelve tones of the diatonic scale at the highest octave of the instrument's range. Connected with each oscillator are five divider tubes which operate at one-half the frequency of each adjoining divider. In this manner the oscillator and the five dividers provide six octaves for each tone of the scale. The harmonic controls of the Novachord enable it to imitate the tones of a variety of instruments. The *Solovox* is a Hammond instrument which operates on a basis similar to the Novachord, with one master oscillator and five dividers. The pitch of the oscillator is not fixed but is tuned by the keys of a three octave keyboard which is fastened to the keyboard of an ordinary piano. With the aid of harmonic controls the Solovox produces the tones of a variety of instruments, and the player may perform a solo part with one hand on the Solovox while he accompanies it with the other on the piano.

Electronic principles have been applied to bowed instruments. In these there remain fingerboard, strings, and bridge, to which is attached an electrostatic pick-up. Amplifiers and loud speakers are housed in separate cabinets. The steel guitar which appears in dance orchestras uses a pick-up system and separate amplifiers.

Another type of electronic instrument which is played, not by means of a keyboard, or bow, but by a player who does not even touch the instrument, is the *Theremin*, invented in 1920 by the Russian, Leon Theremin. In appearance the Theremin looks like a radio receiving set. An upright rod, or antenna, projects from a corner of a cabinet and a metal loop extends horizontally from the side. Sound vibrations are produced by two high-frequency electric circuits which use oscillating radio tubes. The frequency of one circuit is constant and the other is varied by movements of the player's right hand in front of the antenna. As the hand nears the rod, the pitch of the tone is raised; as it draws away the pitch is lowered. Within a range of three feet the right hand of the player may produce a tonal range of six octaves, including not only the half tones of the diatonic scale, but smaller divisions (quarter tones, etc.) as well. By means of harmonic controls the quality of tone may be regulated so that it sounds like the human voice, or like any of a number of instruments. The volume is regulated either by a switch which sets the volume level or by the movement of the player's left hand over the loop at the side of the instrument. When the hand is moved away from the loop the volume is increased; as it nears the loop the tone becomes softer. Modern composers have been interested in composing music for both a solo Theremin and for a group of the instruments. Among them was Joseph Schillinger, with his "First Airphonic Suite."

Benjamin Miessner, inventor of the Miessner electronic piano, has experimented also with electronic wind instruments and has devised clarinets and saxophones which use an electrostatic pick-up system and amplification. He has also invented a chromatic kettledrum in which the vibrations of thirteen bass viol strings are picked up and amplified. The tones of bells and chimes are likewise produced by electronic instruments. Coiled steel reeds produce vibrations which are amplified to volumes equalling the tone of massive bells. Other types of electronic chimes use strings of piano wire.

DICTIONARY OF MUSICAL TERMS

NOTE:—The references in the following definitions, such as "see Musical Form," etc., are to preceding chapters in the text.

A cappella (It.) (*ä-käp-pĕl'lä*). Music written for the "chapel choir;" choral music without instrumental accompaniment.

Accelerando (It.) (*ät-shĕl'ĕr-än'dō*). Accelerating; increasing the speed.

Accent. The stress or emphasis given to one tone over another. Regular (primary) accent falls on the first beat of a measure; secondary accents fall on the third beat of a 4-4 measure, and in compound meters on the 4th beat of 6-4, the 4th and 7th beats of 9-8, etc. etc. Irregular accents are those which fall on normally weak beats.

Accidentals. Signs of chromatic alteration (sharps, flats, naturals) affecting single notes within a measure, as opposed to those given in the key signature of a composition.

Accompaniment. Secondary instrumental or vocal part providing a background for the principal part. It may be either the secondary part of a piece written for a single instrument (piano or organ) or it may be performed by a pianist, organist, orchestra, or chorus in support of a soloist (singer, violinist, etc.) or of a group of soloists.

Acoustics. The science which deals with the production, transmission, and effects of sound. See *Musical Acoustics.*

Adagio (It.) (*ä-dä'jō*). Slow; quicker than *largo* but slower than *andante.*

Ad libitum (Latin) (*ăd lĭb'ĭ-tŭm*). At the pleasure of the performer with regard to time and expression; also, the part so marked may be omitted.

Affabile (It.) (*äf-fä'bē-lĕ*). Affable. *Affabilmente.* Affably.

Affettuoso (It.) (*äf'fĕt-twō'sō*). Affectionate. *Affettuosamente.* Affectionately; with warmth.

Agitato (It.) (*ä'jē-tä'tō*). Agitated; in a hurried, restless manner.

Air. A melody, or tune. French 18th century term for song in general. In 17th–18th century French opera and ballet, an instrumental or vocal piece intended to accompany dancing. In 17th and 18th century suites, a movement of a melodic rather than a dance-like character.

Alla breve (It.) (*äl'lä brā'vĕ*). A tempo mark indicating quick duple time, in which the half note in 4-4 rhythm is regarded as the unit of time, rather than the quarter note.

Allargando (It.) (*äl'lär-gän'dō*). Gradually slower, louder, and broader.

Allegretto (It.) (*äl'lā-grät'tō*). Diminutive of Allegro. Quicker than andante and slower than allegro.

Allegro (Fr. and It.) (*äl-lā'grō*). Quick, brisk, lively.

Alto (It.) A woman's voice of low range. The second-highest part of a four-part chorus. A tenor violin, or viola.

Andante (It.) (*än-dän'tĕ*). Literally, "going"; moderately slow, but flowing easily; often qualified by other words, as, *con moto, largo, maestoso.*

Andantino (It.) (*än-dän-tē'nō*). Diminutive of andante, used most often to designate a short piece of andante tempo. As a tempo mark, it indicates a slight modification of andante, generally a little quicker than andante.

Animato (It.) (*ä'nē-mä'tō*). Animated; spirited.

Anthem. A choral composition for use in church services, with or without accompaniment.

A poco (It.) (*ä pō'kō*). By degrees; gradually.

A poco a poco (It.) (*ä pō'kō ä pō'kō*). Little by little.

Appassionato (It.) (*äp-päs'syō-nä'tō*). Impassioned; passionate. *Appassionatamente.* Passionately; with intense feeling.

Appoggiatura (It.) (*äp-pŏd'jä-tōō'rä*). Literally, a "leaning note"; a discordant, accessory note, placed before a principal note. If it is marked with a diagonal line through the stem and hook, it is called *short* and is played with the least possible duration; if it is without a diagonal line, it is called *long* and has definite time value as indicated.

Aria (It.) (*ä'rē-ä*). Literally an air or melody. Generally used to denote an extended, elaborate vocal solo with instrumental accompaniment, in an opera or oratorio. See *Musical Form.*

Arietta (It.) A small aria.

Arioso (It.) (*ä-rē-ō'sō*). A style in vocal music halfway between the aria and the recitative; also, a short melodic passage interrupting or ending a recitative.

Arpeggio (It.) (*är-pād'jō*). Playing the notes of a chord in harp style, that is in succession instead of simultaneously; marked with a wavy line before the chord.

Assai (It.) (*äs-sī'*). Very, as allegro assai, very quick.

A tempo (It.) (*ä tĕm'pō*). In time; a term used to indicate a return to the regular tempo after some deviation from it.

Attacca, sometimes **attacca subito** (It.) Literally, attach, but used to indicate, at the end of a movement, that the next movement should follow without pause.

Aubade. Morning music, in contrast to Serenade, or evening music. See *Musical Form.*

Augmentation. Introducing a theme written in notes having double the value given them at their first appearance. Opposite of *Diminution.*

Authentic Cadence. See definition of *Cadence.*

Auxiliary Notes. Usually *grace* notes one degree above or below the principal or harmonic note.

Ballad. Originally a song in dance rhythm, accompanied by dancing; now any simple, romantic, narrative, or descriptive song; instrumental music in ballad style.

Ballade. A form of poetry and music used by the Trouvères. See *History of Music* (*Secular Music of the Middle Ages*). In German usage the term indicates poems derived from English ballads. Chopin and Brahms used the term for piano pieces in which the contrasting themes were alternately dramatic and lyrical in character.

Band. A group of instrumental performers playing together; as, a brass band, a military band, or a string band.

Bar. A line drawn vertically across the staff to divide it into measures; a measure is commonly but incorrectly spoken of as a bar. See *Musical Notation.*

Baritone. A male voice intermediate between bass and tenor; also applied to any musical instrument between bass and tenor.

Bass. The lowest part in a musical composition; the lowest male voice; the lowest of a family of instruments. *Continued or figured B.* Bass notes provided with figures indicating chords to be filled in by the performer. *Ground B.* or *Basso ostinato.* A continually repeated bass phrase.

Baton (Fr.) (*bà'tôN'*). The stick used by a leader in beating time.

Beat. Each movement of a conductor's hand or baton, indicating rhythm; each unit division of a measure with reference to accent; a musical embellishment resembling a short trill; the throb heard when two discordant tones are sounded. See *Musical Acoustics.*

Berceuse (Fr.) (*bĕr'sûz'*). A cradle song; an instrumental composition in cradle song style.

Binary Form. The form of a movement having two themes or sections. See *Musical Form.*

Bolero (Sp.) (*bō-lā'rō*). A Spanish dance in triple rhythm accompanied by castanets.

Bowing. The art and the act of managing the bow; the proper manner of using the bow, indicated by certain marks: ⌐ for *down bow;* ∧ for *up bow;* two dots over a note for *spiccato* or *bounding bow.*

Brace. A curved or straight line used to connect two or more staves; the leather slide on a drum chord for tightening the heads.

Bravura, con (It.) (*brä-vōō'rä, kōn*). With boldness and dash.

Broken Chords. Chords whose notes are taken successively, or in *arpeggio,* not simultaneously.

Buffa (It.) (*bōōf'fä*). Comic; in the comic style.

Buffo (*bōōf'fō*). The singer of a comic part.

Burden. A refrain or chorus in syllables without meaning; the bass of any composition; the drone of a bagpipe.

Cadence (*kā'dĕns*). A melodic or harmonic progression which gives the impression of temporary or permanent conclusion. *Perfect C.* A closing group in which the melody returns to an ends with the tonic. *Imperfect C.* One ending on the tonic chord, but with the third or fifth tone of the chord in the soprano, or upper, part. *Authentic C.* The perfect cadence in which the final tonic chord is preceded by the dominant. *Plagal C.* The perfect cadence in which the final tonic is preceded by the subdominant chord. *Half* or *Semi C.* One in which a transposition to the dominant or subdominant is effected. *Deceptive C.* A cadence composed of the chords on the fifth and sixth steps. The dominant chord suggests its natural progression into the tonic, but

moves into the chord on the sixth step instead, hence its name.

Cadenza (It.) (*kä-dĕnt'sä*). A florid ornamental passage inserted near the end of a composition, particularly in a concerto, and intended chiefly to exhibit the virtuosity of a soloist.

Calando (It.) Decrease in loudness, and slacken tempo.

Canceling Sign. The natural sign (♮), used to remove the effect of a previous sharp or flat sign.

Canon. Literally, a rule or standard. A contrapuntal composition in which the melody is taken by the leading voice, and then taken up in turn by the second, third, and fourth voices at intervals of a definite number of beats or measures.

Cantabile (It.) (*kän-tä'bē-lĕ*). Melodious; lyrical; in singing style.

Cantata (It.) (*kän-tä'tä*). Originally a vocal piece, in contradistinction to a *sonata* or an instrumental piece; now a large choral work, resembling an oratorio, if sacred, or a lyric opera, if secular, but shorter than either of these.

Canticle. A hymn with non-metrical words taken from the Bible, used in some churches.

Canto (It.) (*kän'tō*). Song; melody; that part in a choral work which carries the melody; now the soprano, formerly the tenor.

Cantor (Latin) (*kän'tŏr*). A singer; a precentor.

Cantus firmus (Latin). A fixed or given melody which is made the basis of a contrapuntal composition or exercise.

Canzona (It.) (*kän-tsō'nä*), **Canzone** (It.) (*kän-tsō'nĕ*). A form of Italian lyric poetry corresponding to the ode; such a poem set to music, resembling a madrigal but simpler; a similar instrumental piece. **Canzonnet(te).** A little song.

Capo (It.) (*kä'pō*). Head; beginning; the top. See *Da Capo.*

Capriccio. A short composition, irregular in form, free and unconventional in style.

Carillon (Fr.) (*kăr'ĭ-lŏn*; *kä'rē'yôN'*). A set of bells upon which a melody can be played; an instrumental piece in the style of carillon music.

Carol. A song of joy sung principally at Christmas and Easter; formerly, a dance accompanied by song.

Catch. A round for three or four voices, in which each singer in turn "catches" up the melody; later usually with comic effect.

Cavatina (It.) (*kä'vä-tē'nä*). A solo song, shorter than an aria and without repetition of words or phrases; an instrumental piece of song-like character.

Chaconne (Fr.) (*shà'kôn'*). Originally a Spanish or Moorish dance; an instrumental composition in the form of variations, written over a ground-bass, in 3-4 rhythm and in slow tempo. See *Musical Form.*

Chamber Music. Any music suitable for a small hall, as distinct from music best adapted for a large auditorium; instrumental music in the sonata form, for a small group of string or wood-wind instruments, with or without piano.

Chanson (Fr.) (*shäN'sôN'*). A song; a vocal solo with piano accompaniment; formerly, a ballad.

Chant (n.). A sacred song, usually in four parts, having nonmetrical biblical words, the oldest form of choral music; a song resembling a chant; (v.) to sing or recite in a chantlike manner; to intone.

Chime (n.). A set of bells tuned to a musical scale; music played upon a set of bells; music or melody.

Choir. A group of singers, usually connected with a church; that part of a church edifice set apart for the singers; applied also to the main divisions of the orchestra —strings, wood-wind, brass, percussion.

Choir Organ. In a large pipe organ, that group of pipes and the corresponding manual having a soft tone and therefore suitable for the accompaniment of vocal music.

Choral. Pertaining to a chorus or to a concerted vocal composition; suitable for singing. *Choral Service.* A service in which the liturgy is sung by the clergy, choir, or congregation.

Chorale (Ger.) (*kō-räl'*). Psalm or hymn tune; a form of sacred song introduced by Luther.

Chord. A combination of more than two tones, or any rearrangement of the tones so associated. *Common C.* A chord consisting of a fundamental tone together with its third and fifth. *Dominant C.* A chord founded upon the dominant of the key in which a musical composition is written; the leading or characteristic chord. *Fundamental C.* Same as common chord. *Inverted C.* A chord whose lowest tone is some other than the fundamental or root.

Chorus. A group of singers; a choir; a composition intended for a chorus; a refrain.

Chromatic. Derived from a Greek word meaning color; progression by semitones; any scale, chord, or music, containing tones which do not belong to the diatonic scale.

Chromatic Scale. A scale which proceeds by half steps or semitones.

Chromatic Signs. Marks used in musical notation to indicate that a note should be played a semitone higher or lower than as written. These marks are: the sharp, (♯); the flat, (♭); the natural, (♮); the double sharp, (𝄪); and the double flat, (𝄫).

Clef. A character used in modern musical notation to indicate the position of the scale upon a staff. See *Musical Notation.*

Close Harmony. Harmony in which the three upper of four parts fall within an octave; opposed to *open* or *dispersed harmony*, in which one or more parts, if transposed an octave, would fall between two others.

Coda (It.) (*kō'dä*). A "tail"; formerly a few chords at the close of a composition; Beethoven developed it into a general summing up of the movement or composition; the final episode of a fugue.

Coll' arco (It.) (*kōl-lär'kō*). With the bow; a direction that the notes should be played with the bow and not *pizzicato.*

Colla voce (It.) (*kōl'lä vō'chĕ*). With the voice; a direction that the accompaniment shall be accommodated to the tempo of the singer.

Colorature (*kŏl'ō-rä-tûr*). Florid ornaments; in vocal music, brilliant vocalization.

Comma (It.) (*kŏm'mä*). The minutest difference in pitch recognizable by the ear; one-ninth of a whole step; the difference between, for example, true D♯ and true E♭; a sign (,) used as a breathing mark in vocal music.

Common Time. Four-four time, four quarter notes or their equivalent to a measure.

Compass. The range of a voice or of a musical instrument.

Composition. A musical work; the act and the art of writing original music.

Compound Intervals. Intervals which extend beyond an octave.

Compound Rhythms. Those composed of two or more simple times; for example, 6-8 time which may be treated as two 3-8 measures.

Con- (It.). A prefix meaning with.

Concert. A public performance of music, in which a number of singers or instrumentalists, or both, take part; a group of instruments of the same kind but differing in size.

Concertmeister (Ger.) (*kŏn-tsĕrt'mīs'tĕr*). Concert master; the leader of the first violins, who is next in rank to the conductor.

Concerto (It.) (*kŏn-chĕr'tō*). An extended work for solo instrument, generally with orchestral accompaniment. See *Musical Form.*

Conductor. The leader or director of an orchestra or a chorus.

Consecutive Intervals. The progression of two or more parts in parallel sequence. *C. fifths.* The progression of two or more parts at a distance of a fifth from one another; forbidden in strict harmony.

Console. The case containing the keyboard, pedals, and stops, of a pipe organ; often placed at some distance from the organ pipes.

Consonance. A combination of sounds which is agreeable and restful; the opposite to a discord or dissonance. *Perfect C.* An octave, a fifth, or a fourth. *Imperfect C.* Major and minor thirds and sixths.

Continued Bass. See *Bass.*

Contra- (It.) (*kŏn'trä-*). A prefix meaning an octave below.

Contrabass (It.) (*kŏn'trä-bās'*). The lowest bass in a family of instruments.

Contralto (It.) (*kŏn-träl'tō*; *kŏn-träl'tō*). The deepest female voice; the word means lower than alto (high), but it is now used as synonymous with alto.

Contrapuntal. Pertaining to *counterpoint.*

Contrary Motion. A passage in which one part ascends while the other descends. The opposite of *Parallel M.*

Counterpoint. Literally, point against point, actually the art of adding one or more melodies to a given melody. See *History of Music* and *Musical Form.*

Countersubject. The principal counterpoint in a fugue.

Countertenor. High tenor; the highest male voice.

Country-Dance. *Contre-danse* (Fr.); *Contradanza* (It.). A rural dance, of English origin, in which two lines of dancers facing each other perform various figures.

Courante (Fr.) (*kōō'rănt'*). "Running"; a dance of French origin in triple time; the second part in the old *suites des danses*. See *Musical Form*.

Crescendo (It.) (*krĕ-shĕn'dō*). Increasing in loudness; often indicated by the sign

Cross Relation. See *False Relation*.

Cyclic, cyclical. Denoting the musical forms which include several movements; compositions in cyclic form are generally sonatas and symphonies in which the same thematic material is used in all or several of the movements. See *Musical Form*.

Czardas (*chär'dăsh*). A Hungarian national dance.

Da capo (It.) (*dä kä'pō*). A direction to repeat from the beginning.

Da capo al fine (It.) (*dä kä'pō äl fē'nĕ*). Repeat from the beginning and end at the mark *Fine*.

Da capo al segno (It.) (*dä kä'pō äl sä'nyō*). Repeat from the beginning and play to the sign ⊕.

Dal segno (It.) (*däl sä'nyō*). Repeat from the sign 𝄋.

D. C. The abbreviation for *Da capo*.

Début (Fr.) (*dā'bū'*). The first appearance of a performer; the beginning of a career.

Decrescendo (It.) (*dĕ'krä-shĕn'dō*). Gradually diminishing in loudness; often marked with the sign

Degree. A line or a space of the staff; one of the 8 tones in a major or minor diatonic scale.

Deliberato (It.) (*dĕ-lĕ'bĕ-rä'tō*). Deliberate. *Deliberatamente*. Deliberately.

Descant (Sometimes **Discant**). The earliest attempt at polyphony with contrary, rather than parallel, motion in the parts; the highest part in part-music.

Development. The elaboration of a theme or musical idea by working out melodic, harmonic, or rhythmic changes; the part of a composition in which this is done.

Diapason (Eng.) (*dī'ă-pā'zŏn*). The interval of an octave; the consonance of that interval; the range of a voice or an instrument; a recognized standard of pitch; a rule or scale used by makers of wind instruments to determine the pitch beforehand; a class of fundamental organ stops, also called *principal*.

Diatonic. Pertaining to the tones of the major or minor scale. *D. Interval*. One formed by two tones of the major or minor scale. *D. Harmony* or *Melody*. Those formed by the tones of a single major or minor scale. *D. Progression*. A stepwise progression to an adjacent tone of a single major or minor scale.

Diminished. *D. Interval*. A perfect or minor interval contracted by a semitone. *D. Chord*. One in which the highest and lowest tones form a diminished interval.

Diminuendo (It.) (*dē-mēn'ōō-ĕn'dō*). Diminishing gradually in loudness.

Diminution. The repetition of a theme or melodic passage in notes of smaller time-value (1-2, 1-3, or 1-4 that of the original). Opposite of *Augmentation*.

Discord, Dissonance. Technically, a combination of tones so far related from each other that they produce acoustical beats. Commonly, a combination of tones which requires resolution. Opposite of *Consonance*.

Divertimento (It.) (*dē-vĕr'tē-mān'tō*). A musical diversion; a kind of diminutive symphony; a short selection introduced between the acts or at the conclusion of an opera; a potpourri of airs, from an opera or other large composition, arranged for orchestra or piano.

Divisi (It.) (*dē-vē'zē*). Divided. A direction indicating that two parts written on the same staff of a score are to be played by two groups of the instruments playing from that staff. A return to all instruments of the group playing the same notes, or in unison, is indicated by *a due*, or *a2*.

Dolce (It.) (*dōl'chĕ*). Sweet, soft. *Dolcemente*. Sweetly, softly.

Dominant. The fifth tone in the major or minor scale. *D. Triad*. One having the dominant as its root. *D. Chord*. The dominant triad, or the 7th, 9th, etc. chords, each having the dominant as its root.

Doppio (It.) (*dŏp'pē-ō*). Double. *D. Movimento*, twice as fast.

Dot. A point placed after a note, the effect of which is to increase the length of the note by one-half.

Double Stop. In violin playing, stopping two strings at once, and obtaining two part harmony.

Doxology. A hymn of praise to God, used in Christian worship.

Drone. The largest pipe of the bagpipe, sounding only one note, which serves as a bass for every tune. *Drone bass*, a bass on the tonic, or tonic and dominant, which persists throughout a movement, as in the *musette*.

Duet. A composition for two voices, or for two instruments of the same kind, the two parts being of equal importance; a composition for two performers on one piano.

Dur (Ger.) (*dōōr*). German for major, referring to keys; the German for minor is *moll*.

Dynamics. That part of musical science which deals with differences and contrasts in loudness of tones.

Eighth. The eighth note of the diatonic scale. *Eighth note*. A note whose value is one-eighth that of a whole note.

Elegante (It.) (*ĕl-ĕ-gän'tĕ*). Elegant, graceful. *Elegantemente*. Elegantly, gracefully.

Encore (Fr.) (*äN'kôr'*). Again; a demand for the reappearance of a performer, as by applause; the performance given in response to such a demand.

Energico (It.) (*ĕn-ĕr'jē-kō*). Energetic, vigorous. *Energicamente*. Energetically, vigorously.

Enharmonic. *E. Tones*. Those which are of the same pitch on tempered instruments, but which are actually of different pitch in notation and in the natural scale, as C♯ and D♭, F♯ and G♯, etc. *E. Chords*. Those which are alike in pitch on tempered instruments, but unlike in notation and in the natural scale. *E. Change*. One effected in the harmonic relation of tones and chords by considering them as identical in pitch though unlike in notation. Thus an enharmonic change from the key or tonality of B♭, to A♯ would change the notation but not the pitch in the tempered scale.

Ensemble (Fr.) (*äN'sämN'bl'*). The united performance of voices or instruments or both in rendering a composition.

Episode. An incidental, digressive portion of a composition as contrasted with the themes and their development. See *Musical Form*.

Eroica (It.) (*ĕ-rō'ē-kä*). Heroic.

Erotic (*ē-rŏt'ĭk*). Amorous; in an amorous style.

Espressivo (It.) (*ĕs'prĕs-sē'vō*). Expressive.

Etude (Fr.) (*ā'tüd'*). A study; an exercise in technique. *Etude de Concert*. A difficult composition for concert performance, affording opportunity for technical display.

Expression. Interpreting the meaning and emotional quality of a composition, in rendering it. *Expression Mark*. A sign or word introduced to aid the performer to interpret a composition.

False Accent. An accent removed from the proper beat to another.

False Relation. Any tone of a chord stands in a false relation when its chromatic alteration occurs in a different part in the following chord.

Falsetto (It.) (*fäl-sät'tō*). The false voice, which lies above the natural register; so called because it sounds forced and unnatural.

Fandango (Sp.) (*fän-dăng'gō*). A lively Spanish dance in triple time, of obscure origin, but very old. A composition in the rhythm of this dance.

Fantasia (It.) (*fän'tä-zē'ä*). A composition not in strict form; a medley of well-known airs with florid decorations.

Fermata (It.) (*fĕr-mä'tä*). A pause or hold marked thus, 𝄐.

Fifth. The interval between a fundamental tone and the fifth tone above.

Figuration. Ornamental treatment of a passage.

Figured Bass. See definition of *Bass*.

Finale (It.) (*fē-nä'lē*). The conclusion; the last piece of any act of an opera; the concluding number of a concert; the last movement of a composition in the sonata form.

Fingering. The method or the act of playing with the fingers upon an instrument; the characters, 1, 2, 3, 4, 5, used to indicate correct fingering.

Flat (Ger., b; Fr., bémol; It., bemolle). 1. The symbol (♭) derived from the letter *b*, lowering the pitch of the note before which it is placed a semitone; when occurring in the signature, it affects every note on its line or space. 2. Below the correct pitch; singing or playing "flat." See *Musical Notation*.

Foot. A unit used to designate the pitch of an organ pipe. A pipe two feet long sounds middle C; one four feet

long, the octave below. Applied also to corresponding tones of other instruments,—thus middle C, however produced, is called a two-foot tone.

Form. The pattern or design of a musical composition, which is as essential to good music as a pattern or design is to a piece of architecture or to any other work of art.

Forte (It.) (*fôr'tĕ*). Loud, powerful.

Fortissimo (It.) (*fôr-tĕs'sē-mō*). Very loud.

Forzando (It.) (*fôr-tsän'dō*). Forced; emphasis upon one note or chord; marked ∧ or >.

Fourth. The interval between a fundamental tone and the fourth tone above.

Fugue (*fūg*). A contrapuntal composition which consists of an elaborate interweaving of one or more themes by the different parts at various intervals of pitch. See *Musical Form.*

Fundamental. The lowest element of a tone, the other elements being its harmonics; applied also to the lowest tone of a chord when the chord is founded upon that tone.

Fuoco (It.) (*fwō'kō*). Fire, spirit.

Furioso (It.) (*fōō'rē-ō'sō*). Furious, vehement. *Furiosamente.* Furiously, vehemently.

Galop (Fr.) (*gȧl'ŭp; gȧl'ō*). A quick dance, in 2-4 time; a composition in the rhythm of this dance.

Gavotte (*gȧ-vŏt'*). A French rustic dance in quick common time, introduced at the French court in the 16th century, the step characterized by raising of the feet instead of sliding; a composition in gavotte style. See *Musical Form.*

Gigue (Fr.) (*zhēg*). A jig (from the German *geige*, a "fiddle"); a lively dance.

Giocoso (It.) (*jŏ-kō'sō*). Jocose, sportive. *Giocosamente.* Jocosely, sportively.

Giusto (It.) (*jōōs'tō*). Exact, precise, even, steady.

Glee. A vocal composition of three or more parts, popular in England between 1760 and 1830.

Glissando (It.) (*glĭs-sän'dō*). In a slurring or gliding manner In piano playing a *G*, is a rapid scale-effect accomplished by sliding the thumb, or the thumb and one finger, over the white or black keys.

Grace Note. An ornamental note, not essential to the melody but adding grace to it. It is written small and is not counted as part of the measure. The principal embellishments, consisting of grace notes, now in use are *acciaccatura, appoggiatura, mordent, trill,* and *turn.*

Grave. Slow, solemn.

Grazioso (It.) (*grä'tsĭ-ō'sō*). Graceful. *Graziosomente.* Gracefully.

Gregorian Chant. A style of Church music without definite rhythm, written in one of the eight Church modes or scales, formerly attributed to Pope Gregory. See *History of Music.*

Ground Bass. See definition of *Bass.*

Half Note. A note having half the time value of a whole note and twice that of a quarter note.

Half Rest. A pause equal in duration to a half note.

Harmonic Mark. A sign (0) used in violin and harp music to indicate that certain notes should be played as harmonics; also a diamond headed note, which indicates the point at which the string should be touched to produce the harmonic, placed above the note indicating the open string to be used.

Harmonics. Higher partial tones present in practically every musical sound, which can also be sounded separately upon many musical instruments. See *Musical Acoustics.*

Harmony. The art of combining musical tones into chords and progressions. The term may be distinguished from *Chord* in that a chord is a single combination of tones, while *Harmony* embodies successions of chords and the relationship between them. Harmony differs from *Counterpoint* in that the latter represents the horizontal weaving of different melodies, while in notation Harmony consists of a vertical combination of notes which represent chords.

Hold. A character(⌒) indicating that the duration of a note or rest should be extended. See *Fermata.*

Homophonic. Literally, many-voiced, designating a style of music in which one melody, or part, is supported by chords. Opposite of *Polyphonic,* or many-voiced.

Idyl. A short poem dealing with simple rural life; the musical setting for such a poem.

Impetuoso (It.) (*ĕm-pĕt'ōō-ō'sō*). Impetuous. *Impetuosamente.* Impetuously.

Impresario (It.) (*ĕm'prĕ-sä'rē-ō*). The conductor or manager of an opera or concert company.

Impromptu (Fr.) (*ăN'prôN'tü'*). An extemporaneous composition or one written in free style.

Improvisation. The act and the art of composing and performing music without previous preparation.

Instrumentation. The act or art of composing or arranging music for instruments, especially for the orchestra; orchestration.

Interlude. A short piece played between the acts of a drama, the sections of a cantata, the verses of a song or the parts of a church service.

Intermezzo (It.) (*ēn'tĕr-mĕd'zō*). An interlude; a short movement in the symphony; one of the parts of the old suite.

Interval. The difference in pitch between two tones; called *harmonic* if between two tones sounded together, *melodic* if between two tones sounded in succession. The intervals of the diatonic scale are: do, *unison* or *prime;* do-re, *second;* do-mi, *third;* do-fa, *fourth;* do-sol, *fifth;* do-la, *sixth;* do-si, *seventh;* do-do, *eighth* or *octave.* Of these the unison, fourth, fifth, and octave are classified as *Perfect.* The second, third, sixth, and seventh are *Major* in the major scale. *Minor Intervals.* These are a chromatic half step smaller than major intervals of the same name. *Augmented Intervals* are a chromatic half step larger than perfect and major intervals. *Diminished Intervals* are a chromatic half step smaller than perfect and minor intervals. Intervals not exceeding an octave are called *simple;* those greater than an octave, *compound.*

Intonation. The act and the art of producing tones with the voice or upon a musical instrument. *False intonation,* as applied to pitch. Incorrect intonation. *Just intonation.* Correct intonation.

Introit (Eng.) (*ĭn-trō'ĭt*). "Entrance"; a hymn forming a part of the Communion service of many churches, sung as the priest approaches the altar or the Communion table.

Inversion. The transposition of the notes forming an interval or a fundamental chord. In inversion, the interval of a perfect fifth becomes a perfect forth, e.g. C-G, G-C; a major third becomes a minor sixth, C-E, E-C, etc. An *inverted chord* is one in which the lowest tone is not its root.

Kapellmeister. Originally the director of music for a prince, hence the conductor of the court orchestra and chapel choir. Today the term is used in derogation, and *Kapellmeister* music means formally correct music, but lacking in imagination.

Key. A series of tones forming any major or minor scale, virtually synonymous with *Tonality.* The *Keynote* of a passage is the tonic, or lowest note of the scale, and determines its *key.* Also, the levers on keyboard instruments which manipulate the action, and which cover the side-holes on wind instruments.

Keyboard (Ger., klaviatur; Fr., clavier; It., tastatura). The white and black keys or digitals of the piano or the organ taken together. Large pipe organs have three or four keyboards, also called *manuals.*

Largamente (It.) (*lär'gä-mān'tĕ*). Broadly, nobly.

Larghetto (It.) (*lär-gāt'tō*). The diminutive of *largo;* not quite so slow as *largo.*

Largo (It.) (*lär'gō*). Slow, broad; slower than *adagio,* but not so slow as *grave.*

Leading Tone. The major seventh of any scale.

Ledger or **Leger Lines** (*lĕj'ĕr*). Short lines added above or below the staff to increase its compass.

Legato (It.) (*lĕ-gä'tō*). Smooth and connected: often indicated by a slur or *legato-mark;* the opposite of *staccato. Legatissimo.* The superlative of *legato;* very smooth and connected.

Leitmotif (Ger.) (*līt'mō-tēf'*). A "guiding theme"; a musical figure or melodic phrase, which labels or represents a certain person, situation, or idea in a modern music drama or opera.

Lento (It.) (*lĕn'tō*). Slow; slower than *andante,* but not so slow as *largo. Lentamente.* Slowly.

Libretto (It.) (*lĕ-brät'tō*). Literally *a little book;* the text of an opera or oratorio.

Lied (Ger.) (*lēt*). A song, a lay. *Volkslied.* A folk song. *Kunstlied.* An art song. *Strophenlied.* A song composed of stanzas. *Durchkomponierteslied.* A song treated musically as a whole.

Ligature. A slur; a group of notes sung to one syllable or in one breath, or bowed with one stroke.

Litany. A song of supplication.

Loco (It.) (*lō'kō*). A word canceling the sign *8va* meaning an octave above, and indicating that the notes should be played as written.

Lullaby. A cradle song.

Madrigal. An unaccompanied song, usually a love song, for three or more voices, often six or eight, making use of counterpoint and imitation. See *Musical Form.*

Maestoso (It.) (*mä'ĕs-tō'sō*). Majestic, stately. *Maestosamente.* Majestically.

Maestro (It.) (*mä-ĕs'trō*). Master; composer; teacher.

Major. *Greater*; used to signify standard or normal as opposed to minor, diminished, and augmented; applied to intervals, chords, scales, and keys.

Major Scale. The scale in which the half steps occur between the third and fourth, and seventh and eighth tones, both in ascending and descending. See *Musical Notation.*

Manual. A key or digital of a keyboard; the keyboard of an organ played by the hands, as opposed to the pedal board played by the feet.

Marcato (It.) (*mär-kä'tō*). Marked, accented; indicated by the sign $\overline{\cdot}$.

March. A musical composition of strongly marked rhythm, suitable for accompaniment to marching.

Marcia funebre (It.) (*märt'shä fōō'nā-brĕ*). Funeral march.

Mass. A musical setting of the liturgy of the Eucharist. The subdivisions are: Kyrie, Gloria, Credo, Sanctus, Benedictus, and Agnus Dei. See *Musical Form.*

Mazurka (Pol.) (*mä-zōōr'kä*). A Polish national dance in triple rhythm, usually having a strong accent on the third beat; a composition in the rhythm of this dance.

Measure. The grouping of notes or beats into equal units of rhythm, marked upon the staff by perpendicular lines or bars; hence also the space between two adjacent bars.

Mediant. The name of the third scale step.

Medley. A mixture; a composition made up of detached passages from other compositions; usually applied to vocal music; *potpourri*, to instrumental pieces of this kind.

Melodrama. A species of music drama closely resembling opera, in which the dialogue is accompanied by instrumental music; declamation recited to musical accompaniment.

Melody. A succession of single tones varying in pitch, opposed to harmony, which consists of two or more tones sounded simultaneously; the leading part of a composition.

Meter, Metre. The grouping of notes or beats into units of measure to form rhythm; the distribution of long and short, accented and unaccented notes in the measure.

Metronome (Gr.) (*mĕt'rō-nōm*). An instrument for marking time, which consists of a pendulum making one click for each swing, invented by Maelzel in 1816. The pendulum can be made to swing faster or slower by adjusting a weight.

Metronome Marks. Marks placed at the beginning of a piece of music, as for example "M.M. 90," which means that a quarter note has the value of one click on Maelzel's metronome when the indicator is placed at 90, or that quarter notes should be played at the rate of 90 per minute.

Mezzo (It.) (*mĕd'zō*). Medium, half. *M. forte.* Moderately loud. *M. orchestra.* With only half the orchestra. *M. piano.* Moderately soft.

Mezzo-Soprano (It.) (*mĕd'zō-sō-prä'nō*). A female voice, the range of which lies between the soprano and the alto.

Middle C. One-lined C; the C which is nearest the middle of a piano keyboard; written on the first leger line below the treble clef, or on the first leger line above the bass clef.

Minor. Less; smaller; applied to intervals and to chords, scales, and keys having intervals a semitone less than major.

Minor Scale. This scale has three forms: The *Normal* or *natural minor* has half steps between 2 and 3, and 5 and 6. The *Harmonic minor* is the same except that the 7th tone is raised a semitone. This makes it a scale with half steps between 2 and 3, 5 and 6, 7 and 8, and one step and a half between 6 and 7. The *Melodic minor* has half steps between 2 and 3, and 7 and 8, ascending, while in descending it usually has the form of the normal minor. See *Musical Notation.*

Minuet. A slow, graceful dance in triple rhythm, which originated in France about 1650; a composition in the rhythm of this dance. See *Musical Form.*

Modes. A system of scales, used in ancient Greek and in early Church music, which may be described as consisting of overlapping parts of our diatonic scale in C major, or as made up of octaves beginning with various notes and using only the tones represented by the white keys of the piano. See *Musical Notation.*

Modulation. Changing from one key to another in a succession of chords; inflecting the voice musically.

Moll (Ger.) (*mŏl*). Minor.

Molto (It.) (*mōl'tō*). Much; very.

Mordent (*môr'dĕnt*). An embellishment consisting of a quick alternation between a principal note and the note below, indicated by the mark (^^) placed above the note to be so rendered.

Morendo (It.) (*mô-rĕn'dō*). Dying away.

Motet. An unaccompanied contrapuntal vocal composition with sacred words, which came into vogue about 1300.

Motion. Melodic progression. See *Contrary Motion* and *Parallel Motion.*

Motif, Motive. A musical figure or phrase which serves as the germ from which a composition or a movement is developed.

Movement. A distinct division of a composition having its own key, rhythm, themes, and general character.

Mutation. The change in the male voice occurring at the age of puberty; shifting the position of the left hand in violin playing.

Mute. A small clamp attached to the bridge of a violin, viola, or cello to muffle the tone; a pear-shaped pad inserted in the bell of a wind instrument for the same purpose. The sign for using a mute is *con sordini*; the sign for its removal is *senza sordini.*

Natural. A character (♮) used to cancel the effect of a sharp or a flat; a note so affected.

Ninth. The interval between a fundamental tone and the ninth above.

Nocturne. A "night piece"; a serenade of a dreamy and romantic character.

Nodes. The points at rest, between the loops of a string vibrating in sections of equal length. See *Musical Acoustics.*

Notation. The act and the art of representing music by means of notes and other symbols; these notes and other symbols taken collectively.

Nuances (Fr. pl.) (*nü' däNs'*). Shades of difference in rapidity, force, and expression, which serve to interpret various emotions and musical ideas.

Obbligato (It.) (*ŏb'blē-gä'tō*). *Indispensable*; applied to a part which is essential and cannot be omitted, the opposite of *ad libitum*; recently used also in the sense of "optional," as a *violin obbligato* to a song.

Octave. The interval between a fundamental tone and the eighth diatonic tone above; the whole series of tones within the interval.

Octet. A composition for eight parts or voices; the performers of such a composition taken collectively.

Offertory (*ŏf'ĕr-tō-rĭ*). In the Roman Catholic Church an anthem or instrumental piece performed while the bread and wine are "presented" to God before consecration, and during which a collection may be taken; in Protestant churches, music performed while an offering is being taken.

Opera (*ŏp'ĕr-ȧ*). (1) A drama set to music consisting of recitatives, arias, duets, trios, quartets, choruses, etc., with orchestral accompaniment; performed with the aid of scenery, costumes, and action. (2) The plural form of *opus.*

Operetta. A short opera, usually in a light vein.

Opus (Lat.) A musical work or composition; as, Op. 1, the first work.

Oratorio (*ŏr'ȧ-tō'rĭ-ō*). A drama with Scriptural text, set to music; performed without the aid of scenery, costumes, or action. See *Musical Form.*

Orchestra (*ôr'kĕs-trȧ*). 1. A band of musicians performing upon various instruments. 2. The space in a theater occupied by the band or orchestra. See *Development of the Orchestra.*

Organ Point. See *Pedal Point.*

Ornamental Notes. Unessential notes introduced for the purpose of embellishment, such as *acciaccatura, appoggiatura, grace notes, trill, turn.*

Ostinato (It.) (*ŏs-tē-nä'tō*). Literally, obstinate. Continuous; applied to a ground bass or a melodic figure often repeated.

Overtone. See *Musical Acoustics.*

Overture (Eng.) (*ō'vĕr-tûr*). An introduction to an oratorio, opera, or other large composition. See *Musical Form.*

Parallel Motion. A progression in which two or more parts in a composition ascend or descend simultaneously, generally by the same intervals. The opposite of *Contrary Motion.*

Partials. See *Musical Acoustics.*

Parlando (It.) (*pär-län'dō*). In a recitative or speaking manner.

Part. A series of tones written for and performed by a voice or instrument, or a group of either. It may be performed as a solo or together with other voices or instruments, each playing or singing its own part.

Part-song. A composition for three or more voices, in harmony, and without accompaniment.

Partita (It.) (*pär-tē'tä*). A composition consisting of a collection of dance tunes, which came into vogue about 1700; also called *suite.* See *Musical Form.*

Partitur (Ger.) (*pär-tĭ-tûr'*); **Partitura** (It.) (*pär-tē-tōō'rä*). The full score, the entire draft of a composition for voices and instruments.

Passacaglia. An Italian dance in triple time and stately rhythm, composed on a ground bass. See *Musical Form.*

Passage. A short section of a composition.

Passepied (Fr.) (*pȧs'pyā'*). A lively French dance in triple time, which originated in the 16th century; a composition in the rhythm of this dance.

Passing Tones. Tones not essential to the harmony but serving to make smooth the transition from one chord tone to another.

Passion Music. The story of the suffering and death of Christ set to music; similar to a cantata or an oratorio.

Pasticcio (It.) (*päs-tēt'shō*). A medley; an opera made up of selections from other operas.

Pastoral, Pastorale (It.) (*päs'tō-rä'lĕ*). A music drama or scenic contata dealing with rural life; a vocal or instrumental composition suggestive of rural life.

Pedal. A foot lever, as piano pedal, organ pedal, harp pedal.

Pedal Keys. A set of pipe organ keys played by the feet.

Pedal Point. A bass note which is held while the harmony of the other parts varies.

Pentatonic Scale. A five-toned scale; the same as our major diatonic scale with the fourth and seventh tones omitted.

Percussion Instruments (*pĕr-kŭsh'ŭn*). Those which are sounded by striking, as drums, cymbals, triangles, tambourines, bells, chimes, castanets, and the xylophone.

Period. A musical sentence; it is composed of two or more phrases, usually of four measures each, and closes with a cadence. See *Musical Form.*

Phrase. A short musical figure or passage. See *Musical Form.*

Phrasing. The proper emphasis and grouping of musical phrases in performance; the signs in notation to indicate proper phrasing.

Pianissimo (It.) (*pyä-nēs'sē-mō*). Very soft.

Piano (It.) (*pyä'nō*). Soft.

Pitch. That property of musical sounds, or tones, which we recognize when we speak of them as high or low. See *Musical Acoustics.*

Più (It.) (*pyōō*). More. *Più lento.* More slowly. *Più mosso.* More rapidly.

Pizzicato (It.) (*pēt'sē-kä'tō*). Plucked; indicating that the strings should be plucked, not bowed.

Plagal Cadence. See definition of *Cadence.*

Plain Song. A nonmetrical chant in one of the ecclesiastical modes, common in early church music.

Poco (It.) (*pō'kō*). Little.

Poco a poco (It.). Little by little; by degrees.

Polka. A lively dance in 2-4 time, which originated in Bohemia about 1830.

Polonaise (Fr.) (*pō'lō'nāz'*). A stately Polish dance in triple rhythm, used as an instrumental form particularly by Chopin.

Polyphonic. Designing music in which the parts or voices are melodically independent while at the same time in harmony; contrapuntal music; opposed to *homophonic.*

Pomposo (It.) (*pōm-pō'sō*). Pompous. *Pomposamente.* Pompously.

Ponderoso (It.) (*pŏn'dĕ-rō'sō*). Ponderous, massive, heavy.

Portamento (It.) (*pôr'tä-mān'tō*). 1. A smooth gliding from one tone to another. 2. A piano touch, semi-staccato, used when notes are marked with dots over which a slur is drawn ( ).

Potpourri (*pō'pōō'rē'*). A composition composed of fragments of other compositions; a medley.

Precentor. The leader of a church choir or of congregational singing.

Precipitato (It.) (*prĕ-tshē'pē-tä'tō*). Hurried. *Precipitamente.* Hurriedly.

Preciso (It.) (*prĕ-tshē'zō*). Precise, exact.

Prelude. An introductory strain, section, or movement, complete in itself; opposed to *introduction,* which leads directly into the following principal section of the composition.

Preparation. Preparing the way for a dissonant tone by using it in an immediately preceding harmonious chord.

Prestissimo (It.) (*prĕs-tĕs'sē-mō*). Very quick; the superlative of *presto.*

Presto (It.) (*prĕs'tō*). Quick, rapid.

Prima donna (It.) (*prē'mȧ dŏn-nȧ*). The leading female singer in an opera.

Program Music. Music intended to portray or suggest a definite series of objects or events; first applied to Beethoven's "Pastoral Symphony."

Progression. *Melodic* progression is the passage from tone to tone in a succession of single tones; *Harmonic* p., the passage from chord to chord in a succession of chords.

Quadrille (Fr.) (*kwȧ-drĭl'*; *kä'drēl'*). A French square dance of five figures in 6-8 or 2-4 time; the music for such a dance.

Quartet (Eng.) (*kwôr-tĕt'*). A composition of four parts or voices, each part for one voice or instrument; the four performers rendering a quartet.

Quasi (It.) (*kwä'zē*). In the style of.

Quickstep. A quick and spirited march, generally in 6-8 time.

Quintet. A composition arranged for five voices or instruments.

Rallentando (It.) (*räl'lĕn-tän'dō*). Gradually slower.

Rapido (It.) (*rä'pē-dō*). Rapid. *Rapidamente.* Rapidly.

Recitative (*rĕs'ĭ-tä-tēv'*). Musical declamation. *Recitativo secco.* Declamation with but slight accompaniment. *Recitativo stromentato.* Declamation with orchestral accompaniment. See *Musical Form.*

Reel. A lively dance popular in Scotland, danced by two couples. *Virginia r.* A variant form popular in the United States, requiring a large number of dancers.

Refrain. The *burden* or chorus of a song, repeated at the end of each stanza.

Register. The range of a voice or musical instrument; a portion of the range of a voice or instrument composed of tones having the same quality; an organ stop.

Requiem (Lat.) (*rē'kwĭ-ĕm*; *rĕk'wĭ-ĕm*). A mass for the dead; a musical setting for the same.

Resolution. The progression of a dissonance to a consonance.

Rest. A character indicating silence.

Retard. To slacken the speed gradually.

Retardation. A suspension resolving upward.

Rhapsodic, Rhapsodie. (*răp'sō-dĭ*). An instrumental fantasy, generally based on folk songs.

Rhythm (*rĭтн'm*). Movement characterized by regular, measured, or harmonious recurrences of stress or impulse, beat, sound, accent, or motion. As a musical factor it deals with pulsations logically grouped by means of accents.

Rigoroso (It.) (*rē'gō-rō'sō*). Rigorous, exact.

Rinforzando (It.) (*rēn'fôr-tsän'dō*). Re-enforced, accented.

Risoluto (It.) (*rĭ'sō-lōō'tō*). Resolute, determined.

Ritardando (It.) (*rē'tär-dän'dō*). Retarded, gradually slower.

Ritenuto (It.) (*rē'tē-nōō'tō*). Immediately slower.

Ritornello (It.) (*rē'tōr-nĕl'lō*); **ritornelle** (Fr.) (*rĭt'ŏr-nĕl'*). A short instrumental passage in a vocal composition, as a prelude or a refrain; the *tutti,* or full orchestra parts of a concerto.

Romance. A vocal or instrumental composition of a romantic character, without a fixed form.

Rondo (It.) (*rŏn'dō*). A form of composition, generally instrumental, characterized by recurrence of the leading theme. See *Musical Form.*

Root. The fundamental tone of any chord; the lowest tone if the chord is in its natural position, but some other, if the chord is inverted.

Roulade (Fr.) (*rōō'läd'*). A florid passage; in vocal music, a number of notes sung to one syllable.

Round. A vocal canon for three or more voices. The first voice sings the melody. The others sing the same melody but enter in turn, each a few measures later than the one before, thus producing the effect of a song going around in a circle. See *Musical Form.*

Rubato (It.) (*rōō-bä'tō*). Robbed; stolen; that is, some tones held a trifle beyond their value, at the expense of the others.

Run. An ornament consisting of a rapid succession of notes.

Saltarella (It.) (*säl'tä-rĕl'ä*). A quick Italian dance, usually in triple rhythm, with a hop step at the beginning of each measure; music in the rhythm of this dance.

Saraband (Eng.) (*săr'ä-bănd*). A slow Spanish dance in triple rhythm, which originated among the Saracens; music in the rhythm of this dance. See *Musical Form.*

Scale. Literally, a ladder; actually, a series of tones arranged according to rising pitches. See *Musical Notation.*

Scena (It.) (*shä'nä*). The largest vocal solo form, usually part of an opera, but sometimes an independent composition.

Scherzando (It.) (*skĕr-tsän'dō*). Sportive, playful.

Scherzo (It.) (*skĕr'tsō*). An instrumental composition of a humorous, playful, or whimsical character.

Schottisch (Ger.) (*shŏt'tĭsh*). A Scotch round dance in triple rhythm, resembling the polka but slower; music in the rhythm of this dance.

Score (Ger., partitur; Fr., partition; It., partitura). Music written upon a number of staves, one for each instrument or voice, and so arranged, one above another, that the relation of any one to the others can be seen at a glance. See *Partitura.*

Second. The interval between a fundamental tone and the next diatonic tone above.

Section. A division of a musical period; a phrase; also a group of periods forming a complete and distinct musical idea.

Semitone (*sĕm'ĭ-tōn*). The smallest interval in European music. One half of a whole tone.

Senza (It.) (*sän'tsä*). Without.

Septet (Eng.) (*sĕp-tĕt'*). A composition for seven instruments or voices; the performers of such a composition.

Sequence (Eng.) (*sē'kwĕns*). The repetition of a figure at different intervals.

Serenade. An evening song.

Sforzando (It.) (*sfôr-tsän'dō*). Emphasis upon a certain note or chord; marked *sf.* or ∧ or >.

Shake. An embellishment consisting of a rapid alternation between two tones separated by a whole step or a half step; also called a *trill*; marked *tr.*

Sharp. 1. A mark (♯) which, placed before a note or in the key signature, raises the note or notes affected one semitone. 2. Above the proper pitch, as one sings or plays sharp. See *Musical Notation.*

Signature. The marks and numerals placed upon the staff at the beginning of a piece of music. *Key signature.* The clef and sharps or flats which indicate the key of a composition. *Time signature.* The numerals in fractional form which indicate the rhythm. See *Musical Notation.*

Sixth. 1. The sixth diatonic tone above a fundamental. 2. The interval composed of the fundamental and the sixth step.

Slide. A movable tube in the trombone which alters the pitch of the tones produced.

Slur. A curved line drawn over or under two or more notes to indicate that the transition from one to another should be smooth.

Smorzando (It.) (*zmôr-tsän'dō*). Quenched, suddenly dying away.

Solfeggio (It.) (*sōl-fäd'jō*). A singing exercise in which a single vowel or the syllables *do, re, me, fa, sol, la, si* are used. See *Musical Notation.*

Solmization. A method of teaching scales and intervals by syllables. See *Musical Notation.*

Solo (It.) (*sō'lō*). Performed alone by one voice or instrument; opposed to *concerted*; a composition for a single voice or instrument.

Sonata (It.) (*sō-nä'tä*). An instrumental composition made up of three or four movements in different though related keys and in different forms and moods. See *Musical Form.*

Sonata Form. See *Musical Form.*

Sonatina (It.) (*sō'nä-tē'nä*). A short, simple sonata.

Song. A lyric, narrative or dramatic poem set to music.

Song Form. See *Musical Form.*

Soprano (It.) (*sō-prä'nō*). The highest female or boy's voice; the treble.

Sordino (It.) (*sōr-dē'nō*). See definition of *Mute.*

Sostenuto (It.) (*sōs'tĕ-nōō'tō*). Sustained; gradually retarded.

Sotto voce (It.) (*sōt'tō vō'shĕ*). In a low voice, in an undertone.

Space. The degree or interval between two lines of the staff. See *Musical Notation.*

Staccato (It.) (*stäk-kä'tō*). Separated, distinct, detached.

Staff. The five horizontal lines, on and between which music is written. See *Musical Notation.*

Step. A melodic progression of a second.

Stop (n.). A set of organ pipes having the same quality of tone, though differing in pitch; the draw knob which controls such a set of pipes; in a reed organ, a draw knob controlling a set of reeds. *Stop* (v.). To press a string of a violin or similar instrument with a finger so as to alter the pitch of its tone.

Strain. A complete period, its close being indicated upon the staff by a double bar; a melody or tune.

Stretto (It.) (*strät'tō*). Compressed, contracted; in a fugue, the part composed of an overlapping of subject and answer. See *Musical Form.*

Stringendo (It.) (*strēn-jĕn'dō*). Binding together; sudden accelerando with increase in loudness.

String Quartet. Music written for four stringed instruments, usually two violins, a viola, and a cello; the performers of such music.

Subdominant. The dominant below; the fourth tone of the diatonic scale, which is in the same relation to the keynote from below as the *dominant* is from above.

Subito (It.) (*sōō'bē-tō*). Sudden; immediate. *Subitamente.* Suddenly; immediately.

Subject. The theme or melodic phrase which serves as the groundwork of a movement or composition.

Submediant. The sixth tone of the diatonic scale.

Subtonic. Under the tonic; the seventh tone of the diatonic scale.

Suite (Fr.) (*swēt*). An instrumental composition consisting of a series of movements in any one of a number of forms and in different keys, sometimes a collection of distinct compositions; formerly, a cycle of dance tunes. See *Musical Form.*

Supertonic. The tone one degree above the tonic in the diatonic scale.

Suspension. A dissonance caused by holding back a tone of a chord while the other tones move, or progress. It later resolves downward to the consonant tone. See *Resolution* and *Retardation.*

Symphonic Poem. A large orchestral composition, originated by Liszt, which differs from the sonata and the symphony in that it is descriptive or narrative and consists of one movement instead of several. See *Musical Form.*

Symphony. A sonata for orchestra, usually in four movements. See *Musical Form.*

Syncopation. A shifting in accent from the normally strong to a weak beat. See definition of *Accent.*

Tarantella (It.) (*tä'rän-tĕl'lä*). An Italian dance in rapid 6-8 rhythm, usually performed by one couple and accompanied by tambourines and castanets; a composition in the rhythm of this dance.

Technic (*tĕk'nĭk*). Manner of execution; musical skill.

Tema (It.) (*tĕ'mä*). Theme, subject, melody.

Temperament. An adjustment of acoustically correct intervals to harmonic discrepancies. See *Musical Acoustics.*

Tempo (It.) (*tĕm'pō*). The rate of speed at which a composition should be played, indicated at the beginning by such words as *largo, adagio, lento, allegro,* etc.

Tenor. The high male voice; a musical instrument, the range of which corresponds to the high male voice.

Tenuto (It.) (*tĕ-nōō'tō*). Held, sustained.

Tessitura (It.) (*tĕs'sē-tōō'rä*). The average pitch of the tones in a composition, as high or low.

Tetrachord (Gr.). A scale series of four tones; half of an octave. See *Musical Notation.*

Theme. A musical subject. See definition of *Subject.*

Third. The interval between a fundamental tone and the third diatonic tone above.

Tie. A curved line connecting two or more notes of the same pitch to indicate they should be played as one.

Time. The rate of speed at which a piece of music should be played. See *Tempo.* Also commonly, but less properly, used as synonymous with *measure* or *rhythm.* See *Measure.*

Toccata (It.) (*tŏk-kä'tä*). A composition for the organ or harpsichord, popular in the 16th century, free in style, resembling the *capriccio*; later a similar composition adapted to the display of technical skill.

Tonality. The chords grouped around and attracted by one central tonic chord. Generally used as synonymous with *Key.*

Tone. A sound of definite pitch and duration.

Touch. The style of touching or striking the keys of a piano, organ, or similar instrument; the resistance of the keys, as light or heavy touch.

Tranquillo. (It.) (*trän-kwēl'lō*). Tranquil, calm. *Tranquillamente.* Tranquilly, calmly.

Transpose. To change a composition from one key to another.

Treble. 1. The highest voice or part; the soprano. 2. Often used as the name of the G clef.

Tremolo (It.) (*trĕm'ō-lō*). The rapid repetition of a note or chord which produces the effect of trembling or quivering.

Triad. Any chord composed of a fundamental tone and the third and fifth above.

Trill (Ger., triller; Fr., trille; It., trillo; Eng., shake). See *Shake.*

Trio (It.) (*trē'ō*). 1. A composition for three voices or instruments; the performers of such a composition. 2. The second part of a march or minuet.

Triplet. A group of three equal notes played in the time of two of like time value; indicated by the sign $\overset{3}{\frown}$ or 3, placed above or below the notes affected.

Tune (n.). An air or melody. (v.) To adjust an instrument so that the tones it produces are correct according to the scale.

Turn. An embellishment following a note, which consists of rapid alternation between the principal note, the note a step above, and the note a half step below; marked ∾. The turn is also used at the close of a *shake* or *trill.*

Tutti (It.) (*tōō't'tē*). All; full orchestra or full chorus; a direction that all should perform together.

Una corda (It.) (*ōō'nä kôr'dä*). One string; a direction in piano music that the soft pedal should be used.

Unison. Identical in pitch; music is said to be in unison when all the voices or instruments perform the same part.

Variations. Elaborations of a theme in a variety of forms differing in time, melody, harmony, or key. See *Musical Form.*

Veloce (It.) (*vĕ-lō't'shĕ*). Swift. *Velocemente.* Swiftly. *Velocissimo.* With extreme rapidity.

Verse. That portion of an anthem, or service, to be performed by one singer to each part; a stanza.

Virtuoso (It.) (*vĕr'tōō-ō'sō*). One who is a skillful performer upon some musical instrument.

Vivace (It.) (*vē-vä't'shĕ*). Lively, vivacious.

Vocal. Pertaining to the human voice.

Voice. Sound produced by the vocal organs in singing or speaking; the faculty of uttering sound.

Voicing. Tuning an organ pipe.

Volume. The quantity or fullness of a tone.

Voluntary. An organ prelude; an organ solo, often extemporaneous, played before, during, or after a church service.

Waltz. A round dance in triple rhythm, performed by couples whirling around and advancing around the room; music in the rhythm of this dance. See *Musical Form.*

Whole Note. The longest note in common use. Shorter notes are looked upon as fractional parts of the whole note.

Whole Tone. The interval of a major second, hence the interval of two semitones. The whole-toned scale consists of the six whole-tone intervals within the octave, e.g. C D E F♯ G♯ A♯ C.

STORIES OF THE LEADING OPERAS

Africaine (*ăf-rĭ-kān'*), **L'.** The last and most consistent of Meyerbeer's grand operas; original text by Scribe; première Paris in 1865.

Vasco da Gama, the famous explorer, is the betrothed lover of a maiden named Inez, the daughter of Don Diego, a Portuguese grandee. When the opera opens he is still at sea, and has not been heard from for years. Don Pedro, the president of the council, takes advantage of his absence to press his own suit for the hand of Inez, and obtains the king's sanction to his marriage on the ground that Vasco must have been lost at sea. At this moment the long-lost hero returns, accompanied by two swarthy slaves, Selika and Nelusko, whom he has brought home with him from a distant isle in the Indian Ocean. He recounts the wonders of the place, and entreats the government to send an expedition to win an empire across the sea. His suggestions are rejected, and he himself, through the machinations of Don Pedro, is cast into prison. There he is tended by Selika, who loves her gentle captor passionately, and has need for all her regal authority—for on the distant island she was a queen—to prevent the jealous Nelusko from slaying him in his sleep. Inez now comes to the prison to announce that she has purchased his liberty at the price of giving her hand to Don Pedro.

In the next act, Don Pedro, who has stolen a march on Vasco, is on his way to the African island, taking with him Inez and Selika. The steering of the vessel is intrusted to Nelusko. Vasco da Gama, who has fitted out a vessel at his own expense, overtakes Don Pedro in mid-ocean, and generously warns his rival of the treachery of Nelusko, who is steering the vessel upon the rocks of his native shore. Don Pedro's only reply is to order Vasco to be tied to the mast and shot, but before the sentence can be carried out the vessel strikes upon the rocks, and the natives swarm over the sides. Selika, once more a queen, saves the lives of Vasco and Inez from the angry natives.

In the next act the nuptials of Selika and Vasco are on the point of being celebrated with great pomp, when the hero, who has throughout the opera wavered between the two women who love him, finally makes up his mind in favor of Inez. Selika thereupon magnanimously dispatches them home in Vasco's ship, and poisons herself with the fragrance of the deadly manchineel tree.

Aïda (*ä-ē'dä*). Music by Verdi; words by Locle, translated into Italian by Ghislanzoni; the most popular of Verdi's operas, except possibly "Il Trovatore"; première Cairo 1871, New York 1873; impressive open-air production at the foot of the pyramids in Egypt, 1912.

Aïda, daughter of Amonasro, king of Ethiopia, is the prisoner of the Egyptians and has been given as slave to Amneris, the king's daughter. Both love the warrior Radames, chief of the Egyptian army, but he cares only for Aïda. Amneris vows deadly vengeance against the slave.

Radames, having crushed the revolt in Ethiopia, returns in triumph, bringing a horde of prisoners, including Amonasro. The king of Egypt embraces Radames, bids Amneris crown him with a wreath of victory, and promises, as a reward, any boon he may request. Radames asks only that the prisoners be restored to liberty. The king orders that all be released except Amonasro and Aïda. He also bestows upon Radames his daughter Amneris in marriage, but Radames assures Aïda that he will be true to her.

Amonasro persuades his daughter to save her people by extracting from her lover the plan of the route the Egyptian army will take next day. At a clandestine meeting in the temple of Isis, Aïda induces Radames to tell her the secret. Amonasro, hidden behind a pillar, overhears it and escapes, exulting in his knowledge.

Then Amneris, who had entered the temple to ask a blessing upon her coming marriage, appears. Her pleas that Radames forsake Aïda being of no avail, she denounces him as a traitor. However, she offers him pardon if he will accept her love and forsake Aïda. He refuses and is condemned by a court of priests to be immured in a prison vault beneath the temple. There he finds Aïda, who has discovered a means of getting in and has made up her mind to die with her lover. With visions of heavenly bliss, of "never fading, endless love," they expire in each other's arms while the solemn chant of the priestesses in the temple above mingles with the sighs of the heartbroken Amneris.

Andrea Chénier (*ăn-drā'yȧ shā-nyā'*). A stirring tale of the French Revolution; music by Umberto Giordano; words by L. Illica; première Milan 1896.

The plot centers in the rivalry of Chénier, the poet, and Gerard, a revolutionary leader, for the hand of Madeleine. Gerard condemns Chénier to death, but is melted by Madeleine's pleading and rescinds the order for the execution. The pardon, however, comes too late, and Madeleine and Chénier ascend the scaffold together, in an ecstasy of lyrical rapture.

Barber of Seville, The. *Il Barbiere di Siviglia.* A comic opera; music by Rossini; words by Sterbini; plot from a story of Beaumarchais; première Rome 1816, New York 1825.

Count Almaviva has fallen in love with Rosina, a charming damsel, whom her guardian, Doctor Bartolo, having an eye to her dowry, keeps under lock and key, hoping to win her for himself. Figaro, ubiquitous barber, takes the count under his protection and smuggles him into the house in the guise of a soldier, announcing that he has been billeted there. An argument follows, and the scheme is frustrated by the arrival of the police. The count barely escapes.

Later, upon Figaro's advice, the count succeeds in getting into the house as a music master. In order to gain Bartolo's confidence, he shows him one of Rosina's letters to himself, pretending that he had received it from a mistress of Almaviva. Bartolo, delighted with the news of the count's infidelity, hastens to tell the scandal to Rosina. Her jealousy aroused, she agrees to marry Bartolo. A notary is sent for that the marriage contract may be signed. Happily, while Bartolo's back is turned, the count finds an opportunity of persuading Rosina of his constancy. Figaro bribes the notary to draw up the contract as between the count and Rosina, and Bartolo is duped into signing. When he finds how matters stand, he tries to make the best of it, and, as the count relinquishes Rosina's dowry to him, he is persuaded to be gracious.

Bartered Bride, The. *Prodana Nevesta.* A comic opera; music by Smetana; words by Sabina; première Prague 1866, New York 1909.

Marie lives in Bohemia. Her parents have arranged through Kezul, the marriage broker, that she shall marry Wenzel, the half-witted son of a wealthy peasant, Micha, living in another village. Marie refuses, for she loves Hans, a servant in her father's house.

The marriage broker offers Hans 300 crowns if he will give up Marie. He accepts, on condition that Marie shall marry none other than a son of Micha. Marie is in despair. She is on the point of accepting Wenzel, when Hans makes public declaration that he is the son of Micha by a former marriage, having left home because he disliked his stepmother. As the money remains in the family, there is no objection. Hans and Marie are married and live happily ever after.

Bohème, La (*lä bō'ĕm'*). Music by Puccini; words by Giacosa and Illica; plot from Murger's novel entitled *Vie de Bohème*; première Turin 1896, San Francisco and New York 1898.

La Bohème is a story of the mingled joy and grief of Bohemian life in Paris. Four young men—Rudolph a poet, Marcel a painter, Colline a philosopher, and Schaunard a musician—live in a garret in the Latin Quarter. It is Christmas Eve. Marcel keeps the landlord at bay until the arrival of Schaunard with an unexpected windfall of money and provisions. After a feast at home, they decide to go to the Café Momus, leaving Rudolph to finish a manuscript.

Mimi, an embroideress, who lives in an adjoining garret, comes to ask a light for her candle. In the draft, Rudolph's candle goes out. Their hands touch. A love duet follows, and the lovers go to join their friends. At the Café Momus, Musette appears with an elderly banker, Alcindoro, for whom she had given up Marcel. She sends Alcindoro on an errand, flies into the arms of Marcel, and joins the party. The jolly revelers leave the bill for Alcindoro to pay.

Mimi and Musette soon weary of the poverty of their Bohemian lovers and accept the attentions of more affluent suitors.

A few weeks later Mimi, ill and abandoned by her viscount, is brought back by Musette. Rudolph places her upon his bed. Marcel calls a doctor; Colline goes out to pawn his overcoat and buy food. It is too late. Weakened by privations and by a dread cough, Mimi breathes her last on the little bed in the attic.

Bohemian Girl, The. Music by Balfe; words by Bunn; plot from a ballet entitled "The Gypsy," by St. Georges and Marzillier; première London 1843, New York 1844.

Thaddeus, an exiled Polish rebel, who has joined a band of gypsies to escape arrest, saves the life of Arline, the six-year-old daughter of Count Arnheim, governor of Pressburg. In gratitude the count invites him and the gypsies to a feast. Thaddeus refuses to drink to the health of the emperor. Confusion ensues. Devilshoof, the leader of the gypsies, tries to protect Thaddeus and is imprisoned. Thaddeus is allowed to go. Devilshoof escapes and carries off Arline.

Twelve years elapse. Arline is grown to womanhood, but all the other characters, strange to say, remain at precisely the same age as in the first act. Thaddeus and Arline, having long loved each other, are united by the gypsy queen, but she swears vengeance, for she too loves Thaddeus. Devilshoof robs Florestan, the count's nephew, of his jewels. The gypsies attend a fair in Pressburg. By the queen's machinations Arline is decorated with a stolen medallion. Florestan sees the trinket and accuses her of theft. Arline is brought before her own father for sentence. The inevitable recognition ensues.

Thaddeus makes known his noble birth and his heroic deeds in battle. The count accepts him as his daughter's suitor. During the betrothal feast, a gypsy assassin attempts to shoot Thaddeus. Devilshoof pushes aside the weapon, and the bullet pierces the heart of the gypsy queen.

Boris Godounov (*gä'dōō-nôf'*). Opera by Mussorgsky, based upon a historical drama by Púshkin; première Petrograd 1873, New York 1913.

Boris Godounov, while regent, killed Dmitri, the legal heir to the throne of Russia, and had himself proclaimed czar. Gregory, a monk resembling the murdered prince, impersonates him and starts a rebellion to overthrow the usurper. Boris, who is haunted by specters and hears voices accusing him of murder, dies of fear.

Carmen. Music by Bizet; words by Meilhac and Halévy; plot from Mérimée's romance of the same name; at first received with a storm of abuse, but now counted among the three or four most popular operas in the modern repertory; première Paris 1875, New York 1879.

Carmen, a beautiful and passionate gypsy girl, is arrested for stabbing one of her comrades in a cigarette factory in Seville. She uses all her powers of fascination upon Don José, a young officer of the guard, who is in charge of her. Because of her charms and soft words, José allows her to escape, having arranged to meet her at the tavern of Lillas Pastia.

For this offense, he suffers two months' imprisonment. At the expiration of his sentence, José appears at the tavern, a resort of smugglers, though a new suitor, the bullfighter Escamillo, has laid siege to Carmen's heart. When the bugle call to duty is sounded, José starts to leave. Because of the taunts of Carmen, he decides to remain. He quarrels with an officer who commands him to go, and to escape punishment he deserts the army to join the gypsies.

At the camp of the gypsies, José repents of his folly, and Carmen tires of her love. José, who is jealous of Escamillo, fights a duel with him. He is about to kill the bullfighter when Carmen intervenes. Micaela, the boyhood sweetheart of José, arrives with a message from his dying mother. José departs, promising to return for revenge.

Escamillo has invited all his friends to attend his bullfight in Seville. José goes to plead once more with Carmen. Carmen spurns him and flings back his ring. In rage and despair, José stabs Carmen through the heart just as shouts are heard from the arena, announcing the victory of Escamillo.

Cavalleria Rusticana (*kä-väl-lā-rē'ä rŭs-tē-kä'nä*). Music by Mascagni; words by Targioni-Torzetti and Menasci; adapted from a Sicilian tale of the same name by Verga; première Rome 1890, New York 1891.

Cavalleria Rusticana is a picture of Sicilian rustic chivalry. Turriddu has returned from the war to find his sweetheart, Lola, married to a rich carter, Alfio. Though he has since paid court to Santuzza, the coquetries of Lola infatuate him, and she soon wins him back to her side.

It is Eastertide, and while the villagers are in the church the deserted Santuzza waits outside to meet Turriddu. When he arrives she appeals in vain to his love and pity. Lola, passing, mocks Santuzza and entices Turriddu away. Lola and Turriddu enter the church; Santuzza attempts to follow but falls upon the steps, just as Alfio comes up. In despair she tells him of his wife's infidelity.

Later Turriddu, in merry mood, invites Alfio to drink with him. Alfio refuses, challenges Turriddu to mortal combat, and kills him. Lola departs, on other conquests bent.

Cid (*sĭd*), **Le.** *The Conqueror.* Music by Massenet; words by D'Ennery, Gallet, and Blau; based upon Corneille's drama; première Paris 1885, New York 1907.

Rodrigo, the conqueror, returning from a victory over the Moors, is betrothed to Chimène, daughter of Count Gormas. A governorship, promised to Gormas, is bestowed upon Rodrigo's father, Don Diego. Enraged, Gormas challenges him. Being old, Diego asks his son to protect his honor. In a duel, Gormas is killed accidentally. Chimène demands the death of Rodrigo. The king cannot spare him, for the Moors are again in revolt. On Rodrigo's second victorious return, Chimène demands his death. The king asks her to pronounce sentence. She cannot. The conqueror draws a dagger to kill himself. Chimène restrains him and confesses that love conquers all.

Daughter of the Regiment, The. *La Fille du Régiment.* A comic opera; music by Donizetti; words by Bayard and St. Georges; première Paris 1840, New Orleans 1843.

Marie, found as a baby upon a battlefield and adopted as the daughter of the regiment, is wooed by Tonio, a peasant who has saved her life. He is accepted, on condition that he shall join the regiment. A letter, addressed to the marchioness of Berkenfeld and pinned to the baby

Marie's clothes, is now delivered. The marchioness claims Marie as her niece, installs her in the family castle, and wants her to marry a count. Marie refuses. The marchioness confesses that she is her mother. Marie agrees to obey her wishes. The mother, touched by this mark of filial devotion, lets her have Tonio, who has risen to the rank of colonel.

Don Giovanni (*dŏn jō-vän'nē*). Adapted by Da Ponte from a Spanish tale; music by Mozart; première Prague 1787.

Don Giovanni, a licentious Spanish nobleman, who is attracted by the charms of Donna Anna, the daughter of the commandant of Seville, breaks into her palace under cover of night, in the hope of making her his own. She resists him and calls for help. In the struggle which ensues, the commandant is killed by Don Giovanni, who escapes unrecognized. Donna Elvira, his deserted wife, has pursued him to Seville, but he employs his servant, Leporello, to occupy her attention while he pays court to Zerlina, a peasant girl, who is about to marry an honest workman named Masseto. Donna Anna now recognizes Don Giovanni as her father's assassin, and communicates her discovery to her lover, Don Ottavio; Elvira joins them, and the three of them vow vengeance against the libertine.

Don Giovanni gives a ball in honor of Zerlina's marriage, and in the course of the festivities seizes and tries to seduce her. He is stopped only by the interference of Anna, Elvira, and Ottavio, who have made their way into his palace in masks and dominos.

In the next act the intended vengeance of the three conspirators is still unfulfilled, for Don Giovanni is again pursuing his vicious courses and employing Leporello to beguile the too trustful Elvira. After various escapades he finds himself before the statue of the murdered commandant. He jokingly invites his old antagonist to sup with him, an invitation which the statue, to his surprise, hastens to accept. Leporello and his master return to prepare entertainment for the evening. When the merriment is at its height, a heavy step is heard in the corridor, and the marble man enters. Don Giovanni is still undaunted and, even when his terrible visitor offers him the choice between repentance and damnation, yields not a jot of his pride and insolence. Finally, the statue grasps him by the hand and drags him down, amid flames and earthquakes, to eternal torment.

Elixir of Love, The. *L'Elisire d'Amore.* A comic opera; music by Donizetti; words by Romani; première Milan 1832, New Orleans 1842.

Nemorino, a penniless youth, loves the wealthy Adina. Sergeant Belcore also woos her. Nemorino purchases a bottle of elixir of love from a traveling quack. The elixir is wine and makes him tipsy. Adina, enraged, accepts Belcore. To get money for more elixir Nemorino enlists. The rumor spreads that Nemorino's rich uncle has left him a fortune. Many maidens show interest in him. Adina's jealousy is aroused. She learns from the quack of Nemorino's devotion and buys his ransom. They are happily united. The news of the quack's elixir brings him many customers.

Ernani (*ĕr-nä'nē*). Music by Verdi; words by Piave; based upon Victor Hugo's drama; première Venice 1844, New York 1846.

Ernani, an outlawed Spanish nobleman, loves Elvira, who is betrothed to the aged De Silva and is secretly loved by the king, Don Carlos. Silva finds Ernani and the king in Elvira's chamber. He challenges both. Discovering one is the king he apologizes to him. Ernani refuses to fight and reminds Silva that the king is their rival. They conspire to murder the king. Ernani gives Silva his hunting horn and pledges that Silva may require his life at any time by blowing the horn. The king captures the conspirators and condemns them to death. On Elvira's plea, their lives are spared. The king unites Ernani and Elvira. In the midst of their bliss, Silva blows the horn. Ernani, true to his word, bids Elvira a fond farewell and stabs himself.

Faust (*foust*). Music by Gounod; words by Barbier and Carré; the story is based upon Goethe's *Faust*; has been sung more often than any other five operas combined; première Paris 1859, New York 1863.

Faust, an aged scholar, despairing of solving the riddle of life, raises a cup of poison to his lips. He hears the merry song of peasants outside. Cursing the things of earth, he invokes Satan. Instantly Mephistopheles appears. In exchange for his soul he offers Faust anything he might ask—riches, youth, love. As an indication of what is to come, Mephistopheles conjures up the vision of a lovely maiden. Faust signs the contract.

Faust, now young, appears with Mephistopheles at a fair in the market place. There Faust sees Marguerite, a beautiful village girl. He offers to accompany her home. She declines but cannot forget his tender words.

Mephistopheles then brings Faust to the garden of Martha, Marguerite's aunt, with whom she lives. He engages the attention of Martha, that Faust may make love to Marguerite, having previously left a casket of gems for her, which puts out of mind the flowers sent by her lover Siebel. Marguerite yields at last to the passionate words of Faust.

Following one sweet night of love, Marguerite is deserted. Siebel offers to avenge her dishonor, but she defends the faithless Faust. Valentine returns and finds his sister's love affair the scandal of the town. Mephistopheles and Faust appear. The former mocks at Marguerite. Valentine draws his sword to slay his sister's seducer. In the combat, Mephistopheles interposes his sword and Valentine receives a mortal wound. He curses his sister with his dying breath. Marguerite, who has come to the scene, abandoned by every one but the faithful Siebel, kneels at a small altar outside the church, not daring to enter. Her efforts to pray are mingled with the taunts of Mephistopheles and with strains from the choir within the church.

Marguerite is in prison. In frenzy she has drowned her child. She has been condemned to die at daybreak. Her reason is gone. Mephistopheles and Faust appear in the cell though the gates are locked and barred. Faust in agony declares he loves her and asks her to flee with him. Although weak and wandering, she refuses, and dies, uttering words of prayer. Angels appear to receive her soul. Mephistopheles drags Faust away.

Favorita, La (*lä fä'vō-rē'tä*). Based upon the French drama *Le Comte de Comminges*; music by Donizetti; words by Royer and Waez; première Paris 1840, New Orleans 1843, New York 1848.

Leonora, the favorite of the king of Castile, is wooed by Fernando, who is ignorant of her relations with the king. She refuses to marry and secures for Fernando a commission in the army. He returns victorious. The king, suffering under a papal anathema, consents to the marriage of the lovers. When Fernando discovers Leonora's former relations with the king, he curses both and seeks refuge in a monastery. Leonora follows, is forgiven, and dies in his arms.

Fidelio (*fē-dā'lyō*). Music by Beethoven; words by Sonnleithner; unexampled for its moral grandeur and for the resplendent purity and ideality of its music; Beethoven's only opera; première Vienna 1805, New York 1839.

Florestan, a Spanish nobleman, has fallen into the power of his bitterest enemy, Pizarro, the governor of a state prison near Madrid. He is confined in a dungeon without light or air. Leonora, wife of Florestan, has hired herself, in man's attire, as servant to Rocco, head jailer, under the name of Fidelio.

News comes that the minister Fernando is about to inspect the prison. To escape detection of his crime, Pizarro plots to kill Florestan. He orders Rocco to dig a grave in the prisoner's cell. Leonora helps the jailer, and when their task is finished Pizarro comes down and is about to stab Florestan. Leonora threatens him with a pistol. She holds the governor at bay till the minister arrives. Pizarro is disgraced, and Florestan is restored to his lost honors and dignity.

Flying Dutchman, The. *Der Fliegende Holländer.* An opera by Wagner; based upon a legend by Heine; première Dresden 1843, Philadelphia 1876, New York 1877.

Because of blasphemy, a sea captain is condemned to sail the seas until he finds a maiden, faithful unto death. He may land once in seven years. Senta meets him and, though bethrothed to Eric, feels she is destined to save the captain. Eric begs her to remain. The captain thinks her unfaithful and goes to his ship. She dashes into the water after him. The ship sinks. The captain and Senta, surrounded by a halo of light, rise from the wreck, clasped in each other's arms.

Freischütz (*frī'shüts'*), **Der.** Music by Weber; words by Kind; plot from an old German legend; very popular; première Berlin 1821, New York 1825.

The Freischütz is Max the huntsman. He loves Agatha, daughter of Kuno, the head ranger of Prince Ottokar of Bohemia. Max has been promised the hand of Agatha in marriage, on condition that he win a forthcoming contest in marksmanship.

Kasper, a huntsman who has sold himself to the Evil One, also loves Agatha. His soul will become forfeit unless he brings a fresh victim in his place. While Max is shooting at a target, the Evil One in the form of Zamiel causes him to miss the mark. Max becomes discouraged. Kasper hands him his rifle, loaded with a magic bullet, and bids him repeat the formula, "in the name of Zamiel." Max easily wings an eagle soaring high above.

On the suggestion of Kasper, Max meets Zamiel at midnight in the haunted Wolf's Glen deep in the forest, to procure more magic bullets. Kasper hopes thereby to deliver Max to the Evil One and as a reward to gain an extension of time for himself. Amid scenes of the wildest supernatural horror the bullets are cast in the presence of the terrible Zamiel himself. Zamiel gives Max six bullets

which he may use as he pleases and one whose course he reserves the right to direct.

Agatha makes arrangements for her wedding. A pious hermit gives her a magic garland of roses. She is troubled because she has dreamed she was a dove and Max shot at her. In her dream the dove changed into a bird of prey and dropped at her feet. She is troubled also, because, instead of the bridal wreath she ordered, a funeral wreath was sent her.

At the contest, Max, having already spent six bullets, is ordered by the prince to shoot at a dove flying past. As he shoots, the dove is transformed into Agatha. Her magic garland protects her. When the smoke has cleared away, it is found that Zamiel directed the bullet to the heart of Kasper. The Evil One carries off Kasper. Max confesses his guilt and is banished. Kuno, Agatha, and the pious hermit intercede for him. The prince reduces his sentence to one year's probation.

Gioconda, La (*lä jō-kōn'dä*). Music by Ponchielli; words by Boito; plot adapted from Victor Hugo's drama *Angelo*; première Milan 1876, New York 1883.

Gioconda is a beautiful street singer in Venice. She loves the noble Enzo Grimaldo and buys his safety from the police spy Barnaba with the promise of her own hand, only to find that Enzo uses his liberty to carry on a love affair with Laura, wife of Alvise. She is generous enough to save the lives of Enzo and his mistress, which are in danger from the vengeance of Laura's husband, and finally commits suicide to escape falling into the hands of Barnaba.

Götterdämmerung, Die (*gût'ĕr-dĕm'ĕr-ōōng*). *Twilight of the Gods.* See *Ring of the Nibelung, The.*

Hänsel und Gretel (*hĕn'sĕl*) (*grā'tĕl*). A fairy opera; music by Humperdinck; words by his sister Mrs. Adelheid Wette; story based upon Grimm's fairy tale of the same name; some critics pronounce it the most important opera since "Parsifal"; première Weimar 1893, New York 1895.

Hänsel and Gretel, the children of Peter, the poor broom maker, and his wife Gertrude, are left to keep house together. They soon tire of their work and begin to play. The mother comes home without food. While punishing the children for neglecting their work, she upsets the milk bowl, the only hope of supper. Angrily she sends the children out into the forest to pick berries. Soon Peter's voice is heard singing cheerfully in the distance. He has had good success selling brooms, and returns laden with food. He asks about the children and is horrified to learn where they are. He terrifies his wife with the story about the witch of Ilsenstein who steals children. They both hurry out to find the children.

Meanwhile out in the forest the children amuse themselves picking berries and making flower garlands until the approach of night, when, to their horror, they find that they have lost their way. Tired out they sink down on the moss beneath a spreading tree. They say their evening prayer, and the fairy sandman puts them to sleep. Fourteen angels descend on a golden stairway and guard them from danger.

The dawn fairy sprinkles dewdrops upon the children, and they wake up. Near by they discover a beautiful gingerbread house. This is where the witch lives, who bakes little children into gingerbread in her great oven and eats them up. She catches Hänsel and Gretel and almost succeeds in her wicked schemes, but, when she opens the oven door to see if the oven is hot, Hänsel and Gretel push her in and close the door. The oven explodes and the house tumbles down. The witch has been baked into gingerbread, and all the children she has stolen come back to life. While they are dancing and singing, the anxious parents arrive and are overcome with joy to find their children unharmed.

Huguenots (*hū'gĕ-nŏts*), **The.** *Les Huguenots.* Music by Meyerbeer; words by Scribe and Deschamps; première Paris 1836, New Orleans 1839.

Anxious to reconcile the Catholics and the Huguenots, Marguerite, who is betrothed to King Henry IV, seeks to unite Raoul, a Huguenot, and Valentine, daughter of the Catholic Count St. Bris. Raoul has saved Valentine's life. She loves him, but he unjustly suspects she has another lover. Having knowledge of the proposed massacre of the Huguenots, Valentine, torn between loyalty and love, warns Raoul. He warns his friends but is determined to share their fate and seeks refuge with them in the church. Valentine joins Raoul. All perish in the massacre.

Iris. Music by Mascagni; words by Illica; première Rome 1898, New York 1902.

Iris, a Japanese girl, named after the goddess of the rainbow, who is the messenger of peace, lives with her blind father. The rich Osaka and a dive keeper abduct her. She is brought to a luxurious apartment. Osaka makes love to her but is unsuccessful because of her innocence. The blind father finds her. Thinking she is guilty, he curses her. She throws herself into a sewer basin. Ragpickers are about to steal her clothes, when she moves and scares them away. She lifts her eyes to the sun and dies with a smile upon her lips. Flowers spring up about her body as her soul floats into the infinite.

Jewess, The. *La Juive.* Music by Halévy; words by Scribe; première Paris 1835.

The scene of The Jewess is laid in Constance in the 15th century. Leopold, a prince of the empire, in the disguise of a young Israelite, has won the heart of Rachel, the daughter of the rich Jew Eleazar. When the latter discovers the true nationality of his prospective son-in-law he forbids him the house, but Rachel consents to fly with her lover. Later she discovers that Leopold is a prince, and betrothed to the Princess Eudoxia. Her jealousy breaks forth and she accuses him of having seduced her,—a crime which in those days was punishable by death.

Rachel, Leopold, and Eleazar are all thrown into prison. There Rachel relents, and retracts her accusation. Leopold is accordingly released, but the Jew and his daughter are condemned to be immersed in a caldron of boiling oil.

Königskinder (*kûn'ĭKs-kĭn'tĕr*), **Die.** A fairy opera; music by Humperdinck; words by Ernst Romer (Elsa Bernstein); première Munich 1897, New York 1910.

The king's children are a prince and princess in the disguise of two poor and neglected children. The princess has fallen into the power of a witch who lives in the forest near Hellabrunn. The witch compels her to tend geese. An exiled prince finds her there. He knows she is a princess in spite of her ragged clothes.

The people of Hellabrunn send three men, a broom maker, a woodchopper, and a minstrel, to inquire of the witch whom to choose as a ruler. The witch replies that their rightful sovereign will pass through the city gate at noon on the morrow. The minstrel, having the eyes of a seer, recognizes the princess in the goose girl and breaks the witch's spell.

The next day at noon the goose girl, followed by a flock of geese, enters the city. The prince, who is a swineherd, alone hails her as a princess. The people, expecting to see a king in royal robes, laugh at the prince and the princess and drive them away. In anger the people burn the witch. The broom maker and the woodchopper go to live in the abandoned hut.

The poor children, after wandering in the forest a long time, find the hut. They ask for food. The prince must give his crown in exchange for a loaf of bread. The loaf has been poisoned, and the prince and princess die. The minstrel and children from Hellabrunn find their bodies in the snow and give them a royal burial.

Lakmé (*läk-mā'*). Music by Delibes; words by Goudinet and Gille; plot based upon the romance *Le Mariage de Loti*; première Paris 1883, New York 1886.

Lakmé, the daughter of a Brahman priest in India, loves Gerald, an officer of the British army. Knowing he is on sacred ground she warns him that he would be punished by death if her father should find him. Soon after he leaves, her father, Nilakantha, appears. He notices strange tracks in the soft earth and swears death to the trespasser.

Nilakantha and Lakmé, disguised as penitents, enter the public square. Nilakantha, thinking thereby to attract the trespasser of yesterday, commands his daughter to sing. Gerald falls into the trap and speaks to her. The priest tries to assassinate him, but Lakmé, with the aid of her maid, conveys Gerald to a hut in the forest, where she nurses him back to health. He has grown to love her and one day asks her to bring him a draft of the water said to make earthly love eternal. During her absence, Frederick, a brother officer, visits Gerald and exacts from him a promise to join his regiment which has received orders to march. When Lakmé returns she finds Gerald changed. A faint bugle call is heard. Gerald says duty calls and he must go. He bids Lakmé a tender farewell. She eats some flowers of the poisonous stramonium tree and falls into his arms. Nilakantha appears. Lakmé implores her father with her dying breath to forgive Gerald. One victim being thought sufficient to appease the wrath of the deity, Gerald is permitted to go unharmed.

Lohengrin (*lō'ĕn-grĭn*). Music and words by Wagner; story taken from many sources, including an old German legend and that of King Arthur and his knights; première Weimar 1850, New York 1871.

At the instigation of his wife Ortrud, Frederick of Telramund charges Elsa of Brabant with the murder of her brother Gottfried, who has disappeared. King Henry the Fowler, holding council under the great oak beside the river Scheldt is judging the case. Elsa makes denial. The king, unable to judge, calls for the judgment of God and asks Elsa to choose a champion. She speaks of a knight she has seen in a vision, who will defend her. The king proclaims the combat and orders trumpets to be sounded. No one answers. On Elsa's entreaty the trumpets are sounded again.

A boat drawn by a swan and bearing a knight clad in silver armor approaches on the river. The people declare it is a miracle. The knight disembarks and announces that

he is sent by God to defend a maiden unjustly accused. Turning to Elsa he asks if she will trust him to defend her honor. In gratitude she kneels at his feet. He asks her to become his wife and, if she will grant this boon, to promise further never to ask his name or race. If she should violate her promise he must at once return. They embrace tenderly. In the combat which follows, the strange knight strikes down Telramund but spares his life. Telramund and his wicked wife, Ortrud, are outlawed.

The king orders a royal wedding. As the procession nears the church, Telramund and his wife denounce the strange knight as a sorcerer. They are driven away. Ortrud, however, succeeds in planting seeds of doubt in the mind of Elsa. In the bridal chamber words of endearment are spoken. The knight utters passionately the name of his beloved. She deplores that she cannot speak his name. Why should he not reveal it now when there is no one to overhear? At last, in frenzy, she asks the fatal question, "Who art thou?" At that moment Telramund and four nobles rush in with drawn swords. Too late Elsa sees her mistake. She hands her lord his sword. With one stroke he strikes Telramund dead.

The last scene takes us back to the banks of the Scheldt. Surrounded by the assembled army the knight appears in silver mail before the king, who again is holding council under the great oak beside the river. The king greets him. The knight expresses regret that he cannot lead the troops. He relates how Telramund was killed. He declares sadly that the woman he loves, contrary to her promise, has demanded to know his name and race. He must answer. He is Lohengrin, son of Parsifal, lord of Monsalvat, the keeper of the Holy Grail. His mission is to succor the distressed, but his mystic power vanishes if the secret of its origin be known. Even as he speaks, the swan reappears drawing the boat which is to bear him away.

Now, in her moment of triumph, Ortrud exultingly declares she bewitched Gottfried and changed him into the swan. Lohengrin kneels and after a short prayer loosens the swan's golden chain and steps into the boat. The white dove of the Grail descends from the sky, releases the swan, and, while Elsa clasps her restored brother to her breast, swiftly draws Lohengrin's boat away over the waters of the Scheldt.

Louise. Music and words by Charpentier; a story of Bohemian life in Paris; première Paris 1900, New York 1908.

Louise, a young working girl, and Julien, a poet, fall in love. The parents of Louise twice reject their proposal to marry. Louise then goes to live with Julien. Her broken-hearted father sends for her. She goes home for a visit but is treated so unkindly that she soon returns to her kind-hearted lover.

Lucia di Lammermoor (*lōō-chē'ä dē lăm-mĕr-mōōr'*). Donizetti's masterpiece; words by Cammerano; based upon Walter Scott's novel; première Naples 1835, New Orleans 1841, New York 1845.

Lucia, who is betrothed to Sir Edgar, is persuaded by her brother, Sir Henry Ashton, that her lover is unfaithful. To please her brother she reluctantly marries Lord Arthur. As the marriage contract is signed, Sir Edgar appears and denounces her. Lucia becomes insane, kills her husband, and dies of a broken heart. Sir Edgar, griefstricken, commits suicide.

Madame Butterfly. Music by Puccini; words by Illica and Giacoso; plot from story of the same name by John Luther Long; première Milan 1904; Washington 1906.

Madame Butterfly is a Japanese maiden, Cho-Cho-San, of Nagasaki, who becomes the wife of an American naval lieutenant, Pinkerton, through the aid of a marriage broker, Goro. The wedding is attended by the American consul, Sharpless, and the relatives and friends of the bride. Her uncle, a native priest, having heard that Cho-Cho-San has adopted the religion of her husband, rushes in to denounce her as an outcast. Pinkerton drives away the Japanese guests and assures his wife of his devotion to her. A few weeks after the wedding, however, Pinkerton returns to America.

Three years elapse. Butterfly waits patiently. Her husband has promised he will return when the robins nest again. Sharpless, commissioned by Pinkerton, calls to tell Butterfly that Pinkerton will soon arrive with his American wife. He advises her to marry the rich Yamadori who is suing for her hand. Butterfly scorns the advice and brings in her golden-haired boy as proof of her husband's love.

A salute of guns is heard from the harbor. Butterfly rushes to the window. It is the American warship *Abraham Lincoln*. She decorates the little house with cherry blossoms and watches throughout the night. In the morning Pinkerton, his wife Kate, and Sharpless appear. Pinkerton, realizing his baseness, turns back. Butterfly meets Kate in the garden and instantly understands. Kate, in pity, asks to have the boy. Butterfly says she may have him in half an hour, takes him in her arms, and enters the house. She places the boy upon a cushion, blindfolds him, and puts an American flag into his hands. With her father's dagger bearing the inscription, "To die with honor when one can no longer live with honor," she stabs herself. She falls at the feet of her boy and stretches her arms toward him. Pinkerton enters to ask forgiveness. Finding Butterfly dying, he is overcome with remorse and folds her tenderly in his arms.

Manon (*mä'nôN'*). Music by Massenet; words by Meilhac and Gille; plot from the novel of Abbé Prévost; première Paris 1884, New York 1885.

Manon is a pretty country girl, the cousin of Lescaut. The Chevalier des Grieux meets her at an inn while she is on her way to a convent to finish her education. He falls in love and they elope to Paris. Des Grieux not being able to supply the luxuries she craves, Manon elopes with a rich nobleman, De Bretigny.

She learns that Des Grieux is despondent and intends to enter a monastery. She goes to him and they are reconciled. Des Grieux visits a gambling place to gain riches for his love. He wins heavily, but the roué, Gillot, causes the arrest of Des Grieux for alleged cheating, and of Manon as being a dissolute woman. Manon is exiled to a prison colony. On the way Des Grieux, who has been saved from prison by his father, seeks her out. She asks his forgiveness and dies in his arms.

Martha. A comic opera; music by Flotow; words by St. Georges and Friedrich; première Vienna 1847, New York 1852.

Martha is really Lady Harriet Durham, maid of honor to Queen Anne. She is courted by her aged cousin Sir Tristan. Tired of court life, she visits the Richmond fair, dressed as a servant. Sir Tristan and her maid Nancy, dressed as peasants, accompany her.

Two farmers, Plunkett and his foster brother Lionel, attending the fair, engage the two ladies as servants. The ladies accept the customary earnest money and find, too late, that it binds them to serve for one year. In spite of the protestations of Sir Tristan, they are carried off.

The ladies, who give their names as Martha and Julia, cause much annoyance at the farmers' house by refusing to cook and spin. Nevertheless, Lionel falls in love with Martha, and Plunkett with Julia. At midnight the ladies escape with the aid of Sir Tristan who appears with a carriage.

Lionel and Plunkett, in search of their lost servants, happen upon the queen's hunting party in the forest. They recognize their servants and claim them but are haughtily denounced as mad and are arrested.

Lionel had inherited nothing from his father but a ring, which his father had bidden him show to the queen if he ever got into trouble. This ring he brings to the attention of the queen through the aid of Plunkett and the secret aid of the fair Martha. The queen recognizes the ring as having belonged to the banished earl of Derby, and acknowledges Lionel as his son. As the charges against the earl had proved false, his estates are restored to Lionel.

Lady Harriet makes advances to Lionel. He remains cold, thinking she is again merely trifling with his already wounded heart. Resolved to win Lionel, she and Nancy again go to the fair, disguised as servants. Lady Harriet meets Lionel. The clouds roll away. They are betrothed. Nancy and Plunkett unite their fortunes.

Masked Ball, The. *Il Ballo in Maschera.* Music by Verdi; words by Somma; première Rome 1859, New York 1861.

Reinhart, secretary to Count Richard, governor of Boston, seeks the governor to warn him of a conspiracy. He finds him in the forest, accompanying a veiled lady to the retreat of a sorcerer. The conspirators approach. The lady is left in Reinhart's care. By accident he discovers she is his wife, Amelia. Reinhart joins the conspirators and later, at a masked ball, stabs the governor. The dying man declares Amelia is innocent of wrong and gives Reinhart an important commission in England.

Meistersinger, Die (*mīs'tĕr-zĭng'ĕr*). *The Mastersingers.* A comic opera by Wagner, in which the composer satirizes his critics; première Munich 1868, New York 1886.

Sir Walther loves Eva. Her father, Pogner, determines that only the winner in a singing contest may woo her. To enter the contest, Walther must learn the rules of singing laid down by the fraternity of mastersingers and submit to an examination by the clerk, Beckmesser. He fails miserably. Nevertheless, he enters the contest and sings from his heart. He wins the applause of the people and the hand of Eva.

Mignon (*mē'nyôN'*). Music by Thomas; words by Barbier and Carré; plot based upon Goethe's *Wilhelm Meister*; première Paris 1866, New York 1872.

Mignon, apparently a gypsy girl, appears upon the streets of a German village. Giarno, the leader of the gypsy band, brutally compels her to dance before the inn, for the entertainment of a troupe of actors on the way to the near castle. Lothario, an old half-witted harper, interferes. He is on the point of being overpowered by the

gypsies when Wilhelm Meister rescues him. With a purse of gold Wilhelm purchases the release of Mignon.

Upon the invitation of Filina, an actress, Wilhelm accompanies the troupe to the castle. Not knowing what else to do with Mignon, he takes her along as his servant. Wilhelm soon becomes infatuated with Filina. Mignon from the first loved her master. In a fit of jealousy she tries to drown herself. Lothario, who is instinctively drawn to her, prevents this and tries to console her. Mignon expresses the wish that lightning might strike the castle. Lothario sets it on fire.

After the entertainment, the actors emerge from the castle. Filina sends Mignon back for a bouquet of flowers she had forgotten. Repenting of her sinful wish, Mignon obeys. After she has gone, the castle bursts into flames. Wilhelm rushes after her. He finds her unconscious and brings her out in his arms.

Lothario takes Mignon to Italy to nurse her back to health. Wilhelm follows. There it is found that Lothario is of noble birth, and that, when his daughter Sperata disappeared years before, he had lost his reason and had since been wandering about in search of her. The familiar scenes restore his mind. Lothario hears Mignon recite a prayer she learned in childhood and recognizes her as the daughter who was lost. Wilhelm has come to love Mignon as dearly as she loves him. On her recovery they are united.

Mikado, The (*mĭ-kä'dō*). A comic opera; music by Sullivan; words by Gilbert; première London 1885, Chicago and New York 1885.

The Mikado is the emperor of Japan. His son Nanki-Poo has run away in the garb of a strolling minstrel to escape marrying the elderly Katisha. He has become infatuated with Yum-Yum, the ward of Ko-Ko, who has a monopoly on guardianship and is also the Lord High Executioner. Ko-Ko too loves Yum-Yum and is planning to marry her.

When Ko-Ko, the tailor, was appointed to his high office, all the ministers of state resigned, and Pooh-Bah succeeded to their titles. He is also "retailer of state secrets at a low figure." This Pooh-Bah informs Nanki-Poo of Ko-Ko's intentions with regard to Yum-Yum. Nanki-Poo nevertheless sees Yum-Yum and, on revealing his high rank, wins her affections.

Ko-Ko, who is a mild-mannered man, did not have an execution even on his inauguration day. The Mikado sends him word that he must arrange for an execution of some sort within a month or he will lose his position. Nanki-Poo comes to Ko-Ko's rescue by offering himself as a victim, provided he may marry Yum-Yum and live with her during the month before the execution. Ko-Ko gratefully accepts the offer.

Yum-Yum has made all preparations for the wedding. She is having a tête-à-tête with Nanki-Poo when Ko-Ko interrupts to inform them he has discovered a law which requires that a wife whose husband is executed must be buried alive. To avoid anything so tragic, Nanki-Poo offers to commit suicide. This, however, would only complicate matters and would not save Ko-Ko, so he proposes to make a false statement that Nanki-Poo has been executed with horrible torture.

The Mikado arrives. Ko-Ko tells him about the execution which he claims has taken place. The Mikado flies into a rage and informs Ko-Ko it is the heir to the throne he has killed. As punishment for his blunder the executioner is condemned to be boiled in oil. Nanki-Poo unexpectedly appears. Ko-Ko saves himself by marrying Katisha. Nanki-Poo and Yum-Yum have a royal wedding.

Oberon (*ō'bĕr-ŏn*). Music by Weber; words by Planche; story based upon Wieland's poem; première London 1826, New York 1827.

Oberon, the king of fairyland, and his wife Titania have quarreled. He vows he will not make up until he shall find lovers constant to each other through trials and temptations. Puck, who has tried to find such lovers, enters with news. Sir Huon has been banished by Charlemagne and forbidden to return until he has slain the caliph of Bagdad's wicked councilor, Babekan, and won the caliph's daughter Rezia as his bride. Oberon's interest is aroused. He offers aid. Sir Huon's adventure succeeds. Then Huon and Rezia are successively imprisoned, shipwrecked, sold as slaves, and condemned to the death at the stake, but their love remains constant. Oberon rescues the lovers. Their constancy is rewarded. They are united. Charlemagne restores Sir Huon to favor. Oberon and Titania are reconciled.

Orpheus and Eurydice (*ôr'fūs*) (*ū-rĭd'ĭ-sē*). Gluck's masterpiece; the oldest opera still popular; words by Calzabigi; première Vienna 1762, New York 1885.

Orpheus, the great singer, mourns his wife Eurydice, who had died and passed to the Elysian fields. Eros, the goddess of love, promises to aid him in bringing her back, on condition that he will not look at Eurydice during the journey. Orpheus descends into Hades, overcomes the demon guards by his song, and finds Eurydice among the shades. He takes her by the hand and leads her away. Wounded by his apparent coldness, Eurydice implores him to look at her. Orpheus steels himself against the temptation but finally yields and clasps her in his arms. She dies at his feet. The goddess of love, touched by his constancy, restores Eurydice to life.

Pagliacci, I (*ē päl-yä'chē*). *The Players*. Leoncavallo's masterpiece; words by the composer; première Milan 1892, New York 1894.

A troupe of players gives a play in an Italian village. Before the play, Canio, the master of the troupe, finds his wife Nedda with a secret lover who escapes. In the play a similar situation occurs. With scarcely a pretense of keeping to his rôle of Pagliaccio, Canio demands from his wife, representing Columbine, the name of her lover. She mocks him. Overcome by jealousy, he stabs her. She speaks the name of her real lover, Silvio. The latter, who formed one of the rustic audience, rushes to the stage only to receive his deathblow as well.

Parsifal (*pär'sĭ-făl*). Words and music by Wagner; the plot based upon an old legend found in many forms; Wagner's version inspired by epic written about 1300 by Wolfram von Eschenbach; première Bayreuth 1882, New York 1903.

The cup from which Jesus drank at the Last Supper, and which received His blood when He was wounded upon the cross, is called the Holy Grail. This and the spear with which His side was pierced were placed, according to legend, in the care of a pure knight, Titurel, who built for them the splendid temple Monsalvat in the fastnesses of the Pyrenees. He then chose other pure knights to serve with him as protectors of the holy relics. When Titurel became infirm with age he appointed his son Amfortas to succeed him as king of the Grail.

Near the castle dwells the magician Klingsor, who has in vain solicited entry into that company of pure knights. In revenge he has sought counsel of an evil spirit, and is now devoted to the destruction of the knights and to the capture of the Holy Grail. He has constructed a garden of wicked loveliness, peopled by beautiful sirens, through whose charms many of the knights have already fallen. Chief among these sirens is the beauteous Kundry, a strange being, over whom Klingsor exercises hypnotic power. She is that Herodias who laughed at our Savior upon the cross. She was thenceforth condemned to wander through the world, cursed to laugh at pain and suffering, praying only for the gift of tears to release her weary soul.

Amfortas too has sallied forth to subdue the sorcerer, armed with the sacred spear, but has succumbed to the charms of the siren Kundry. He has lost the spear to Klingsor, and received from its point a grievous wound which no balm can heal.

The opening scene is a cool woodland glade, near the castle, where Gurnemanz, an old knight, and two young esquires are sleeping. Upon awakening, Gurnemanz tells the esquires the story of the Holy Grail and repeats the prophecy which promises relief to their suffering king.

> Wise through pity,
> The sinless fool.
> Look thou for him
> Whom I have chosen.

Several knights and esquires rush in, dragging Parsifal, who has slain a sacred swan with his bow and arrow. Finding the youth simple and as innocent as a child, Gurnemanz leads him to the vast hall of the Grail knights in the hope that he may prove to be the sinless fool of the prophecy. There the solemn ceremony of uncovering the Grail is performed. Parsifal, who watches the whole rite, feels a sharp pang of sympathy at Amfortas' suffering, but as yet he does not understand what it means. He is not yet wise through pity, and Gurnemanz, greatly disappointed, turns him from the temple door.

Parsifal now wanders near the castle gardens of Klingsor, who, sensing danger, commands Kundry and the sirens to bewitch him. Parsifal vanquishes the knights who guard the castle, and enters the enchanted garden. Lovely maidens dance around him until dismissed by a voice sounding from a network of flowers. Parsifal turns and beholds Kundry, a woman of exquisite loveliness. She tells him of his dead mother and, drawing him toward her, presses upon his lips the first kiss of love. The touch of defilement awakens in him a throbbing compassion for a world of sin. The wounded Amfortas' cry becomes plain to him. He puts Kundry and her endearments from him, and in her discomfiture she cries to Klingsor. The latter hurls the sacred spear at him, but it stops over Parsifal's head. Parsifal grasps it and makes a sign of the cross; with a crash the enchanted garden and castle fall into ruin. The sirens become withered flowers. The spot, a moment before bright with exotic beauty, becomes a desert waste.

Years pass. Then, one Good Friday morning a warrior approaches the temple of the Holy Grail, clad in black armor. It is Parsifal returned at length after weary wanderings.

Gurnemanz, seeing him approach, recognizes the spear and salutes and anoints Parsifal as the new guardian of the Grail. Kundry, who now serves Gurnemanz, washes the feet of Parsifal and dries them with her hair. Parsifal baptizes the regenerate Kundry, redeemed at last from her curse. The three proceed to the temple where the rites have not been performed since Parsifal's former visit. The knights are gathered for Titurel's burial. Amfortas, suffering unspeakable agony from his wound and from his sense of unworthiness, still obstinately refuses to uncover the Grail. Parsifal heals his wound with a touch of the sacred spear, ascends to the altar, unveils the sacred chalice, and kneels in silent prayer. Once more the sacred glow illuminates the mystic cup. As Parsifal waves it in token of benediction alike to the pardoned Amfortas and the ransomed Kundry, a snowy dove hovers over his anointed head.

Pinafore, H. M. S. A comic opera; music by Sullivan; words by Gilbert; the most popular opera ever produced in England; première London 1878, New York 1879.

H. M. S. Pinafore lies at anchor in the harbor of Portsmouth. Captain Corcoran is the master of the ship. The Right Honorable Sir Joseph Porter, first lord of the admiralty, accompanied by sisters, cousins, and aunts, comes aboard to sue for the hand of the captain's daughter Josephine. She rejects him and tells her father she loves a common sailor though no one shall ever know it. Ralph, the common sailor, woos Josephine but is haughtily spurned. In despair, he threatens to shoot himself. She then confesses her secret love for him, and they plan to elope that night. The wicked Dick Deadeye overhears them.

The captain at night complains to the moon of his hard lot. Little Buttercup, the round and rosy bumboat woman, offers to console him. He lets her know he can never be more than her friend. She threatens that he shall have a surprise some day. Sir Joseph approaches and informs the captain he is disappointed with Josephine's behavior. The captain reminds him she is no doubt dazzled by his rank. Sir Joseph again seeks Josephine and assures her that "love levels all rank." She seems pleased and says she will hesitate no longer. Sir Joseph and the captain rejoice over the prospect when Deadeye reveals the lovers' plot. The captain confronts them as they are about to escape. Ralph declares his love. The captain swears. Sir Joseph, overhearing him, orders him to the cabin and demands from Ralph the cause of the captain's profanity. On learning the truth, he flies into a rage and sends Ralph to the ship's dungeon.

Little Buttercup relates to Sir Joseph that long ago she nursed two babies, one a patrician, the other lowborn. She got the babies mixed. The first was Ralph, the other the captain. Sir Joseph orders Ralph and the captain to appear before him. He reduces Corcoran to the rank of a common sailor and gives Ralph command of the ship. Ralph and Josephine receive consent to marry. Corcoran and Buttercup agree to unite their fortunes.

Prince Igor (*ē'gŏr*). The only opera of the Russian composer, Borodin; based upon *The Epic of the Army of Igor*, a chronicle of the 12th century; première Petrograd 1890, New York 1915.

Prince Igor leaves his wife in the care of his brother, Prince Galitzky, and goes with his army to fight the Mongol chief, Kontchak. Prince Galitzky betrays his trust and stirs up rebellion. Prince Igor is captured. When the situation seems hopeless, he escapes, returns home, and restores order.

Prophet, The. Music by Meyerbeer; words by Scribe; première Paris 1849.

John, an innkeeper of Leiden, loves Bertha, a village maiden who dwells near Dordrecht. Unfortunately her liege lord, also, the count of Oberthal, has designs upon the girl and refuses his consent to the marriage. Bertha escapes from his clutches and flies to the protection of her lover, but Oberthal secures the person of Fidès, John's old mother, and, by threatening to put her to death, compels him to give up Bertha. In his rage against the vice and lawlessness of the nobles, John joins the ranks of the Anabaptists, a revolutionary sect pledged to the destruction of the powers that be. Their leaders think they recognize John as a prophet promised by heaven, and he is installed as their chief. The Anabaptists lay siege to Munster, which falls into their hands, and in the cathedral John is solemnly proclaimed the Son of God. During the ceremony he is recognized by Fidès, who, believing him to have been slain by the false prophet, has followed the army to Munster in hopes of revenge. She rushes forward to claim her son, but John pretends not to know her. To admit an earthly relationship would be to prejudice his position with the populace, and he compels her to confess that she is mistaken. The coronation ends with John's triumph and the unhappy Fidès is carried off to a dungeon. Later John visits her in her cell, and obtains her pardon by promising to renounce his deceitful splendor and to fly with her. Soon afterward he discovers that a plot against himself has been hatched by some of the Anabaptist leaders, and he destroys them as well as himself by blowing up the palace of Munster.

Queen of Sheba, The. *Die Königin von Saba.* Music by Goldmark; words by Mosenthal; première Vienna 1875, New York 1885.

Assad, affianced to Sulamith, is sent by Solomon to conduct the Queen of Sheba to his presence. Assad is dazzled by the queen's beauty and renounces Sulamith. Banished for blasphemously calling the queen his divinity, Assad wanders about in the desert. The queen visits him but is repulsed. Sulamith goes to him. A simoom sweeps across the desert. Locked in each other's arms, they perish.

Rheingold, Das (*rīn'gôlt*). *The Rhinegold.* See *Ring of the Nibelung.*

Rigoletto (*rē'gô-lĕt'tō*). Musically, Verdi's masterpiece; story based upon Victor Hugo's *Le Roi s' Amuse*; words by Piave; première Venice 1851, New York 1857.

Rigoletto, buffoon and panderer to the licentious duke of Mantua, hires an assassin to murder the duke, after his own daughter Gilda has been violated by his master. The assassin's sister lures the duke to his house, but on her plea his life is spared. As the assassin must deliver a victim to Rigoletto, he murders the first person who enters his house. It happens to be Rigoletto's daughter dressed as a page.

Ring of the Nibelung, The (*nē'bĕ-lōōng*). *Der Ring des Nibelungen.* Music and words by Wagner; based upon the *Nibelungenlied* and the Scandinavian *Eddas*; an allegorical festival drama consisting of four operas: (1) a prologue, *Das Rheingold*, première Munich 1869, New York 1889; (2) a trilogy, *Die Walküre*, première Munich 1870, New York 1877; (3) *Siegfried*, première Bayreuth 1876, New York 1877; and (4) *Die Götterdämmerung*, première Bayreuth 1876, New York 1888.

1. *Das Rheingold*, or "The Rhinegold," symbolizing earthly power, is gold which belongs to the nymphs dwelling in the waters of the Rhine. The dwarf Alberich, prince of the Nibelungs, clumsily courts the maidens, unsuccessfully trying to catch first one, then another. The nymphs incautiously reveal the secret of the gold which, if made into a ring, will make the possessor ruler of the world, provided he renounces love forever. Alberich boldly seizes the gold, carries it to his country, Nibelheim, forges from it a ring, and makes himself master of the realm.

Wotan, of the race of gods, and his wife Fricka awaken from their slumber upon a bed of flowers to gaze upon the stately castle of Walhalla which giants have built for them during the night. The giants, Fasolt and Fafner, carry off their reward, Freia, the goddess of youth and beauty, foolishly promised by Wotan. As a result the gods begin at once to age.

The fire god, Loge, brings news of Alberich's treasure-trove, and the giants agree to accept the golden treasure in place of Freia if the gods can secure it. Wotan and Loge go to Nibelheim on this quest. There they find Alberich dominating his fellow dwarfs by virtue of his magic gold. He has forced his brother Mime, a clever smith, to make a Tarnhelm, a helmet of invisibility. Wotan and Loge cunningly beguile Alberich into exhibiting the power of his new treasure. The confiding dwarf first changes himself into a huge snake, and then into a toad. While he is in the latter shape, Wotan puts his foot upon him, while Loge snatches the Tarnhelm from his head. Together they bind him and carry him off. With his treasure torn from him, his Tarnhelm, and last of all the ring with which he hoped to rule the world, Alberich is in despair. He utters a terrible curse upon the ring, vowing that it shall bring ruin and death upon every one who wears it, until it returns to its original possessors. The giants now appear to claim their reward. Wotan gives them the treasure, Tarnhelm, and the ring, in exchange for Freia. The curse at once begins to work. The giants quarrel over the possession of the ring. Fafner slays Fasolt and carries off the spoils.

Donner, the god of Thunder, calls up a storm and builds a magic rainbow bridge, over which the gods pass into Walhalla. Far below rise the despairing cries of the Rhinemaidens lamenting their lost treasure.

2. *Die Walküre*, or "The Valkyrie," Brunhilde, is one of the nine splendid daughters of Wotan by Erda, the goddess of the Earth. The mission of these valkyries is to bring dead heroes from battlefields to dwell in Walhalla and, if need be, help defend it.

Only a man without fear and without the lust for gold can wrest the ring from Fafner, who had changed into a fierce dragon. To raise up such a man, Wotan, under the name of Volse, weds a mortal who bears him two children, Siegmund and Sieglinde. The brutal Hunding murders the mother and forces Sieglinde to become his wife.

Siegmund, after years of wandering, comes to the hut of Hunding. The story of Sieglinde arouses Siegmund's pity and love. He draws from the trunk of an ash tree a magic sword, Nothung, placed there long before by a stranger (Wotan) who had said it should belong to the hero

able to withdraw it. Siegmund and Sieglinde flee, pursued by Hunding. Wotan sends the valkyrie, Brunhilde, to protect Siegmund. His wife, Fricka, the goddess of marriage, objects. Wotan then sorrowfully forbids Brunhilde to interfere. She, knowing her father's inmost desire, disobeys him. In his battle with Hunding, Siegmund is on the point of victory when Wotan interposes a lance and shatters his sword. Siegmund is pierced through by the spear of Hunding. Brunhilde collects the pieces of the broken sword and escapes with Sieglinde upon her horse, while Hunding falls dead at a contemptuous wave of Wotan's hand.

Wotan punishes Brunhilde for her disobedience by changing her into a mere woman. She is to be put to sleep upon the mountain top, to be the bride of the first man who finds and wakens her. On her entreaty, Wotan agrees to surround her with a ring of fire so that only a hero who will brave the fire can reach her. As Brunhilde's divine powers forsake her and she goes to sleep, Wotan kisses her a fond farewell. He places her upon a moss-covered rock and signals Loge to surround her with the ring of fire.

3. *Siegfried*, the second of the trilogy, advances the drama another stage. Many years have passed. Sieglinde had dragged herself to the forest and had died in giving birth to a son, Siegfried. Siegfried was brought up by the Nibelung dwarf, Mime, who hoped that the boy, now grown to manhood, might win the treasure for him by slaying Fafner, the dragon. Fafner is the former giant who had transformed himself into a dragon by means of the Tarnhelm in order to protect his hoard of gold.

Siegfried compels Mime to tell, bit by bit, the story of his mother and of his father's shattered sword, the fragments of which his mother had preserved. Mime tells also of Fafner, the dragon, ever guarding the treasure in his cave. He plans darkly that after Siegfried has killed Fafner he will drug and kill Siegfried, and gain possession of the ring.

Siegfried forges his father's sword anew, seeks out the dragon, and easily kills him. Touching his lips to the blood of the dragon on his hand, he finds that he can understand the song of the birds. As he listens, the warning voice of one of them tells him to fetch the ring and magic helmet from the dragon's cave. This he does and places the ring upon his finger. From the song of the birds he learns of Mime's dark plans. With one blow of his sword Siegfried slays the treacherous dwarf, then guided by his feathered friend proceeds to the mountain top, where Brunhilde lies within the flaming circle, awaiting the hero who shall release her. Wotan attempts to bar the way, but Siegfried shatters the spear of the god with one stroke.

Fearlessly and gayly Siegfried passes up through the fire and finds Brunhilde asleep. He awakens her by imprinting a kiss upon her beautiful lips. Siegfried speaks of love and persuades Brunhilde to become his bride.

4. *Die Götterdämmerung*, or the "Twilight of the Gods," tells of the destruction wrought by the curse of gold, and of the final triumph of love.

After a period of happy wedded life, Siegfried goes forth to do heroic deeds. Brunhilde remains within her circle of fire. Siegfried gives her the ring as a pledge of faith. She gives him her horse, Grane.

A valkyrie entreats Brunhilde to return the ring to the Rhine-maidens. Wotan had said that by so doing she would lift the curse and save the gods from destruction. Brunhilde refuses, for the ring is the symbol of Siegfried's love.

Siegfried arrives at the court of Gunther, who lives with his sister Gutrune and his half brother Hagen, the son of Alberich. Hagen has been bound by his father to gain possession of the ring. He devises a crafty scheme for getting Siegfried to do his will. He persuades Gutrune to give Siegfried a love philter which makes him forget the past. Siegfried's former love for Brunhilde is swallowed up in a burning passion for Gutrune.

According to Hagen's dark plans, Siegfried is to win Gunther's consent that Gutrune be given to him by fetching Brunhilde to be Gunther's bride. Assuming the form of Gunther by means of the Tarnhelm, Siegfried goes to Brunhilde's Rock, announces himself as Gunther, overcomes her resistance, and robs her of the ring, which he places upon his finger. When they arrive at the court of Gunther, unknown to Brunhilde, he has Gunther take his place. Hagen announces the arrival of Gunther and his bride and orders that a feast be prepared.

Hagen, pretending friendship for Brunhilde, offers to become her avenger. In despair, she reveals that Siegfried is vulnerable only in his back.

In a forest on the banks of the Rhine, Siegfried, having strayed from his companions in the chase, is asked by the Rhine-maidens to return the ring, warning him of the curse attached to it. He laughs at what he considers their womanly wiles and decides to keep it, trusting his sword.

Gunther, Hagen, and the hunters now appear on the scene, with game on their shoulders. After passing around the cup, Hagen addresses Siegfried, saying that he has heard that he understands the language of the birds. Thus invited, Siegfried tells the story of Mime, the dragon, and the forest bird. When he gets to the part where he followed the bird to Brunhilde's Rock, Hagen gives him a potion which restores his remembrance of Brunhilde. He proceeds to relate how he wooed, won, and wedded her. As Gunther listens horrified to this revelation, two ravens fly past. Siegfried turns to look at them, and Hagen stabs him in the back. Siegfried makes one last terrific effort to crush Hagen with his shield, then falls and expires with a greeting to Brunhilde, unconscious of having betrayed her. In silent grief, the vassals raise the dead body upon their shields, and carry it back to the castle through the moonlit forest, to the immortal strains of the "Funeral March."

Hagen demands the ring. When Gunther denies the request, he kills him. Hagen then attempts to take the ring from Siegfried's finger, when the corpse raises its hand in awful warning. At this moment Brunhilde appears, solemnly, majestically. She directs the young men to build a funeral pyre. After taking the ring from his finger she has Siegfried's body placed upon the pyre. With her own hand she applies a torch and, as the flames rise on high, she leaps upon her horse and rides into the burning mass. As the fire collapses, the Rhine begins to swell until it reaches the coals of the pyre, bearing on its surface the three Rhine-daughters, one of whom recovers the ring. Hagen dashes into the flood in search of the ring and is dragged down to the depths by the Rhine-maidens. The sky is seen aglow. Walhalla is in flames. The end of the gods is at hand.

Salome (*să-lō'mĕ*). Music by Richard Strauss; a setting, almost unabbreviated, of Oscar Wilde's play of the same name; première Dresden 1905; has had triumphs in Italy and Paris, but so seriously scandalized New York that it was withdrawn after a single performance. Although ethics of the story are somewhat difficult of digestion, there is a strange, exotic beauty in the weird harmonies and infinitely suggestive orchestration of the opera.

The scene is laid upon a terrace of Herod's palace, where soldiers are keeping watch while the king holds revel within. Salome, the daughter of Herodias, comes forth from the banquet chamber. The voice of Jochanaan (John the Baptist), who is imprisoned in a cistern near by, is heard. Salome commands Narraboth, a young Assyrian, to bring him forth. Dragged from his living tomb, Jochanaan denounces the wickedness of Herodias, but Salome, fascinated by the strange beauty of the prophet, has no ears for his curses. She pours forth her passion in wild accents, but is sternly repulsed by Jochanaan, who retreats once more to his cistern.

Herod and Herodias now come forth from the banquet, and Herod bids Salome dance. She extorts a promise from him that he will give her whatever she asks, even to the half of his kingdom, and dances the dance of the seven veils.

When this weird dance is finished she demands the head of Jochanaan. Herod pleads with her in vain, the executioner is sent into the cistern, and the head of Jochanaan is brought in upon a silver platter. Salome kisses the lifeless lips, but Herod in terrible wrath and horror cries to his soldiers, "Kill this woman," and, as the curtain falls, she is crushed under their shields.

Samson and Delilah. *Samson et Dalila.* Music by Saint-Saëns; words by Lemaire; a biblical opera, almost an oratorio; première Weimar 1877, New Orleans 1893, New York 1895.

The Hebrew leader, Samson, is lured by the Philistine woman, Delilah, to reveal that his hair is the secret of his strength. She soothes him to sleep, cuts off his hair, and puts out his eyes. Brought before the priest of the Philistines, Samson prays Jehovah for renewed strength and with a mighty effort pushes apart two pillars, with the result that the temple falls in ruins.

Siegfried (*sēg'frēd*). See *Ring of the Nibelung, The*.

Suzanne's Secret. *Il Segreto di Susanna.* A comic opera; music by Wolf-Ferrari; words by Golisciani; première Munich 1909, New York 1911.

Count Gil detects the odor of cigarette smoke in the drawing-room and accuses his young wife of having a secret. She does not deny it. He flies into a rage and attacks the furniture. He goes out, then returns unexpectedly, only to find more traces of cigarette smoke. He grasps his wife's hand furiously. In doing so he receives a burn from a cigarette. The secret is out. As a token that all is well, Count Gil daintily helps Suzanne light a fresh cigarette.

Tales of Hoffman. *Les Contes de Hoffman.* Music by Offenbach; words by Barbier; based upon three famous stories by Hoffman; première Paris 1881, New York 1882.

In the first act, or prologue, the poet, drinking with a group of students at an inn in Nuremberg, proposes to relate his adventures in love. The second, third, and fourth acts describe these adventures.

Olympia is an automaton made by Coppelius, who represents the Evil One. Spalanzani buys it and gives a bad check in payment. Hoffman sees Olympia through magic

spectacles supplied by Coppelius and falls in love. He is disillusioned only when Coppelius enters and smashes the automaton because he has been defrauded.

Giulietta, an accomplice of the Evil One in the form of Dapertutto, lures Hoffman to make love to her by displaying her charms and a magic gem furnished by Dapertutto. She then entices him to slay her dupe, Schlemihl, and deserts him for Dapertutto.

Antonie, the daughter of Krespel, is a good soul who stirs in Hoffman a feeling of pure affection. Her mother had been a great singer but died from treatment given by the Evil One in the shape of Doctor Mirakel. Antonie is consumptive and has been forbidden to sing, as the exertion may prove too great a strain. Doctor Mirakel provokes her to sing by conjuring up a vision of her mother. She dies in the arms of her father.

In the fifth act, or epilogue, Hoffman is again at the inn. He declares he has tried all kinds of love—that inspired by mere beauty, that inspired by sensuous charm, and pure affection. Henceforth he will devote himself to art as his only mistress.

Tannhäuser (*tän'hoi-zĕr*). Words and music by Wagner; plot from 13th century legend of contests between minnesinger arranged by the landgraves of Wartburg castle; première Dresden 1845, New York 1859.

Tannhäuser is a minstrel knight who has wasted a year at Venusberg under the spell of Venus. Wearying of his amorous captivity he would fain return to the earth once more. On the way, the pious chant of pilgrims bound for Rome wakens his slumbering conscience and bids him expiate his guilt through suffering, and his prayer mingles with the pilgrims' chant. The landgrave of Wartburg, with a retinue of minstrel knights, returning from the chase, comes upon Tannhäuser and invites him to the castle. Remorse bids him refuse, until the name of Elizabeth the landgrave's niece is mentioned. His heart moved by returning love, he gladly hastens to the castle with his newly found friends.

The landgrave arranges a contest for the minstrels in his great hall of the Wartburg. He proposes they prove their skill in song by singing the praises of love, and offers as a prize to the victor permission to seek the hand of Elizabeth. Other minstrels sing their improvisations of love in lofty strains; Tannhäuser, in brutal terms of the amorous orgies of the Venusberg. Outraged, several rush upon him with drawn swords to execute justice upon the self-convicted sinner, but Elizabeth throws herself before them and pleads for his life. Touched by her agonized pleading they lower their weapons. Tannhäuser, as his madness slips from him, realizes all that he has lost and falls repentant upon the earth. The landgrave bids him hasten to Rome where alone he may find pardon for so heinous a sin.

Elizabeth has been waiting anxiously for the return of the pilgrims. As they file past she eagerly scans their faces, but Tannhäuser is not among them. The faithful Wolfram tries to give her aid and comfort. She is grateful but indicates she must take the way which leads to heaven. Wolfram remains behind, and as darkness comes he sings to the lovely evening star whose bright rays pierce the darkness and reveal the path to the late traveler. To this star he confides her.

Tannhäuser appears, disappointed and despairing. The pope has bidden him hope for no pardon for his sin till the barren staff in his hand shall put forth leaves and blossoms. With these awful words ringing in his ears, Tannhäuser has had enough of earth and thinks only of returning to the embraces of Venus, but he cannot find the way. Venus appears in a light cloud. Through perfumed and rosy mists, seductive nymphs can be seen dancing. A voice reminds Tannhäuser of the myriad joys which await him in the realms of the goddess of love. In vain Wolfram appeals. Tannhäuser breaks from his friend and is rushing to meet the extended arms of the goddess when Wolfram adjures him once more by the sainted memory of Elizabeth. At the sound of that sinless name, Venus disappears.

The morning breaks. A funeral procession approaches. As the bier bearing the remains of Elizabeth is carried forward, Tannhäuser sinks lifeless beside it. Another group of young pilgrims advances swiftly, bearing the pope's staff which has put forth fresh leaves, the symbol of redemption and pardon for the repentant sinner.

Thaïs (*tä-ēs'*). Music by Massenet; words by Gallet; plot based upon novel by Anatole France; première Paris 1894, New York 1908.

Thaïs, an actress and courtesan, is the central figure in the gay life of Alexandria. Athanael, a monk living at the retreat of the Cenobite Order beside the Nile, returns from a visit to the city, saddened by the riotous living of his former wealthy friends. That night he has a vision of Thaïs appearing as Venus before an excited audience at the theater.

Impelled to save her from a life of sin and shame, he visits the house of Nicias. a friend of former days, and declares his purpose. Nicias invites him to remain for a party in honor of Thaïs, after the theater, and robes him in proper garments. Thaïs is attracted by the handsome stranger of stern mien. Athanael tells her he has come to teach her the way of salvation. She says she believes only in love and pleasure. Horrified by the revelry, Athanael departs, after telling Thaïs he will meet her at her home.

In the house of Thaïs, Athanael pleads eloquently that she embrace a higher love and the life everlasting. Thaïs, decked to allure him by her charms, is frightened, then becomes defiant. He commands her to follow him. She hears the voice of Nicias in an adjoining room and hesitates. Solemnly proclaiming she will yet repent, Athanael says he will await her coming on the doorstep until dawn and goes out.

Just before dawn, Thaïs, in somber dress, emerges from the house. She is ready to go but asks to retain an ivory image of Eros, the gift of Nicias. Athanael dashes it to the pavement. He commands her to destroy all her earthly possessions. With her permission he sets fire to the house. Nicias and his friends rush out in rage. They threaten Athanael and Thaïs. Nicias, to avoid violence, scatters gold among the crowd, and Athanael and Thaïs escape.

After a long and hard journey through the desert, Thaïs is given into the care of the White Ladies at their convent. Athanael returns to his retreat, but he cannot find peace. The image of Thaïs oppresses him. He dreams of her as Venus, then as dying at the convent. Though the night is stormy he sets out for the convent. He finds Thaïs upon a couch attended by nuns. In frenzy he begs her to return to earthly life. She has already had a vision of heavenly bliss. With a smile upon her lips she dies. Athanael utters a cry of despair and falls to the ground.

Tosca (*tŏs'kä*), **La.** Music by Puccini; the libretto is a clever condensation of Sardou's famous drama; première Rome 1900.

The scene is laid in Rome in the year 1800. The first act introduces Mario Cavaradossi, a painter who is at work in a church, and Floria Tosca, a famous singer with whom he is in love. She pays him a visit and teases him with her jealous reproaches. Cavaradossi befriends Angelotti, a victim of papal tyranny, who has escaped from the castle of Saint Angelo. He dispatches him by a secret path to his villa in the outskirts of Rome. Scarpia, the chief of police, who is close upon Angelotti's heels, suspects Cavaradossi of being implicated in Angelotti's escape and uses La Tosca's jealous disposition to help him in securing the prisoner.

In the next act, Angelotti is still at large, but Cavaradossi has been arrested. Scarpia, who in the meantime has fallen violently in love with La Tosca, extracts from her the secret of Angelotti's hiding place by putting her lover to torture in an adjoining room. From there, his cries penetrate to her distracted ears. La Tosca buys her lover's safety by promising herself to Scarpia. The latter gives orders that Cavaradossi's execution shall only be a sham one, blank cartridges being substituted for bullets. When they are left alone, La Tosca murders Scarpia with a knife when he tries to embrace her.

In the last act, after a passionate duet between the lovers, Cavaradossi is executed,—Scarpia having given a secret order to the effect that the execution shall be genuine after all—and La Tosca in despair throws herself into the Tiber.

Traviata, La (*lä trä-vē-ä'tä*). Music by Verdi; words by Piave; founded upon Dumas's *La Dame aux Camélias*; première Venice 1853, New York 1856.

Violetta, a courtesan of Paris, gives up her gay life to live in a humble apartment with Alfredo. His father persuades her to release him. She returns to Paris. Alfredo, ignorant of the cause of her desertion, insults her publicly. Too late he discovers the truth about the nobility of her sacrifice. Full of remorse he visits her, only to find her dying of consumption. With words of forgiveness on her lips, she expires in his arms.

Tristan und Isolde (*trĭs'tän*) (*ē-zōl'dĕ*). Music and words by Wagner; plot from an old Celtic legend; Wagner's version taken from that of the 13th century minnesinger Gottfried von Strassburg; generally considered Wagner's masterpiece; première Munich 1865, New York 1866.

Tristan is a knight of King Mark of Cornwall. He had killed Sir Morold of Ireland in battle and sent his head to Isolde, the affianced bride of the dead warrior. Wounded by the poisoned sword of Morold, Tristan disguises himself as Tantris and seeks aid from Isolde, far famed as a healer. She recognizes the stranger from a notch in his sword which matched a splinter of steel she had removed from the head of Morold. She is about to slay him, when their eyes meet and love is kindled. Tantris departs. Soon he returns as Tristan and asks her hand for King Mark. Her parents accept.

Isolde sails with Tristan for Cornwall. During the voyage she sends for him repeatedly. As the ship approaches land

he goes to her. She reproaches him with neglect and declares there is a blood debt between them. He bares his breast and offers her his sword. She proposes instead a cup of reconciliation. He suspects poison but drinks. She has ordered her maid, Brangane, to prepare a death philter. The maid disobediently has prepared one of love. When Tristan has taken half the draft, Isolde snatches the cup and drains it. They gaze into each other's eyes. There each reads the other's secret. Overcome with emotion they embrace. As the king comes aboard, Brangane confesses to the lovers what she has done. They look at each other in wild distress. Isolde swoons.

The king goes on a hunt one night. The hunting party has hardly disappeared from view when Isolde gives the signal with a torch which brings Tristan to her garden. They sing of their love, but the night is too short. Suddenly, Brangane, who has been watching in the tower, bursts in to say the king is coming. Kurwenal, the faithful servant of Tristan, comes in backwards with drawn sword, followed by the king, his courtier Melot, and others. The king looks with grief upon the couple and reproaches them bitterly. Tristan spreads his mantle to protect Isolde from the sharp glances of the intruders. He looks with pity upon the king. Turning to Isolde, he says he will go to the dreary country of his birth. There she will find asylum if she wishes to follow. He kisses her brow. Melot, enraged, draws his sword. Tristan defends himself but allows Melot to wound him.

In his old manor in Brittany, whither Kurwenal has brought him, Tristan is slowly dying from his wound. Isolde has been summoned to heal him. At last she comes, but the excitement is too great for Tristan. In delirium he tears the bandage from his wound and expires in her arms. The king and Melot arrive. Kurwenal, looking upon them as enemies, gives battle. Melot is killed; then Kurwenal is wounded and dies beside his master. The king approaches. Sadly he relates that Brangane has told all, that he holds the lovers guiltless and has come to pardon and unite them forever. Isolde does not understand. She gazes upon her dead lover, Tristan, and expires in the arms of Brangane whose ruse of the love philter had but served to intensify the tragedy.

Trovatore, Il (*ēl trō'vä-tō'rĕ*). *The Troubadour.* Music by Verdi; words by Cammerano; plot based upon Spanish drama of the same name; in popularity second only to "Aïda"; première Rome 1853, New York 1855.

Manrico, the troubadour, a chieftain of the prince of Biscay, is really Garzia, the brother of Count Luna, a young nobleman of Aragon, but nobody knows this except Azucena. When Garzia was a child an old gypsy cast a spell over him. For this she was burned to death. The gypsy's daughter Azucena, in revenge, carried off the child, and the next morning the smoldering bones of an infant were found among the charred embers where her mother had been burned. By mistake Azucena had thrown her own child upon the fire. She has brought up Garzia and named him Manrico.

Leonora, a princess of the house of Aragon, has crowned the troubadour victor at a recent tournament. Count Luna, who loves Leonora, lingers under her window at his palace, Alfiera. Leonora enters the garden to meet Manrico. Mistaking the count for Manrico she greets him warmly. At that moment Manrico appears. Seeing her with the count he charges her with being unfaithful. Leonora rushes into his arms. The count challenges Manrico to combat. As the men begin to fight, Leonora falls to the ground in a swoon. Later, thinking Manrico dead, she goes to a convent.

A messenger arrives at the gypsy camp, summoning Manrico to defend the castle of Castelar, relating also that Leonora has gone to a convent. Manrico rescues Leonora as she is about to take the vow and brings her to Castelar but is there taken prisoner by the count's forces. Azucena, brought to the count's camp as a spy, is recognized by Ferrando, the captain of the guard, as the supposed murderer of the count's brother. She calls upon Manrico for help. The count orders her burned. Manrico attempts to rescue her. Both he and Azucena are thrown into a dungeon.

Leonora pleads with the count to spare the life of the troubadour. At last she promises to marry the count if Manrico's life is spared, resolving, however, to take poison as soon as Manrico is safe. The count consents. Leonora visits Manrico in prison to tell him he is free. Having already taken poison, she dies at his feet. The count enters. Enraged at being thus robbed of his bride, he orders Manrico to be taken outside and beheaded instantly. The count drags the sick and weary Azucena to the window to witness the execution of her son. Azucena tells the count in a loud whisper: "You have killed your brother!" The count in remorse utters a wild cry and falls to the floor in a swoon.

Walküre, Die (*väl-kü'rĕ*). *The Valkyrie.* See *Ring of the Nibelung, The.*

William Tell. The last and greatest opera of the Italian composer, Rossini; words by Jouy, Bis, and Marast. The plot is based upon Schiller's drama of the same name; première Paris 1829, New Orleans 1842, New York 1888.

William Tell is the patriot who was instrumental in freeing Switzerland from the Austrian yoke in 1307. The plot deals with conditions which led up to the actual uprising. Leuthold has killed a vassal of the tyrant Gessler, the governor, in order to save his daughter from dishonor. Being closely pursued, his only escape is by way of the lake. In the raging storm, the fishermen refuse to undertake the passage. The voices of the pursuers are heard, when William Tell comes to the rescue, takes the rudder from the hands of the fisherman, and steers Leuthold safely to the other side.

For this act against the government, William Tell incurs the bitter hatred of Gessler. Arnold, the son of old Melchthal, is in love with Mathilde von Habsburg, the ward of Gessler, and is torn by the conflicting emotions of love and duty. Tell tries to win Arnold over to the cause of the fatherland, and to leave Mathilde, the Austrian born aristocrat, whose sympathies are against Switzerland. When Arnold hears that the tyrants have slain his old father, he forgets all but his love for his country, and dedicates himself to a blood revenge against the oppressors of his country.

Further to humiliate the Swiss by his tyrannical methods, Gessler places his hat upon a pole in the market place in Altdorf, and, accompanied by Mathilde, watches the poor villagers acquiesce to his latest order,—that all shall bow humbly before this symbol of his authority. Refusal to do so is to be punished by death. Tell, accompanied by his young son, passes by and refuses to bow before the hat. He is recognized as the rescuer of Leuthold. Realizing that the affairs of the country are approaching a climax, Tell secretly tries to send his son to give the signal for the uprising. Gessler, however, bids the boy remain, and then commands Tell to shoot an apple from the head of his own son. The shot is a long and difficult one, but is successfully accomplished by Tell. Perceiving that Tell had placed a second arrow in his belt before making the shot, Gessler suspiciously asks Tell why he had done so. "With this arrow I would have shot you, and, truly, I would not have missed," is Tell's answer. Again Gessler commands that Tell be bound, but the approach of the armed multitude of angry Swiss announces the beginning of the uprising which follows. It ends in the victory of the Swiss. Tell kills Gessler, and Mathilde, recognizing the cause of her lover, also turns from the Austrians and flies into the arms of Arnold.

Zauberflöte, Die (*tsou'bĕr-flö'tĕ*). *The Magic Flute.* A fairy extravaganza; music by Mozart; words by Schickaneder; plot adapted from tale by Wieland; première Vienna 1791, New York 1833.

Pamina, daughter of the Queen of Night, has been carried off by the wise master, Sarastro, priest of Isis, to protect her from evil influences. Tamino, a noble prince, who has lost his way and spent his last arrow, is attacked by a huge serpent and faints from fright. Three veiled ladies of the queen's suite kill the serpent. They are so much impressed with the beauty of the prince that they cannot decide who shall bring the message to the queen and who shall remain, so all go. When Tamino revives he sees before him the birdcatcher, Papageno, dressed in feathers, and thanks him for destroying the serpent. The birdcatcher boastfully admits his prowess.

On returning, the ladies rebuke Papageno and show Tamino a small portrait of the princess Pamina. He loves her from the first and gladly sets out on a mission to rescue her, accompanied by Papageno. Tamino receives a magic flute to protect him from danger; Papageno, a set of bells.

In Sarastro's Temple of Wisdom, Pamina is pursued by the unwelcome attentions of Monostatos, her Moorish attendant. Papageno rescues her. He frightens the Moor by his feathery dress and in turn is frightened by the Moor's dark hue. Pamina, however, is brought back by the Moor. Tamino also is caught and all are taken before Sarastro. The wise master promises to unite the lovers if they will remain at the temple until they have been purified and the constancy of their love tested. Gladly they accept. Pamina returns to her duties, and Tamino enters upon a novitiate.

The queen, suddenly rising from the earth, gives Pamina a dagger and commands her with threats to kill Sarastro. Not knowing that the ordeal of silence has been imposed upon Tamino, Pamina cannot understand his apparent coldness and is inclined to listen to the counsel of her mother. Sarastro however convinces her of his beneficent intentions. The lovers go through the ordeals of fire and water successfully and, having been purified, are united in wedlock by Sarastro. The Queen of Night and her accomplice, the Moor, try to prevent the wedding ceremony, but the scene changes suddenly to the Temple of the Sun with Sarastro on the throne. The bright light baffles the queen, and she, with her retinue, sinks into the earth.

PAINTING

THE art of painting is wide, almost limitless in its appeal. More rapidly than its sisters, architecture and sculpture, it awakens the emotions. Purely sensuous is the pleasure to be derived from it; while mental activity is involved in the mood following upon the sight of a noble structure and, to a less degree, upon that of a successful statue. Painting works through the magic of color and of optical illusions. The other major arts of form obtain their effects by means of properly employed line and mass. They are less complicated in principle, less poignantly expressive, less representative of nature.

Development of the Art. Painting may be defined as an art whose elements are drawing, composition, light-and-shade (*chiaroscuro*), and color. Considered historically, the development of the art may be divided into periods limited by time and by separate civilizations. Or its stages may be counted by the practice of artists, accordingly as they have worked under the tyranny of rules, or have recorded the testimony of their eyes by representing things, not as they are, but as they appear to be under varying conditions of distance, and of light and shade.

Chronologically, therefore, painting may be studied under the time-honored heads: ancient, classical, medieval, Renaissance, and modern. More rationally, however, it may be regarded under two aspects only. The first includes all painting according to strictly observed traditional methods and preconceived concepts. The second phase, still operative, began with the 15th Christian century, when Italians were born who solved the problems of perspective, differentiated tactile values, and were the first to appreciate the action of light upon color.

Egyptian Painting. Among the ancient peoples, beginning with the Egyptians, painting was first used to convey information by picture writing; this limited service ending with their dominance. But their decorative system, essentially sound and true, remains to this day a valuable object lesson. They applied pigments to surfaces so as to make flat areas of color, using the primaries and secondaries and casting no shadows.

If destined for exterior surfaces, the scheme was made brilliant, in order to overcome the graying of local color by an atmosphere suffused with light. And it may be observed that the same provision is made by Nature when she peoples the tropics with bright-hued fauna and flora, reserving the neutral tints for the temperate zones. In the forecourts and in the halls thickly set with columns, like forests with trees, the Egyptian decorators adopted schemes lower in key; employing only the gravest and deepest tones in chambers approaching the sekos, or sanctuary, into which the Pharaoh alone had the right of entrance, and that at stated intervals.

The flat areas of color were heightened in effect by characteristic drawing, of which a French critic said, "The Egyptians saw as through a veil"; thus describing by a clear simile their failure to model within the contour of any object which they represented. The same critic elsewhere touches the secret of this failure, when he comments upon the apparent loss of roundness suffered by a dome, or that of the third dimension by a square tower when seen against a sunlit background. Consequently, it may be accepted that atmospheric conditions—not imperfect organs of vision—were responsible for the way in which the Egyptians saw large objects from a distance. And what more natural than to expand this necessity into a principle of universal application, and, by so doing, to create a definite, always recognizable style?

Assyrian Painting. Quite different are the atmospheric phenomena observable in Mesopotamia, in the plains watered by the two rivers which give a name to the country. There, mists obscure the contours of distant objects, so that they are seen in planes,—the foremost very distinctly and those behind gradually disappearing into the void. These conditions determined the color schemes of the ancient Assyrians, who used cool greens, opaque blues, and clear yellows, not unlike the tones chosen by Japanese decorators, who also work in an atmosphere charged with humidity.

In design the Assyrians showed their progressive, practical quality of mind. Their manner of communicating information was not by picture writing, but by means of wedge-shaped (cuneiform) letter characters. They embellished their articles of daily service, such as carpets, tents, saddles and other trappings for animals, and their tiles, glazed to prevent disintegration through dampness. All these they ornamented with *motifs* derived from those of the Egyptians, but modified always to the betterment of unity. Their flower-and-bud border, their rosette, and their overlaid (imbricated) feather pattern have still an active existence in the products of the industrial arts.

Greek Painting. From the practical Assyrians the student follows the natural historical passage to the Hellenic Greeks, who, in addition to their admirable attainments in architecture, sculpture, and the drama, excelled also in painting; using various methods, especially the encaustic (hot wax) in murals, and treating a wide range of subjects, preferably mythological and portrait.

Unhappily, examples of Greek painting are virtually nonexistent, since the substances on which they were executed were too fragile to escape destruction. Therefore, the sources from which estimates of these works must be formed are largely the reports of travelers, who saw them in antiquity, and the descriptions, accompanied by uncritical, childish tales, given by the elder Pliny.

Like the other arts of Greece, painting reached its climax in the 5th and 4th centuries B. C. In the first of these periods, murals were executed by Polygnotus at Athens in a "slip" or liquid clay. In these, the figures were isolated, and no provisions were made for optical illusions consequent upon distance or position. Their qualities, it is evident, paralleled those of contemporary vase paintings, and their interest for the modern eye would be purely historical.

At the end of the 5th century, the easel picture, painted on a wooden or marble tablet, was produced together with the mural, carrying the result of greater realism. And this quality was further emphasized by the substitution of modeled figures for mere outlines filled with flat masses of color.

In this stage of the development of Greek painting, Zeuxis and Parrhasius were the masters; both of them being natives of Asia Minor but working at Athens. After them the easel picture specialized into portraiture, and of this branch of the art Apelles, at the court of Alexander the Great, became the chief exponent; there attaining admirable results in the encaustic process (application of colors by means of hot wax), as well as in distemper (pulverized pigments attached to background by means of a viscous substance).

Of this period, two representative works remain, although they are Greco-Roman copies of far worthier originals; while the value of one has been still further diminished by its transference into mosaic. It is known as the "Battle of Issus," and was discovered at Pompeii. The second painting, under the modern name of the "Aldobrandini Wedding," is a mural of miniature proportions preserved in the library of the Vatican. Remarkable for its fine drawing and its soft, harmonized color tones, it is a precious historical document. Together with the wall decorations of Pompeii, it proves that the painters of antiquity, although masters of line, were never able to overcome the difficulties offered them by the dimension of space.

Byzantine Illumination and Mosaics. The heritage of line and composition bequeathed by the Greeks to the art of painting slowly lapsed into a long passive state as classic civilization declined. In the new capital created about 330 A. D. at Byzantium by Constantine, painting minimized itself, developing into two branches of decorative art: (1) the illumination of manuscripts, practiced by the monks primarily for the propagation of the Church ritual; (2) mosaics, that is, pictures composed of cubes of brilliantly colored stone, glass, or enamel set in a bed of cement. The latter species adorned the basilicas of the new faith and were the successors of the antique murals. They served to announce the doctrines of Christianity and to glorify its martyrs. They appeared wherever Byzantine influence extended itself, and, in Italy and Sicily, were finest in Rome, Ravenna, Venice, Palermo, and Monreale; the period of their production ranging from the 5th to the 14th century. Both these arts were limited by hard and fast conditions, which, beginning with the materials (the inks or the minerals) with which the pictures were produced, extended to the unsettled or the secluded state of life in which the artists or craftsmen lived, including even the character of the producers themselves, who were in all ways different from the freethinking Greeks and the judicially minded Romans.

Painting in Western Europe. Finally, as a consequence of the thought and skill developed in the practice of illumination and of mosaic production, among the peoples of western Europe, there rose the third and greater art: that of painting in the modern sense of the term. Its beginnings were naturally made in the most advanced region of the most civilized country—in the central city-states of Italy. It had undoubtedly two points of origin, Florence and Siena, and its rise was synchronous with that of the revival of sculpture as an independent art in the maritime Pisa. The Pisans, besides, contributed to the movement the worthy painter, Giunta.

The earliest Italian painters either had studied their profession in Constantinople or were the pupils of masters who had served a long apprenticeship in that Eastern city. Among them, to quote the authority, Salomon Reinach, "We are accustomed to regard Cimabue as the first painter, much as we regard Adam as the first man." In other words, we accept a tradition largely founded upon two famous lines of Dante (1265–1321), who was a younger contemporary of the above-mentioned artist and an equal in age with Giotto, the real founder of the Florentine school of painting.

Cimabue and Duccio. It is proved by documentary evidence that Cimabue was a mosaicist and that a much restored work by him in that medium exists in the dome of the Cathedral of Pisa. But of the paintings attributed to him in the galleries of continental Europe and of England there is not one the authorship of which is free from doubt. This stricture applies even to the picture which is widely acknowledged as the first extant monument of Italian painting and is contained in the Rucellai Chapel of the Church of Santa Maria Novella, Florence. Its subject is the enthroned Madonna and Child, flanked by adoring angels. It is painted in distemper on a wooden panel, probably of white poplar. It shows in drawing, in composition, and in flatness of color a degree of the Byzantine influence inevitable in any work of its period and the heritage of all painters then working in Italy.

Beyond these general considerations, the style of the picture is eloquent of its author, the chief of the then rising school of Siena, Duccio di Buoninsegna. Finally, these style-evidences are corroborated by documents which describe the location of the picture by Duccio so definitely as to eliminate from the question the name of Cimabue. Consequently, it is from the "Rucellai Madonna" and from the wooden triptych (folding picture of three panels) by the same artist, contained in the Palazzo Pubblico, or Town Hall of Siena, that we must date the remote, fragile beginnings of modern painting.

In the presence of either of these works, the student recognizes that the art, which was arrested in its development in the age of Augustus and then retrograded in the catacombs to the crudest, most elementary principles, guarded the germ of its vitality through the chaos of the early middle ages. He finds it among the primitive Italian masters of the 13th and 14th centuries, struggling for utterance in a less polished and perfect, but more expressive and intimate, medium.

Giotto and His School. To follow this finally successful struggle, it is necessary to return to the Florentine school, which, in the development of painting from its infancy to its adult stage, served a purpose similar to that of the vertebral column in the human body. Of this school, the real founder was Giotto, the reported pupil of Cimabue, who became an epoch-making painter. He lived at a fortunate period, when imagination was fruitful and effort generous, in the period of great churchmen and sovereigns. Dogmatic Christianity had been softened by the fraternal love of Saint Francis of Assisi. The Gothic cathedrals of France were building, and the medieval vision of hell, purgatory, and paradise was assuming concrete form in the brain of his friend, the supreme Christian poet, Dante.

The lifetime of Giotto lay between the approximate dates 1266 and 1336, and his position as the founder of the Italian schools, and through them of those of all other modern nations, may be adequately judged by his extant mural works. Of these, the best exist at three points of Italy: at Assisi in the Church of Saint Francis; at Padua, in the Arena Chapel; and in Florence in the great Franciscan Church of Santa Croce. In addition, more or less authentic examples of Giotto, and certainly of his school, exist in fragments in Rome and in Naples, together with a number of "crucifixions," intended for altarpieces, in the north of Italy.

The Giottesque Influence. From the wide diffusion of these works and the importance of their locations, it is apparent that the principles and methods of Giotto were accepted without hesitation by the governments, the nobles, and the enriched burghers, who all together then constituted in Italy the body of art patrons. But their acceptance was not based upon the love of art for its own sake. It was prompted largely by the recognition of the murals as instruments of religious propaganda; their effectiveness lying in their wonderful narrative quality, their necessity being absolute at a time when only "learned clerks" could read.

Today the value of the Giottesque murals has entirely shifted its base. The scenes portrayed in them have become a vast field of demonstration. They offer a progressive course of study for one who will follow them from the Upper Church at Assisi to the Bardi and Peruzzi chapels of Santa Croce, Florence. At their beginning they have all the dullness of the most debased period of Christian Roman art, as represented in chaotic mosaics. In the late Florentine pieces they are filled with reminiscences of the Greek art from which they sprang. At the same time they foreshadowed the decorative system of the 19th-century genius, Puvis de Chavannes. Their author must be regarded as the founder and institutor of modern painting.

To draw a simile from nature, Giotto may be likened to a river, destined to be a great one, at a point where it first assumes its proper name, having proceeded from a union of countless streams whose origin is lost in obscure, impenetrable distance. The Florentine master, equally gifted in composition, in design, and in color, had, at his death, renewed in his own art the order and symmetry, if not the suavity, of the antique. Further, like the ancients in their paintings, he had sought realism, but had surpassed them in expressiveness of gesture, making that ele-

ment almost as pliable and as comprehensible as speech itself. He had displayed also a capacity denied to ancient artists by mingling in a single scene the solemn and tragic with the intimate and humorous, to the advantage of the scene portrayed.

For at least two generations following the death of Giotto, slight advance was made in the development of painting. Originality was stifled in both the Sienese and the Florentine schools by a mistaken reverence for their founders. The composition, design, types, and technique of these first masters were copied, to the neglect of their principles, which, had they been studied, would have led to rapid progress. But owing to the position of Florence, then the financial capital of the world, the local school of painting did not decline, since the art was so useful to the burghers as a means of self-aggrandizement through the multiplication of their portraits and their gifts of great altarpieces to churches or of murals to family chapels.

Andrea del Castagno. Throughout this period of retarded growth the Giottesques kept the sound although restricted traditions of their master. But in the last years of the century two innovators rose among them. The first, in point of time, Andrea del Castagno, devoted himself to the study of "tactile values," as the subject is named by artists; in other words, he sought to render the third dimension, the thickness, of figures, so that they might appear beings, rather than phantoms, and capable of resistance to pressure.

Uccello; Ghiberti; Brunelleschi. The studies of the second of the innovators, Paolo Uccello, produced the most far-reaching and durable results. Born on the very threshold of the new century (1397), he was one of three artists to whom we practically owe the laws governing perspective, or the art of delineating solid objects on a plane surface so as to give the same impression of relative positions and magnitudes as the objects would do when viewed from a particular point. Each of the three men represented a different art. The eldest, Lorenzo Ghiberti, the sculptor (1378?–1455), showed in his reliefs the influence of both linear and aerial perspective. The second, even more distinguished than Ghiberti and, in some sense, his enemy, was the architect and engineer, Filippo Brunelleschi, author of the finest dome scheme of the Italian Renaissance—that of the Cathedral of Florence. The third and much the youngest was the painter Paolo Uccello, the apprentice of Ghiberti, to whom the master taught the new and absorbing subject; finding in the youth an extreme aptitude, which was recognized and further fostered by Brunelleschi. From this distinguished group in central Italy, interest in the study spread to the north and the east of the peninsula, and so fervent did this sentiment become that important problems, when solved, were placed on parchment and exhibited for the instruction of the public in the principal squares of the larger towns. And, as then the minor and industrial arts were more closely and worthily joined to the major than is now the fact, expert artisans in wood inlay (*intarsiatura*) treated the same problems in designs with which to embellish the furniture destined for rich interiors.

Masaccio, Pioneer of Realism. The movement toward realism was, perhaps, aided most of all by Masaccio (1401–28), whose chief murals in Florence were made objects of close observation by the masters of two generations later. Nor is it too bold to suggest that, had this man of genius been omitted from the sequence of the makers of painting, the climax of the Renaissance (1500–50) would have been delayed a half century, or indeed might never have been reached.

Masaccio's position in the history of art is that of one who wished to sweep away what seemed to him outworn traditions. As far as he was able (since he was a pioneer among the realists), he painted "according to vision." He sought to represent what he saw. rather than to record what absolute knowledge either he or his predecessors had gained of any pictorial subject. His innovations are obvious, even to the eye of an untrained observer, whose examination is limited to illustrations in black and white of his murals in the Brancacci chapel of the Church of the Carmine, Florence. In subject they are similar to the works of the primitives. In conception and, above all, from the technical point of view, they are epoch-making, as any single example will suffice to show. They present, for the most part, certain of the Apostles healing the sick, distributing alms, or administering the rites of the Church. But the holy personages, instead of being mere symbols and abstractions, as in the scenes painted by the weak imitators of Giotto, have become men among men.

Successors of Masaccio. The point of progress reached by Masaccio was advanced by two of his immediate successors, Mantegna (Vicenza, Padua, Rome, 1431–1506) and Piero della Francesca (Umbria, 1420–92). The former produced for the first time (Padua, Church of the Eremitani) ceiling decoration in correct perspective and foreshortening, as judged by the observer standing on a floor far below. He produced also the illusion of a ceiling open to the sky, since he painted figures as if they were suspended in open space; so creating a precedent for the masters of the High and the Post Renaissance, such as Michelangelo (1475–1564), Correggio (1494–1534), Paul Veronese (1528–88), and Guido Reni (1575–1642).

The advance toward modern painting made by Uccello, Masaccio, and Mantegna was supplemented by Piero della Francesca, who, in his day, apprehended the principles of the 19th century French impressionists. His contribution to the development of painting is best understood by comparing him with those of his quasi contemporaries who devoted themselves to perspective. For, while the latter could indicate the recession of planes, they could not give the impression of depth, of free space. Their pictures were representations of flat surfaces with landscapes, which, when introduced, rose vertically. On the contrary, Piero, four centuries before the French master, Claude Monet, saw, although less keenly, the effects of light under which every object momentarily changes color. He was the first painter to disclose the marvels of a world of "values" determined by degrees of luminosity.

The Study of Anatomy. To the great elements of progress in painting just discussed, the knowledge of anatomy also was added in the 15th century. The study of the nude, pursued by the ancient Greeks through observation and later through dissection, had been discredited by the early churchmen. Hostility toward this subject was long continued. Nor were there signs of a reversion to sounder judgment, until Saint Francis in his canticles praised God for the visible fairness of nature. But it was not until the invention of printing from movable types, at the middle of the 15th century, and the consequent diffusion of Greek and Latin literature, that the nude was freely represented in painting. Further, it must be acknowledged that this departure was greatly favored by the study of anatomy, inaugurated late in the 14th century at the University of Bologna.

The introduction and the rendering of the nude is one of the most obvious proofs of the age and the school of an Italian picture; the statement being equally true of the adult and of the child figure—the latter as instanced in the Infant Christ. Draped and sitting or standing on the knee of His mother, in the Byzantine and early Tuscan schools, He appears covered with a thin veil when painted by Fra Angelico (1387–1455). In the famous circular picture (*tondo* of the Pitti palace, Florence) by Fra Filippo Lippi (1406–69), He is wholly nude, with awkward articulations and the head set squarely on the shoulders, with practically no intervening transitional line of neck.

These, as well as other aggressive faults in figure structure committed by the gifted Fra Filippo, were repeated, as if in softened echo, by his son and by the pupils of the latter. They were not eliminated until Raphael (1483–1520) painted in Florence (about 1508) a perfectly formed Christ Child modeled upon the antique. As to the adult nude, it is found slender, fragile, unstable, and slightly unreal in the universally known "Spring" (Primavera) of Botticelli (1447–1515); effeminate in the youthful male saints of the Umbrian Perugino (1446–1524), master of Raphael; of a Praxitelean beauty in both the male and the female figures of the last-named painter in his Roman and final period (1508–20); emphasized and often strangely exaggerated in the murals of Michelangelo, greatest of the artistic anatomists of the High Renaissance.

The High Renaissance. Such was the state of advancement in the art of painting at the opening of the 16th century. During the hundred years just preceding, progress in that art had been almost inconceivably rapid, owing to the enthusiasm of the painters and the rivalry among them, as well as to public interest in their works. In the year 1400 Andrea del Castagno was yet a child and Uccello a mere infant, with their accomplishments lying far before them in the future. In the year 1512 Michelangelo completed the ceiling frescoes of the Sistine Chapel in the Vatican, which mark the climax of the High Renaissance, after which all the worthy accomplishments of the historic Italian schools of painting were inevitable consequences of the impetus given before that date. Further, it may be said that the very brilliancy of the artists living and working at the brief period of the climax was, in itself, a cause of the decline and sterilization of their immediate successors.

As a consequence of civic strife in Florence and the election of a strong pope, Julius II (1503–13), artistic supremacy was transferred to Rome. There the newly elected pontiff wished to glorify his family and to make memorable his own reign by the creation of great monuments. Therefore, for the adornment of his papal palace, the Vatican, he commissioned Michelangelo to decorate the walls and ceiling of the chapel named the Sistine in honor of his uncle, Pope Sixtus IV (1471–84). At the same time, he chose the more comprehensible and pliable genius, Raphael, to embellish with murals a spacious chamber (stanza) which is now believed to have been the private papal library and study. Four years later both artists had finished their commissions, which represented in the case of each his best mural work.

Sistine Chapel Frescoes. Michelangelo illustrated the history of the world from the Creation to the Deluge, as told in the Scriptures, on the flat panels of the vaulted ceiling of the chapel; filling the triangular spaces between the arches with majestic rhythmic figures, male and female, symbolizing Hebrew prophets and pagan sibyls who foretold the birth of the Christ. The whole constitutes a scheme of overwhelming grandeur, constructed upon the unit of the human figure, which is used, not merely to present the actors in the drama, but also as a purely decorative detail, in the frames of the scenes. Imposing are also the proportions of the composition and adapted to the dimensions of the chapel, which has a height of 68 feet, with an area of 132 by 44.

In both conception and execution the Sistine ceiling frescoes are the work of a superman. They, together with the statue of "Moses" and those of the four "Slaves" originally related to the first-named, represent the climax of Michelangelo's physical and mental strength. The pictorial Genesis is still charged with life, impressing with its turbulent power even the cynical, surfeited modern observer. But it belongs to a class of creations that are themselves sterile, or, if they reproduce, generate only weaklings and perverts. The influence of Michelangelo upon the painters who were his younger contemporaries or his immediate successors deflected them from the sound traditions of their art, resulting, for example, in the violent foreshortenings of the Venetian Tintoretto and in the sinister force of Caravaggio, the Neapolitan, who inspired the Spaniards of his time in their renderings of revolting martyrdoms.

The Work of Raphael. Slightly before the completion of the Sistine ceiling, Raphael also (1511) finished his first great commission from Pope Julius. Unlike Michelangelo, he had begun his murals with a thorough knowledge of the processes to be employed. He had treated, under the pope's order, subjects lending themselves to his clear, suave, and tranquil style. He was newly come from Florence, where, with his power of rapid assimilation, he had studied the great murals of Masaccio, and the then recent innovations in composition made by Leonardo da Vinci.

In the spacious study of Julius II, the artist presented the subjects of "Theology," "Philosophy," and "The Triumph of Poetry"; the first in a decorative style, with treatment of the wall as a flat, opaque substance, bringing to the mind of the observer a magnified sheet of illuminated parchment. In the second picture, "Philosophy" (later named the "School of Athens"), Raphael acknowledged the influence of the architects by whom he was surrounded at the papal court, chief among whom was his uncle Bramante. He showed in adequate perspective an imposing interior like that of an imperial Roman bath, apparently filled with atmosphere and serving as a place for discussion. Therein he pictured an assembly of Greek philosophers represented on two levels with two distinct purposes: the first of which was to show mastery of perspective; the second, to declare that speculative philosophy must be based upon scientific research. For such, without doubt, was his thought in grouping on the lower pavement the physicists, with their various instruments; while he reserved the axial point of the higher level for the figures of Plato and Aristotle, the former of whom was slightly advanced, as became one who dominated the studies of the Renaissance. In the third picture, "The Triumph of Poetry," or "Parnassus," Raphael painted like the greater pupil of his Umbrian masters, Pinturicchio and Perugino, selecting elements from each and perfecting all that he selected.

The course given to painting by Raphael could not be deflected. In the hands of Giulio Romano and of the lesser pupils of the artist, composition became a mere formula of line, applicable in a certain class of cases and replaced by another framework of rules when the occasion demanded a change.

Leonardo da Vinci. The influence of the third great master of the time, a Florentine, but founder of the second Lombard school, was too subtle to be grasped by the majority of either professional painters or laymen; while for certain of his pupils it was positively baleful. This versatile artist, Leonardo da Vinci, was undoubtedly the greatest genius of the Italian Renaissance. In painting he revolutionized composition, he developed *chiaroscuro* to limits previously unsuspected, he created figures and faces lovely in line and modeling, but challenging, like the Sphinx, or alluring, with a morbid charm, sinister and suggestive of evil.

By reason of his line—when possible, a spiral—Leonardo has been characterized by the English critic, John Addington Symonds, as an inspired experimentalist or amateur, as one who, although gifted to the highest degree, yet distrusted his own powers; thus lacking the self-assertion which is the essential quality, the convincing force of the professional. His was a power so distinctively personal that it could not be transmitted and perpetuated. By its breadth he was enabled to create in his "Cenacolo" ("Last Supper") a work uniting, in a composite expression, psychology, drama, and painting regarded from its purely technical side. In each

of these elements he showed himself different from any of his predecessors who had presented the same scene. Moreover, he copied nothing from his own previous works, nor can it be found that later he ever repeated himself.

The Last Supper. It was rare in Italian art to change the treatment of a subject, once that subject had been presented and its treatment had been received favorably by the authorities of the Church. Therefore, during the quarter millennium beginning at the time of Cimabue and Giotto, the scene of the "Last Supper" had become a historical group, varying only with the development of painting, the school of the painter, and his individual temperament. But Leonardo, with his mastery of facial expression and gesture, which was partly intuitive and partly derived from intensive study of the muscles, presented the event in the light of a trial, showing the effect of the declaration, "One of you shall betray Me," upon twelve men of differing character.

In composition the "Cenacolo" has possibly but a single equal. This is the eastern pediment of the Parthenon, from which a sufficient number of figures remain to show the rise and fall of the linear rhythm, matchless in the world of art except for its parallel in the attitudes and gestures of Leonardo's apostles grouped and seated, as if in a conventual refectory and at the farther side of a narrow, rectangular table. It may be added that in both instances the rhythm receives essential assistance from light and shade, afforded in the temple pediment by the external air and in the mural picture by the painter's own genius.

The Venetian School. Matching with almost equal steps the path of Florentine painting, the very separate and distinct Venetian school declined after the careers of Titian (1477?–1576) and Paul Veronese (1528–88). This special development was based upon color used, one might say, as an element of structure, suggested by the atmospheric phenomena, lovely and kaleidoscopic, which offered themselves ceaselessly to the inhabitants of the multiple-island city. To the atmosphere as a primary influence other contributory causes were added—such as the Oriental commerce which carried into Venice brilliantly colored fabrics, and the fact that the earliest and most authoritative group of the school had risen on the island of Murano, then, as it is today, a center of the finest mosaic production.

From the use of large, flat areas of color, from a Byzantine stiffness in the treatment of the figure, and an architecture plainly derived from that of Constantinople, the Venetians advanced to what has been called by German critics the "mood-picture." This species is exemplified in the works of Giorgione (1477–1511) who, in life and temperament, is often paralleled with the English poet Keats. The just mentioned title (in German: *Stimmungsbild*) has been applied to a picture containing figures placed in a landscape which is gay, grave and tranquil, or sinister, according to the requirements of the action for which it serves as a background. A golden light, caught and softened by shrubbery, suffuses the scene of Giorgione's "Rustic Festival"; while a threatening sky, charged, it would seem, with electricity, broods over the dramatic group of Tintoretto's "Miracle of the Slave."

Such quickening of the thought underlying the presentation was the secondary gift and legacy of the Venetians to the art of painting. It was created and bestowed during a portion of the long lifetime of Titian (1477?–1576), the greatest of his entire school, since he was the exponent and the measure of its chief characteristic. To this painter, color was an orchestra composed of many voices—strings, wood winds, brasses, and instruments of percussion—which he used to their limits in his formal compositions, like the "Presentation of the Virgin" in the Academy of Fine Arts, Venice. Furthermore, in the judgment of certain critics, he excelled in the branch of portraiture all his Italian contemporaries; while it is certain that he produced a new type of altarpiece, of bold composition, in which a populous group of figures on one side is balanced on the other by the mere folds of a floating banner. Also, he attained in landscape a distinction rare for an Italian, and partially attributable to his memories of the picturesque regions of the Dolomites, or Tyrolese Alps, in which he had passed his childhood. Of his influence upon his school the best of early 20th century Italian art critics, Corrado Ricci, has said: "With Titian the art of Venice took on a definite character . . . . The forms, the composition, the technique, all proceed from him, just as was the case with the Italian opera, when fixed once for all by Rossini."

Decline of Italian Painting. The Venetian school survived the Florentine, but at the opening of the 17th century the art of painting in Italy was far advanced in its decline. The latest school of the peninsula—that of Bologna—was frankly eclectic; that is to say, its adherents were free and even counseled to imitate whatever was acknowledged as admirable in the work of other painters. They were not taught, first of all, to seek principles and then to follow these principles to solution by personal and individual means. Facility of composition and execution, brilliancy of tone, and harmonious color-combinations were alone demanded of the painters, and these qualities attracted the superficial minds of the period, who praised extravagantly works that were still admired by the English of the 18th century.

Academy of Bologna. The beginning of the period of artificiality was recognized by those who had most hastened it in the years immediately following the death of the great masters of the High Renaissance. To counteract the unhappy influences then prevailing, an academy was established at Bologna, and principles of imitation and of universal borrowing, there announced as essential and indispensable, were incorporated into a now famous sonnet by one of the earliest masters of the Bolognese group. In this agreeable and very learned capital city of Emilia young students assembled from all parts of Italy, gaining for themselves the name of *Gli Incamminati*, "Those pursuing the right path." The conduct of the school was reasonable and wise, resembling that of our present day institutions of similar purpose.

Plaster casts, medals, and a library of books upon æsthetic subjects were provided for the use of the students, and their major instructors were members of the family Carracci, two of whom executed the frescoes of the magnificent Farnese palace in Rome. These works formulated the artistic creed of their authors by mingling the influences of the antique, of Michelangelo, as shown in the ceiling of the Sistine Chapel, and of Raphael's art in his murals which relate the myth of Cupid and Psyche in the Villa Farnesina on the Tiber. The result is a style composed of borrowed elements so harmoniously adapted to one another as to lay the foundations of a school as distinct and separate, although not so admirable, as any other of the Italian peninsula.

The Work of Guido Reni. The painters Carracci asserted a bold realism and delighted in strong effects of light and shade. And, although lacking the virile sincerity of the early Florentines or the spontaneous, individual qualities of the chiefs of other groups, they were yet far from decadent. Nor can the reproach of decadence even be cast upon their still more famous pupil, Guido Reni, whose ceiling fresco, the "Aurora" of the Rospigliosi palace, Rome, is enthusiastically admired by persons of superficial culture seeking obvious and assertive attractions. The composition illustrates a theme drawn from the *Metamorphoses* of Ovid, which served more frequently than any other work of classic literature as the source of inspiration for the Italian painters, sculptors, and medalists of the

Post Renaissance. Formal and brilliant, it impresses the eye as the ear is affected by the rapid scales of a perfectly trained musician. But the mind of the observer does not react to the structure of the scene, nor are his feelings moved by its color. The "Aurora" is the torn chrysalis of Italian painting, abandoned and left to wither through the escape of its vital principle.

However, the influence of this work, at the time of its production, was pernicious from a technical point of view only. Those who imitated it, being less gifted than Guido, fell into exaggerations or feebleness. As to the religious pictures of the same painter, their effect was far more detrimental. The "Ecce Homo," or head of the thorn-crowned Christ, the emotional "Virgin at the Foot of the Cross," the youthful "Saint Sebastian," ecstatic under harrowing torture, generated alike in the painters and in the public the thirst for revolting naturalism, or they developed, in the minds of those who studied them as aids to worship, the desire for unnatural physical suffering as a prelude to spiritual reward.

Caravaggio. Synchronous with the productions of the painters of Bologna were those of Caravaggio, a highly gifted artist born at Bergamo in northern Italy, but usually regarded as a Neapolitan. The son of a stonemason, of a nature hostile to culture, free in the use of weapons, and himself dying at the hands of paid assassins, his crimes and brutalities are today largely pardoned. They have been absorbed in his accomplishments as an artist. He is now believed to have exerted over subsequent painting a greater influence than any other of the old Italian masters, with the single exception of Michelangelo. That this should be true is surprising, since Caravaggio presented types akin to himself— plebeians and criminals—in their sordid surroundings and their ugliness. He thus defied and deflected Italian traditions, in obedience to which the noble in countenance, in bearing, and, for the most part, in garments had alone been treated.

From the point of view of foreshortening and of violent effects of light and shade, Caravaggio derived from the Venetian Tintoretto, for whose fervent, tragic, religious spirit he often substituted a baseness provoking a shuddering fear in the observer of such scenes as "The Card-Players," which is preserved in the Dresden Gallery. This picture of intense power, eminent among the works of the artist, reveals his distinctive method of study. It was not enough for him to pose his models in darkened interiors, as was the custom with certain of the Flemish and Dutch masters, his younger contemporaries. His studio, provided it can be dignified by that name, was a subterranean room, lighted through a trapdoor. And this arrangement not only permitted him to emphasize his style, but, at the same time, suggested his character as a man and his tendency toward criminal adventure.

Caravaggio stands at the end of the Italian Renaissance, resembling the ebb of a formidable tide which gathers itself for a final effort. He is powerful, sinister, and destructive, with a cruelty like that of Nature herself. His forced shadows, chief of his technical characteristics, darkened the canvases of all the artists of Bologna. They lurked in those of Sir Joshua Reynolds and of others of the classic English school. Nor were they wholly swept away until the French open-air advocates (*les plein-airistes*) of the 19th century arose to suggest the flooding splendor and the fusing power of sunlight.

The Flemish Painters. Through the accomplishments of the Italian schools, the art of painting, as we now understand it, passed from its birth at the middle point of the 13th century to full maturity in the 16th and to a grave decline during the 17th. In the meantime, certain countries of central and western Europe developed the same art from the 15th century onward, in obedience to spontaneous impulse, as well as to influences from the East and from Italy itself. Late in the 14th century, appeared the earliest masters of Rhenish Cologne, long previously the seat of pagan Roman culture, and immediately following them, the founders of the primitive Flemish school,—Hubert and Jan Van Eyck.

From the last-named, through the mediation of a traveling Sicilian student, there passed to the Venetian family of the Bellini the secret of an excellent oil technique, which, being propagated rapidly, facilitated and specialized everywhere the advance of the art. North of the Alps, the harder physical conditions of life and the responsive energy necessary to overcome them produced a strong social and civic bond, which inspired the artists to their best efforts. The industrial guilds, rather than princes or churchmen, gave commissions to the painters, all of whom, until the time of Luther, treated Bible subjects and the mysteries of the faith as frequently as did the Italians, but with an ingenuousness and intimacy far removed from the formal, emphatic Italian manner.

The schools of Ghent and Bruges and of Brussels, in the persons of the Van Eycks, Hans Memling, and Rogier van der Weyden, made the beginnings of the modeling and the atmospheric effects which later their neighbors, the Dutch, carried to so great a climax. Their realism was frank and homely, without being grotesque, as when they did not hesitate to emphasize in their portraits the distended muscles, the wrinkled skin, and the stiffened hands of old age. They literally painted "what they saw," but their vision included always a beautiful detail, like a square of idyllic landscape opened in the background, or some accessory of costume, like a full-petaled carnation or the elaborate gold chain and jewel of the Knights of the Golden Fleece.

The German School. In the school parallel with the Flemish—the German—this sensitiveness to refinement did not exist, and little advancement beyond the primitives was made during the 15th century; while, as we have seen, painting in Italy was acquiring all the characteristics of an adult art. The Germans worked in lines of bronzelike hardness and with somber color; giving to their holy figures contortions and grimaces that are revolting to the modern eye. But an exception to the general truth is found in a pupil of Flemish masters, Martin Schongauer of Colmar (1446?–91), subsequently to whom the school became concentrated in Nuremberg (Franconia), Augsburg (Swabia), and Weimar (Saxony); its chief representatives being Albrecht Dürer (1471–1528), Hans Holbein the younger (1497–1543), and Lucas Cranach the elder (1472–1553).

Dürer. The first of these men had the good fortune to be born in Nuremberg, which, of all German cities, had the closest commercial and intellectual relations with Italy at that significant time. He reached his maturity at a proper moment to profit by the fast developing arts of printing and engraving. His life was spent before the Lutheran movement had succeeded in dissociating in his Fatherland all the arts, save music, from the service of the Church. He may be called a lesser Leonardo da Vinci, since he too treated in thesis-form geometry and perspective, military engineering, the proportions of the human figure, and other subjects involving thought and research. But his imagination was less independent, less joyous than that of the Italian; his vision less analytic, more confined, and opening upon a gloomy prospect. Technically, if he could on occasion paint like the Venetians of his period, his personality and power are best epitomized in his woodcuts of "The Apocalypse" and the "Great Passion," and in his still more famous copperplates of "The Knight and Death," "Melancolia," and "Saint Jerome in His Study." The last three, Dantesque in conception, are regarded as the "masterpieces of the greatest mind that ever expressed itself in this form of art."

Holbein. The second of the three, the younger Holbein, unlike Dürer, has retained down to our own day almost universal admiration. His art in portraiture, searching the character of the sitter, created the figures of Erasmus, Jane Seymour, Anne of Cleves, Sir Thomas More, and "The Falconer," which modern masters may still study with advantage. As judged today through the perspective of centuries, it would appear that Holbein's fame in portraiture can never be lessened. He worked upon permanent, inflexible principles and with extreme delicacy of hand. What is obsolete in his presentations does not essentially detract from their value.

Cranach. The last of the three distinguished German painters of the 16th century, Lucas Cranach, although born in Franconia, is placed in the school of Saxony, because of his long attachment to the court of the elector of that principality. Less gifted than either Dürer or the younger Holbein, Cranach yet bears a name which may not be neglected in the history of his art. He produced, like Dürer, paintings, copperplates, and woodcuts; many of the latter showing that complicated symbolism so dear to the Germans, and having either religious or mythological subjects. From the historic Church, Cranach turned to follow Luther, and it is to this painter that we are indebted largely for the portraits (engravings and woodcuts) of all the Reformers and their titled adherents. His artistic impulses hardened and became scholastic with his change of faith, and with him German painting, which from its rise had developed no essential principle, declined, partially because it yielded to Italian influence, but more largely because of the religious agitation which extended to all Teutonic lands.

Progress in Flemish Painting. In the Low Countries, which, through the marriage of sovereigns and inheritance, fell under Spanish rule, this struggle was of incredible violence, since matters of faith were there complicated with aspirations for political independence. But, during the period of stress, a group of secondary artists carefully observed the excellent traditions of their predecessors.

Rubens. The reward of their fidelity was the appearance of Rubens, the greatest of all Flemish masters, who, born during the exile of his Protestant parents in 1577, returned after his studies in Italy to his ancestral city, Antwerp. Filled with the joy of living, virile, sometimes even coarse in his conceptions, and instructed in all the principles and the processes of his art, he rose to the first rank of painters, irrespective of time and nationality. His genius has been best symbolized by Taine, who said of him: "Rubens mounted to Olympus with his heels weighted by quintals of Dutch cheese." But in spite of his occasional grossness, natural to him as a Fleming, he does not deserve the warped criticism of Ruskin: "Rubens was a courtly phrased animal." His unique art could not be paralleled nor transmitted. His grossness was more than equaled by that of his younger contemporary, Jakob Jordaens (1593–1678); while the late Italian influence was more apparent and permanent in the works of his direct pupil, Antoon (Sir Anthony) Van Dyck (1599–1641). The latter, like his younger contemporary, Sir Peter Lely, of Dutch extraction, passed overseas to England, where he became court painter to Charles I; being succeeded in his office by Lely, who maintained his popularity during the Commonwealth and until his death late in the reign of Charles II.

Rise of the Dutch School. At the middle of the 17th century, painting declined among the Flemings; while in Holland the same art rose to the highest distinction in portraiture, both single and multiple (the guild picture), as represented by Frans Hals (1584?–1666) of Haarlem and by Rembrandt van Rijn (1606–69) of Amsterdam. There appeared also a specialized landscape, the greatest examples of which were produced by Jacob Van Ruysdael (1628?–82) and by Hobbema (1638–1709). To the painters of the northern Netherlands the two above-named branches were alone open. For the Reformation had precluded the use of the altarpiece, as well as that of the great religious mural. On the contrary, the burghers, finally free from the grinding Spanish occupation and enriched by the commercial enterprises of the Dutch East India Company (founded in 1602), wished to bequeath their portraits to their descendants and to embellish their houses with scenes from the country which they had reclaimed with almost superhuman effort, alike from the encroaching sea and from the aggressive foreigner.

Guild Pictures; Hals and Rembrandt. At first, the artists and the newly enriched burghers did not agree as to the composition of the guild picture. The latter desired a monotonous procession, all members of which, similarly garbed, should be equally prominent. To these childish presentations of the civic pageants of Haarlem, Frans Hals put an end by showing the guilds as preparing for the functions in their chapter houses; introducing sometimes a spiral staircase to break the monotony of line, obtaining by other devices strong effects of light and shade, and brightening here and there the somber citizen garments by a brilliant blue or orange sash.

With the same purpose of transformation, Rembrandt painted his group of 29 life-size figures of civic guards issuing in gala attire from their quarters. The composition, known incorrectly as the "Night Watch," seems actually to move, having the form of a wedge advancing, point forwards, with its mass defined by the admirable gradation of values and the placing of great spots of color. By this single canvas, Rembrandt would have gained the right to be ranked among the greatest masters of painting. But he had, as yet, marked only two of the three phases of his art. He had already produced one of the greatest of his etchings, the "Hundred Gilder Piece" ("Christ Healing the Sick"); while 22 years later, in poverty and despair, he was to paint his masterpiece, the "Cloth Syndics."

Interiors; Vermeer, Terburg, De Hooghe. Secondary only to these great masters were the Dutch painters of interiors, Jan Vermeer of Delft (1632–75), Terburg (1617–81), and Peter de Hooghe (1632–81), all of whom set for themselves practically the same problem. They sought to display what the French sculptor Rodin called "the cubical contents of a room." Almost equally but differently fascinating are the pictures of these three painters. The eye is caressed by the soft colors and by the radiance of Vermeer's "Woman Estimating the Value of Pearls," with the figure in a delicate light which sifts through a window in the background, touching in its course masses of blue drapery and catching the rainbow surface of the gems piled upon the table. A graver but still sensuous pleasure is afforded by Terburg's groups of a lady and two cavaliers, with the figures arrayed respectively in white satin and in black velvet; the former fabric being introduced to show the power of reflecting light, as opposed to the absorption of luminosity by the other textile. The third painter, De Hooghe, set for himself a single problem, which he stated according to his opportunity and in the most varied terms. He followed the diminishing echoes of a ray of light, from the moment when it first struck, it might be, the brick pavement of an interior court, until, darting through an open door, it died away on the rounded shape of some domestic utensil of brass or copper.

Thus it was by their treatment of natural phenomena that the painters of the Low Countries, especially those of Holland, during the 16th and 17th centuries, made a most valuable contribution to the advancement of their art.

Velasquez. In the 17th century, also, a great Spaniard, like his contemporaries, Frans Hals and Rembrandt, realized the truth of space. Velasquez

(1599–1660) rose in his country single. Among his compatriots he had no prototype. His art was too personal to be transmitted. The restrictions binding him to the court were too galling to permit him either to form pupils or to diffuse broadly his influence. He was free from the asceticism of his great contemporary, Francisco de Zurbarán (1598–1662), the painter of monks in white draperies. Nor did he continue the ecstasy and the tendencies of the Spanish painters who preceded him.

Yet the insight of Velasquez into the secrets of mind was not secondary to his ability to interpret free space and degrees of distance and of light. In his portraits of the Habsburgs, one of the most baleful influences ever exercised in history is probed and laid bare, so that the face of the subject becomes the very symbol and presence of tyranny, of blighting and withering power. And again, in certain of his portraits of dwarfs, he reveals by both the facial expression and the gesture that uncompromising, cruel cynicism, inspired by envy, which is the mainspring of the mental life of those who are physically deformed.

It is, however, as a technical painter, as an absolute master of brushwork, that Velasquez, after 300 years, holds today a position unassailed by artists or critics. He was modern in his methods. He painted in single, loose strokes, which, when observed closely, appear unrelated, but which, seen from the proper distance, combine into a concrete whole having depth, solidity, and a changeful color play imitating that of Nature herself as she bathes in atmosphere and softens the edges of objects.

The contributions made by Velasquez to the progress of his art were never approached by any painter of his nation, and have very rarely been equaled by those of any single individual. Following his death in 1660, his memory received scant honor from his countrymen, until the Napoleonic wars, when their appreciation of him was largely created by foreign recognition of his greatness.

Murillo; Goya. Nor did Velasquez alone among Spaniards receive from the expert judgment of 19th century Europe the deserved, but long withheld, superlative expression of esteem. Fervent admiration was extended also to Murillo (1617–82), the artist of two manners, who, like Velasquez, first presented proletarian types ("The Beggar-Boys," "Melon-Venders"), and later passed to portray the "Holy Family" and the "Immaculate Conception" in floods of radiance, into which the rounded figures draped with luscious color seem to melt away. Considerably later the cult of Francisco Goya (1746–1828), a subtle portrait artist and mordant satirist, technically a luminist, was extended throughout Europe and among the *cognoscenti* of the United States.

Later Spanish Painting. In the meantime, the modern art of Spain had fallen into the most revolting naturalism, from which it emerged with Fortuny (1838–74), a genre painter and colorist of the first rank. The Renaissance gathered strength, and still continued under the marvelous luminist, Sorolla (1863-1923), and Ignacio Zuloaga, a man who has reflected, in his many-sided art, memories of El Greco and Velasquez, while overpowering them with his own strong and piquant personality.

French Painting; Sixteenth Century. The remaining important continental nation, the French, did not show in painting the initiative and originality that had marked their great accomplishments in medieval architecture. In the 16th century, appeared the first truly French painters, the family Clouet, founders of the national school, to whom are due the portraits of Francis I, his son Henry II, and his grandson Charles IX. But, as a consequence of war and of royal marriage alliance, Italian influence penetrated France, grafting itself upon the fine and the industrial arts, upon the literature and the language of the transalpine country. The native French painters hastened to eliminate from their work traces of Flemish teaching. As a consequence, their portraits, whether shown in three-quarter length or as mounted figures, if deprived of documentary evidence, might appear to have been painted by the 14th century Italians who were then developing their sense of tactile values.

"The Italianate" in France, or supremacy of principles and points of view derived and accepted so joyously from the anciently cultured peninsula, was slow in passing away. In the 17th century, Simon Vouet (1590–1649), while reflecting in his own composition, drawing, and accentuated shadows the contemporary, artificial school of Bologna, developed three painters, his pupils, whose murals and easel pictures form one of the chief artistic glories of the period to which they belong. Two of them, Eustache Le Sueur (1617–55) and Pierre Mignard (1610–95), overshadowed by the personality and the official position of the third, Charles Lebrun (1619–90), did not have at the proper moment of their careers the opportunity to assert their talents.

Le Sueur. The first-named, of deeply religious nature, presented with intensity of expression the more tragic of the Church subjects, such as the "Scourging of the Christ," in which he combined the pose of Michelangelo (the "Slaves") with the line and the modeling of Raphael. Again, in the fine series of murals portraying the life of Saint Bruno, founder of the Carthusian order, Le Sueur recalls Raphael's tapestries (*Gli Arrazzi*) and the lower group of the scene of "The Transfiguration."

Owing to the date of his death (1655), Le Sueur can scarcely be ranked among those whose accomplishments gave luster to the reign of Louis XIV, the most brilliant portion of which was included between the years 1661 and 1690.

Lebrun. During this triple decade, Lebrun occupied at the French court a position somewhat comparable with that held by the Greek sculptor Phidias, under the Periclean democracy of Athens, in the 5th century B. C. Possessed of extreme versatility, Lebrun became almost a dictator in the arts. He was author and executant of great mural schemes in the Louvre (Gallery of Apollo), at Saint Germain en Laye, and at Versailles (Hall of Mirrors). He directed the royal manufactures of tapestry (*Les Gobelins*) and gave numerous designs for landscape gardening, for architectural ornament, and even for pottery. By the eminent critic and professor, Henry Lemonnier, he is placed "side by side with Louis XIV and his prime minister Colbert in the general history of the age, but before them in the history of art."

Judged specifically as a painter, however, the rank of Lebrun is much lower. His conceptions are superficial, his color is almost negative, his line lacks vigor. But, in spite of these faults, he still maintains a place among the great decorators, owing to his vivacity of composition, his arrangement of masses, and his ability to maintain a focal point.

Mignard. As director of the Royal Academy of Painting and in other official posts, Lebrun was succeeded by his enemy Mignard, who was already 78 years of age. Nor was he, it must be admitted, of the artistic stature of Lebrun. On the contrary, Mignard possessed a power of appeal, of awakening emotion in the minds of those who observe his works, that was quite denied to his successful rival. Among the Madonnas painted in the 17th century, his beautiful "Virgin of the Grapes" (now in the Louvre) holds a high place, even if it be compared with those of Murillo, with which it has a certain affinity, at least in composition and line. With these qualities the resemblances cease, for the thicker paste and the colder color of the French painter lose their charm, if brought to the eye or the mind, beside the ethereal touch and warm tones of the Spanish master in his second manner. The religious pictures of Mignard also wholly lack mysticism and ecstasy. To them he brought the point of view of the man of the world, which made him so successful

in his portraits of royalty and of nobles, especially of highly placed women. His masterpiece, however, is his decorative scheme in the Val-de-Grâce, which, when death closed his career at the age of 83, he hoped yet to surpass in the other church of the architects Mansart, the now more widely known structure, Les Invalides.

Watteau; Lancret; Pater. In French painting, the connecting link between the 17th and the 18th century was Antoine Watteau (1684–1721), born in the northeast on a wavering line of nationality and reacting throughout his artistic career to the impulses of both the Latin and the Teuton. The half of his short life he passed in Paris, and by his art there exercised for 20 years, he stabilized for the outside world the symbol of the city. A scene painter by profession, he gave to his figures the movement, the expressive quality, the aloofness from daily life, which belong to the stage. Nor did he fail to indicate by subtleties possible to the painter alone the bitterness and futility of existence. By a shadow, a gesture, a modulation of color value, he was able to turn comedy to tragedy with a dramatic power suggestive of Molière.

To repeat the delicate art of Watteau was the aim of Lancret (1690–1743) and of Pater (1693–1736), who were, like the first-named, Flemings. They too painted, in small proportions, figures dressed in silk garments and powdered wigs, projected against a background of formal gardens or parks. While in such scenes there is no room for the display of the classical nude so dear to French artists, yet in Watteau there is much vitality, as shown by the figure of the Punchinello, "Gilles," garbed in white, which is one of the treasures of the Louvre. There is also in his work a progressive movement which, as explained by the subtle sculptor-critic Rodin, served as an inspiration for rendering the complicated "action" in his own statue, "The Age of Bronze." As to the color used by these painters, it is suggestive of Rubens,—warmer, softer, and more luminous than had been characteristic of the French school up to that moment.

The Art of François Boucher. Later in the 18th century the purely national traits were revived. The nude reappeared in the decorative panels of François Boucher (1703–70), the favorite painter of Madame de Pompadour. This artist was an accomplished classical scholar, and in his time the artificial life of the court had already begun to pall upon the courtiers, in whose minds there rose a longing for the open spaces of nature. Therefore, two classes of subjects presented themselves to the decorator. Either he pleased himself in portraying youthful deities attended by cupids, who in drawing and pose were reminiscent of the later Italians, or he painted lords and ladies disguised as shepherds and shepherdesses, in whom his noble observers delighted to recognize themselves.

As his drawing and foreshortening savored of Correggio, so also did his effects of light. These it was his custom to concentrate in the body of a nymph or shepherd; surrounding this focal point with trees or draperies painted in the soft, attractive tones of rich, silken, faded fabrics.

Conventional and unreal as was the art of the 18th century for at least two-thirds of its course, it satisfied the play-impulse of the nobles and of the scholars of France who were the observers of a political and social system in decline. But upon the accomplishment of the Revolution (1789–1800) there followed a new order of things.

David and His Period. Under the Consulate (1799–1804), in each of the three great arts of form, austerity succeeded sportiveness. Form contracted its curves, and color grew somber or paled, as a face composes itself after a smile. In painting, the new school was guided by a single master, David, whose control over his pupils was more absolute than that of any of the great Italians of the High Renaissance, excepting Raphael. David was himself a revolutionist, and, wearing the red "liberty cap," sat in judgment upon the aristocrats during the "terrible year" of 1793. Later, he devised the republican festivals and pageants after the manner of those of ancient Rome.

Apart, however, from the permanent interest attaching to him as the official court painter of the First Empire, David is æsthetically unattractive today. He was in the strictest sense a classicist. That is, he generalized; presenting no realistic figures and no specific backgrounds. With a model before him, and the attitudes of antique statues in his memory, he eliminated from his subjects all effect of movement and even the suggestion of the power to move. During the early part of his career he set his figures symmetrically against the bare, dark backgrounds of Roman interiors; while later he placed them under a cold, gray light which for him symbolized the open air.

By this system and by his commanding position, David impoverished the power of painting. He left nothing to represent, except the harmonized and generalized proportions of the body, purity of modeling, and a studied beauty of attitude. Therefore, the reactions of events and of temperaments to such principles could not fail to be both interesting and most important.

The Reaction from David. The empire, resulting from the Revolution, and the supremacy of the Davidian studio ended together. But the greatest of the pupils of David, Baron Gros (1771–1835), was, without doubt, the forerunner of the new movement, Romanticism. Thoroughly trained and, at the same time, impetuous, he broke the hard and fast rules of composition. An ardent admirer of Rubens, who of all artists had most vividly rendered battle scenes, he painted in thin, brilliant color certain of the most telling episodes of the Napoleonic wars. Reaction, violent but ineffective, appeared also in Girodet (1767–1824), who, in his poetic canvases, enveloped his figures in strange lights; while in his "Deluge" and his "Battle of Cairo" he sought to render overwhelming passion by exaggerated attitudes.

Ingres, Classicist. Meanwhile, the classic influence persisted in Jean Auguste Ingres (1780–1867), the great draftsman whose figures, like "Œdipus" and the "Nymph of the Rivulet" ("La Source"), are triumphs of pure rhythmic outline, rather than of modeling. The same artist also, by virtue of his very long, direct study of 15th century Italian frescoes, became the founder of a school of mural painting adapted to an architectural frame and having the characteristics of flat and low relief.

The Romantic Movement. At the beginning of the third decade of the 19th century the painters of France were divided into two hostile groups, one of which was headed by Ingres, the other by Eugène Delacroix, styled by his opponent the "Apostle of Ugliness." Around the latter gathered the Romanticists of every degree or, in other words, those painters to whom the artificialities of the Davidian studio had become hateful. Their spirit is best expressed in the exclamation of their chief: "I hate systematic painting." Their passion was for color and the indication of violent action and emotion, as is witnessed by Delacroix's massacres, shipwrecks, revolutionary scenes, lion hunts, and wild beasts seeking their prey.

Realism; Courbet. At the middle point of the century, realism, or rather naturalism, asserted itself, with Gustave Courbet (1819–77) as its champion. The affiliations of this painter were not with his compatriots, either historical or contemporary. His family tree as an artist spread its roots in Holland and in Spain. As Ribera in the 17th century presented the figure of Cato in the act of tearing out his own entrails, so Courbet in his "Quarry" painted the cadaver of a noble stag, lying beneath a great forest tree, with gaping flanks and as the prey of devouring hounds. Others of his

subjects, like "The Wave," show nature in cruel mood, or again they declare the hard necessity of human labor, as in the "Stonebreakers." But all were the results of direct visual observation, differing from the works of *les pleinairistes* (open-air school) solely in having been painted in the studio.

Corot and His Associates. Within the walls of a studio also Jean Baptiste Corot (1796–1875) painted what may be called his synthetic landscapes, the *motifs* of which, after having closely observed nature, he modulated into compositions whose chief factors were light and atmosphere. His processes were those of reduction, and his chief objective was to obtain a gamut of luminous values. He developed from the Dutch masters of the 17th century, as the man understands and explains with a broadened intelligence the impressions of his childhood. He gathered, besides, the heritage of that other northern luminist, Claude Lorrain (1600–82), to whom Italy and antique legend were so eloquent and so wholly divested of archeological pedantry.

While excelling all others in treating the phenomena of light, Corot was not the only Frenchman of his time to interpret nature through painting. Théodore Rousseau (1812–67) was, perhaps, the chief of the greatest of all schools of landscape in the history of art, but his two associates in the villages of Barbizon and Fontainebleau—Dupré (1812–89) and Huet (1804–68)—each added materially to the sum of beauty created by the highly specialized movement which more than atoned for the frequent coarseness and brutality of the gifted Courbet.

Rousseau established himself at Fontainebleau, that he might paint the monarch oaks of the forest attaching to the royal château of historic fame. His manner as an artist was grave and, if the expression be allowed, that of a portraitist intent to shadow forth the character of his sitter. He descended in more direct line than did Corot from the 17th century Dutch painters of trees, but his renderings were more devout and more individual. To borrow the words of a judgment of Rousseau passed by a French critic: "Ruysdael and Hobbema have left no such varied gallery, no such powerful portraits of forest personalities." Of the two remaining masters, Huet, influenced by Constable, but more dramatic than the Englishman, produced his masterpiece by studying the destructive forces of nature in his "Inundation at Saint-Cloud."

As for Dupré, the close friend of Corot, he gave solidity to his composition, and produced from his knowledge of the chemistry of color a tranquilizing harmony of tones. Always watchful of the *ensemble*, and logical to the degree of his talents, he showed, together with his admirable art, the best qualities of the French mentality. He had the power of extracting from a rapid sketch of a single natural object a principle which, under his treatment, amplified and assumed a majestic beauty.

Millet, Painter of Peasant Life. With the names of these four landscapists, who contributed so richly to the evolution of their art, must be joined that of Jean François Millet (1814–75), painter of peasants at their toil. In spirit he was a 19th century Saint Francis, apprehending poetically the just relations between the laborer and nature. As a painter, he was the exponent of telling gesture, showing how far that mute language had progressed since Giotto painted in the Arena Chapel at Padua the presentation of the Infant Christ in the Temple. Further, Millet was the master of the dark silhouette cast upon a luminous background. Himself of peasant origin, his first instructor was his uncle, a priest, and his most treasured books throughout his life were the Bible and Virgil. His pictures, like the *Georgics* of the pagan poet, show the "works and days" of husbandmen, and were conceived in artistic ecstasy, undisturbed by envy or hatred of another class. For years blindly praised by propagandists of social revolt, Millet has already resumed his place in the France of his time as an artist pure and simple.

Impressionism. Before the passing of this great group and that of the chief naturalist Courbet, all of whose deaths occurred between the years 1867 and 1889, impressionism appeared in the work of its pioneer, Edouard Manet (1832–83). This French painting included within its sweep many and different points of view. However, the term does not defy definition. Impressionism is the translation of a play of light and shade into a play of color. To be more explicit: the painter may imitate the luminous effects of nature by reversing the process as illustrated in the prism. By the use of a highly colorful palette he may bring together the elements of white light. But he cannot combine them, as the prism separates them. The fusion must be made in the eye of the spectator, and, as in the prism, nature is the operative agent.

Of impressionism, Manet was but the forerunner. Its greatest exponent was Claude Monet, who, by amplifying or withdrawing luminosity, presented in infinite variation and charm the same scene at different hours of the day or under different conditions of weather. The movement as it appears in the work of the latter, and in that of Sisley, Pissarro, and Renoir (to a certain extent his disciples), implies an advance in the point of view from which the painter contemplates nature.

The Modern School. Since then the modern school of French painters has come to look upon nature differently. This group, headed by the Spanish-born Pablo Picasso, holds that nature is not a subject to be imitated or noted on canvas, but is merely a springboard for the thoughts and feelings of the artist.

Among the individualists, each of whom has pursued his own particular line of expression, are such revolutionary masters of modern art as Henri Matisse, Maurice Utrillo, Marc Chagall, Fernand Legér, Georges Rouault, Georges Braque, André Derain, Maurice Vlamick, and Raoul Dufy. Their influence has been world-wide.

Continental Painters in England. The play-impulse of the men of the British Isles has externalized itself more powerfully in creative literature than in other forms of art. Nevertheless, in architecture and in painting, native genius, further quickened by contact with continental Europe, has produced results that are most admirable. As expression in painting was not spontaneous among the British, it required to be fostered by those in power. Hans Holbein the younger became the court painter of Henry VIII, dying in London late in the reign of that monarch, and in the following century the Fleming, Sir Peter Lely (Van der Faes), advanced to a similar honor under Charles I.

Hogarth. Early in the 18th century, painting in England passed to the control of native artists, and a truly national master made himself felt in the personality of William Hogarth (1697–1764). Necessarily much of his art is today obsolete, because it is narrative, as it was his clearly expressed intention that it should be. By nature he was a humorist, by profession a painter and engraver. Yet critics delight to place him in the company of Cervantes, Molière, and Fielding, those masters of literature "who lashed the morals of their times with laughter." Outside of his social and moral series, which it was his custom first to paint and then to engrave for financial profit, Hogarth executed a number of fine portraits, and he occasionally treated a romantic subject. And it is especially in these two latter species that he shows brilliant pictorial qualities.

Reynolds and Gainsborough. The late Italian influence, visible in Hogarth, was accentuated in the work of the great portrait artist, Sir Joshua Reynolds (1723–92), recognized as the head of the first English school. Self-centered, persistent, and restrained, after the manner of his race, he patiently created an effective style, and gave to the national branch of his special art a distinction, an aristocratic tone, which it has never lost. The painters of Bologna, Rubens, and Van Dyck were his masters,

as is proved by his still existent notebook, which he compiled during his period of foreign study. His success, most brilliant in his portraits of men, was also marked in full-length figures of women, expressive of arrested motion. Further, in his pictures of children, he far excelled his greatest rival, Thomas Gainsborough (1727–88), who failed in delicate observation, and painted diminutive men and women.

On the contrary, Reynolds never painted a landscape background suggestive of mood, which was often so eloquent in the portraits of Gainsborough, nor was he capable of portraying the pathos of solitude and advancing age, as it exists in the "Parish Clerk" of the other artist. Again, the modern eye prefers Gainsborough's rendering of Mrs. Siddons, in graceful pose, society dress, and soft Van Dyke color, to Reynolds's treatment of the same subject, represented as a queen of tragedy in classic drapery, seated on a throne, and drawn in the lines of Michelangelo's sibyls of the Sistine Chapel. Finally, it is Gainsborough who is the prophet of the French impressionists in his sparkling canvases of broken lights and color, such as the "Blue Boy."

Lawrence; Romney; Raeburn. Possessed of certain very attractive and individual qualities, Sir Thomas Lawrence, George Romney, and Sir Henry Raeburn were also distinguished painters of portraits during the Georgian period. The first of these three, gifted for the stage, and in drawing able quickly to catch resemblances, became noted in his early adolescence and before he had studied seriously. A lesser Reynolds in his talents, at the death of that painter, he succeeded to his position at the court and also as president of the Royal Academy. The art of the second of the three, Romney, has a subtle, continental flavor reminiscent of both France and Italy. Unforgetable are his aristocratic children dancing in a ring and posed against the park scenery of a great English estate. The last of the group, the Scotchman, Raeburn, was simple and virile in manner, somewhat lacking in the treatment of light and shade, but in brushwork recalling Velasquez.

Constable and Turner. As the reign of George IV ended, British painting fell into such decline that in 1830 one of its two living champions, John Constable (1776–1837), asserted that in a few decades it would have ceased to exist. As a corrective to a long prevailing usage, he had himself changed the conventional English landscape into one of possibility, by the substitution of verdure for brown foliage. He set himself to reproduce the charms of his moist and rainy island. Constable derived from the Dutch painters, especially from Cuyp the younger (1620–91), and in his turn influenced strongly the French landscapists of Barbizon and Fontainebleau. But in no instance is the difference between talent and genius better illustrated than in the comparison between Constable and his contemporary Turner (1775–1851), that enigmatic man of more than Stevensonian duality, whose sordid personality gave forth with small loss the sunsets of Venice, and differentiated with nicety vapor, smoke, and rain.

The Pre-Raphaelites; Rossetti. The decline in British painting ended with the very year of Turner's death, since the Royal Academy exhibition of 1851 contained a canvas expressive of a new movement. This was the "Annunciation" of Dante Gabriel-Rossetti (1828–82), the son of a Neapolitan political exile and of a half-Tuscan, half-English mother. Conspicuous for its archaic quality and for its faults of drawing, attractive through its color, spiritual in content, the picture was, so to speak, the formulated creed of the body of young artists represented by it. These were a group of seven men naming themselves the Pre-Raphaelite Brotherhood and following the professions of painting and sculpture, with among them one literary critic.

These artists believed that they justified both themselves and the name of their association by rejecting the suave line and elaborate composition characteristic of Raphael, adopted by his pupils and subsequently bound firmly into the traditions of painting. Gradually the pictures of the Brotherhood, especially those of Rossetti and Holman Hunt, awakened overtones in the hearts of mystics, or they excited a ridicule so trenchant and witty as to make them known throughout the world.

Burne-Jones and Morris. Therefore the new movement persisted through its own vitality. It was also powerfully aided by John Ruskin in his lectures at Oxford (1870–79), since by his influence two remarkable young students of Merton college were led to follow the principles of English Pre-Raphaelitism, although its founders had long since ceased to work in common. These youths were Burne-Jones and William Morris, whose names have become household words in all civilized countries; that of the first because he created pictures, which readily translated themselves into tapestries and stained glass; that of the second because his versatile talents, manifested in all the industrial arts, revolutionized the interiors of Victorian England.

The experiments of Morris in dyeing and weaving greatly advanced these crafts, or, to speak better, restored them to medieval honesty and excellence. His designs for textiles were carried through continental Europe, where they especially influenced Belgium and France. In the latter country the Pre-Raphaelite movement, modified and broadened, assumed the title of *l'Art Nouveau* at the beginning of the 20th century and came gradually to include all the arts, major and minor. Thus, for the first time in the history of British painting, had the current of influence flowing from the art been strong enough to reach a foreign shore.

First American Painters. From this statement exception must naturally be made of the relations between the mother country and her North American colonies during the first three quarters of the eighteenth century. The first group of American painters included John Singleton Copley (1737–1815), Benjamin West (1738–1820), John Trumbull (1756–1843), and Gilbert Stuart (1755–1828), all of whom were self taught and were afterward strengthened by study abroad. West, a Pennsylvanian, began to paint when some Indians showed him how to make red and yellow paint. The family cat supplied him with hair for his brushes. In England he was one of the founders of the Royal Academy, later becoming its second president. Of the four men, the Bostonian Copley and Gilbert Stuart were the most gifted. Copley's father-in-law owned the tea that was thrown into Boston Harbor, and, in 1774, on the eve of the Revolution, the youthful artist, already famous for his portraits, moved to England.

The second of the group, Benjamin West, aspiring to be a painter of large canvases and of historical scenes, failed in his ambition, and the interest still attaching to his work has its principal source in our patriotism. Trumbull, later born by two decades than the first two of the group, was the son of a colonial governor of Connecticut, a graduate of Harvard, and a soldier of the American Revolution.

The war ended, Trumbull went to London, there to place himself under the instruction of Benjamin West in historical and battle pieces, two branches of painting which he subsequently studied in Paris. Certain of his works then produced, both portraits and episodical pieces, were purchased by the United States government, and others, to the number of fifty, by Yale university (then college), where they now constitute the Trumbull gallery. And at the time of their acquisition (1831), the institution granted the artist an annuity of one thousand dollars, upon which he established himself in New York, where he practiced his profession until his death.

Gilbert Stuart. The last and greatest of the group, Stuart of Rhode Island, while having less soaring ambitions than West and Trumbull, made finer achievements than either of these men. His profile head of Washington, projected on an unfinished canvas, is known to every North American

school child as the accepted likeness of the first president of the United States. He painted more than 100 pictures of Washington. His portraits of other early presidents and patriots are regarded as scarcely less admirable. During the residence of Stuart in England and in France, George III and Louis XVI, Lords Clinton and Lyndhurst, Sir Joshua Reynolds, and Copley became his sitters. Through these patrons, he acquired the reputation of being one of the most skillful of the then living representatives of his chosen branch of art.

Somewhat later in time, but among our earlier portrait painters, were Thomas Sully (1783–1872), who painted many prominent persons; Chester Harding (1792–1866), an itinerant artist, and Samuel F. B. Morse (1792–1872), who, though generally remembered as an inventor of the telegraph, is now regarded as one of our outstanding artists.

Second Period of American Painting. Following the first period of American painting, which came to an end during the first quarter of the nineteenth century, there followed a second period during which the eyes of artists turned away from political events and personalities to the phenomena of nature. Thomas Cole (1801–48) was the founder of the so-called Hudson River school of landscape painting. Among the best painters of this school, besides Cole, were John Kensett (1818–72), Alexander Wyant (1836–92), and George Innes (1825–92). The work of these Americans helped to raise the art of the United States in the estimation of European critics.

Other portrayers of the American scene during the nineteenth century were the genre painters George Caleb Bingham (1811–79) and Eastman Johnson (1824–1906). Bingham, who was born in Kentucky, but spent most of his life in Missouri, is one of our most important regional painters. His Mississippi valley pictures—"Jolly Flatboatmen," "Raftsmen Playing Cards," and "Stump Speaking" are among his best. Johnson's rural paintings include "Old Kentucky Home" and "Corn Husking at Nantucket." Both men, in addition to dealing realistically with scenes from everyday life, were also portraitists, Johnson in particular executing likenesses of many distinguished Americans, from Daniel Webster to Grover Cleveland.

Among the finest artists America has produced are three nineteenth century painters who lived beyond the turn of the century—Winslow Homer (1836-1910), noted for his marine pictures; Thomas Eakins (1844–1916), who painted domestic scenes and other aspects of American life and also portraits; and Albert P. Ryder (1847–1916), whose mystical landscapes were at first misunderstood.

To the nineteenth century also belong the first Americans of thorough French training. These were William Morris Hunt (1824–79) and John LaFarge (1835–1910), both of whom turned to mural decoration, and the latter also to the production of stained glass. The murals of Hunt in the state capitol at Albany were destroyed when alterations were made to the building. Those of LaFarge, our best muralist, exist in the Church of the Ascension, New York, and Trinity Church, Boston.

The Expatriates. Since the days of John Copley and Benjamin West, there have been artists who have preferred to live and work abroad. Famous among these expatriates of the last century were James A. McNeill Whistler (1834–1903), John Singer Sargent (1856–1925), and Mary Cassett (1843–1926). Whistler and Sargent lived in London during their most productive years. Whistler, an etcher as well as a painter, was an innovator and a great controversial figure in the art world of his day. Sargent, more academic in his viewpoint, was a popular society portrait painter, who turned out an amazing number of pictures. It is no disparagement of this gifted artist to say that his contemporaries, William Chase (1849–1916), John W. Alexander (1856–1915), and Cecilia Beaux (1863–1942), sometimes equalled, and, in several instances, surpassed him. Mary Cassett, a figure painter, lived most of her life in France, where she associated herself with the impressionists, who thought highly of her paintings, pastels, and etchings.

Other artists, besides Mary Cassett, who were influenced by French impressionists, but possessed original qualities of their own, were John H. Twachtman (1853–1902), Maurice Prendergast (1861–1924) and Childe Hassam (1859–1935).

Twentieth Century Painting. With the coming of the twentieth century, American art entered a third period of development, a vital characteristic of which has been its multifariousness. Advancement has been along many different lines, some of them so individualistic as to be difficult to classify. But a retrospective glance over the past four decades shows developments in the fields of realism, regional painting, social consciousness, abstraction, expressionism, and surrealism. Many controversial issues have been raised by painting influenced by modern European art, but this has had the salutary effect of stimulating public interest in art. More people have attended exhibitions and more attention has been paid to art by the press than at any time in our history.

Of contemporary American painters, Charles R. Burchfield (1893–) is our leading water colorist. Other fine artists in this medium are Edward Hopper (1882–) and Charles Sheeler (1883–). John Marin (1872–1953) was outstanding.

Regional Painters. Grant Wood (1892–1942) was a leader in a regional school of art that portrayed the Middle West. He was not so realistic as John Steuart Curry (1898–1946), who is well known for his Midwestern farming scenes. The somewhat exaggerated Midwestern and Southwestern types of Thomas Hart Benton (1889–) are unmistakable. Among other contemporaries who are American or regional in subject matter, the following may be mentioned, with their favorite subjects: John Sloan (New York city), Reginald Marsh (Bowery and Coney Island), Jerome Myers (New York city), William J. Glackens (New York parks), Paul Sample (New Hampshire), Peter Hurd (Southwest), Aaron Bohrod (Chicago), Millard Sheets (California), Louis Bouche (New York), and John Costigan (idyllic America).

Arthur G. Dove (1880–) is perhaps America's foremost abstract painter. Other artists who are abstractionist in much of their work are Georgia O'Keeffe (1887–), Karl Knaths (1891–), and Stuart Davis (1894–). Still another was Marsden Hartley (1877–1943).

Traces of abstraction or surrealism appear in the work of Peter Blum (1906–) and Ben Shahn (1898–), who with Max Weber (1881–) and Morris Kantor (1896–) are among the newer leaders whose interest is mainly in pure painting.

Walt Kuhn (1880–1949), who specialized in circus types, was a realistic painter. Other major contemporary realists include the robust Waldo Peirce (1886–), Yasuo Kuniyoshi (1893–1953), Alexander Brook (1898–), Eugene Speicher (1883–), and John Carroll (1892–).

The primitive paintings of John Kane and Grandma Moses have attracted much attention.

Manifesto of the Museums. In an attempt to clarify current controversial issues, the Museum of Modern Art and the Whitney Museum of American Art in New York, and the Institute of Contemporary Art in Boston, whose interests center chiefly in the field of modern art, issued a joint statement in 1950. Noting that the field of contemporary art is immensely wide and varied, with many diverse viewpoints and styles, the statement termed this a sign of vitality and freedom of expression inherent in a democracy. Recognizing that modernity in itself is not any guarantee of quality or importance, it was stated further that they believed it to be the primary duty of a museum concerned with contemporary art to be receptive to new talents and tendencies.

AMERICAN FOLK ART

Above A ship's figurehead carved in polychromed wood and depicting Columbia. It stands five feet, eight inches high.

Upper center Girl of the period carved in wood and resembling a cigar store figure. Carved by an unknown artist in the late nineteenth century.

Above Horn cup, incised, picturing blacksmiths at work. The cup, originally used for drinking, stands four inches high.

Lower center Navigator in polychromed wood and standing 26 inches high. The figure is possibly a ship chandler's or nautical instrument maker's sign.

Below George Washington on horseback. The wood is polychromed and the horse trappings are cane. The figure was carved in the mid-nineteenth century.

Below An Indian weathervane, of polychromed wood and wire. The figure was carved by an unknown artist in the late nineteenth century.

Folk Art Galleries, Fenimore House, Cooperstown, N. Y.

Above Saint Paul's Cathedral in London, England. Constructed during the years 1675-1710. It was badly damaged by German bombings during World War II. Designed by the famous Sir Christopher Wren, it is considered the finest example of Renaissance architecture in England.

Upper right Cathedral of Saint John the Divine in New York City. Completed in 1911, the original style was Romanesque. In 1928, Cram and Ferguson, architects of Boston, undertook to remodel the nave along Gothic lines.

Aerial view of the famous Saint Patrick's Cathedral in Manhattan. Located on Fifth Avenue between 50th and 51st Streets. Saint Patrick's cornerstone was laid in 1858. Renwick, the architect, designed the Cathedral in Gothic style.

FAMOUS CATHEDRALS

ARCHITECTURE

Among the fine arts, architecture alone does not proceed from the "play-impulse"—from the desire of the creative artist to communicate to others an idea, which has arisen within his spirit, in terms of sound, line, or color. The origin of this art is almost synchronous with that of the family, since its practice is necessary to the protection and maintenance of life. The man of the later Stone age, when he had learned to polish his crude implements, used them to construct his dwelling according to one of the two types—the rectangular and the domical—out of which all architecture has expanded.

The Primitive Cabin of the Egyptians. In the valley of the Nile, the primitive builder with his rude ax cut the papyrus reeds at the river bank, clustered them, bound them together, and set the clusters deeply into the earth, at rhythmic intervals,—as the pulsations of his heart, regulating all human activity, taught him to do. Then, with the easily worked clay, accumulated by the yearly inundations of the region, he reared walls between the columns, until he had reached a desired height, when he laid other reed clusters horizontally upon his supports, in order to form with more clay, used as before, the ceiling of his habitation. The walls of his completed structure, viewed externally, suggested by their inward inclination the later pyramids and pylons. Finally, the builder finished his dwelling by drawing his spatula over the roof, without, however, heeding to cut the damp overhang. This overhang, depending from the edges and hardening, became the forerunner of the temple cornice of stone—sometimes called the hawk-beak, from its sharp concave profile—so effective in casting shadow against the atmosphere saturate with light.

The Ancient Mesopotamian Oven. The second architectural type, known as the domical, has, according to certain French archeologists of great authority, been developed from the oven, fashioned of concentric rings of clay, which decrease in circumference as they rise, leaving an aperture at the summit for the escape of smoke. Ovens of this type are still built by the women of the alluvial plains lying between the Tigris and the Euphrates, and they are unquestionably of a traditional form whose origin dates from a past too remote to be realized.

These two structural types of differing principles being accepted, it is easy to follow the progress of each throughout the history of architecture. But, before engaging upon this long sequence, it is necessary to understand the principles underlying the forms beneath which they present themselves to the eye.

The Lintel. The primitive Egyptian, in providing himself with shelter, used the column and the beam—in other words, the *lintel principle*, which, developing to maturity in ancient Greece, where stone was available in large masses, has in our own day and country advanced to new favor, owing to the skillful and extensive employment of concrete. The lintel may be defined as a horizontal bar of solid material (stone or wood), which spans an opening, such as a door or window, with its extremities resting upon two uprights. Against this bar the weight of the wall above presses vertically, causing it, if too heavily loaded, to crack or split about midway in its span,—a danger which, early in the use of the principle, was averted by voiding a triangle directly over the horizontal. Examples of this construction are to be seen in the entrance to the subterraneous tomb chambers of the Egyptian sovereigns of the Old Kingdom (about 3000–2400 B. C.), and over the city gate at Mycenæ in the Peloponnesus.

The Dome and the Arch. The second or *domical principle*, with its close relative, the arch, contains within itself a disruptive force, commonly known as the thrust, tending to make it spread, and requiring an equal opposing force to assure the stability and permanence of the structure. The true dome exerts its thrust equally at all points of the circumference, while the arch, which is a collection of interdependent wedge-shaped solids held in place by the central, or key, stone, demands that the resisting masses, the buttresses, be concentrated at certain accurately determined points.

Therefore, judged from the point of view of structure, the column and lintel produce inert masses and dead weight. Domes and arches, on the other hand, are the visible expression of unseen elements constantly active and mutually hostile, constrained, like turbulent individuals beneath a strong government, to concur in shaping a fabric and in maintaining it in equilibrium.

Both these principles, so early apprehended, were either advanced or hindered by the physical environment of the ancient peoples who, successively holding power, developed architecture, in order to meet their own special religious, civic, and domestic requirements.

Egyptian and Greek Use of the Lintel. Therefore, if the beauty worshiping Greeks perfected the column and lintel, the achievements of the Egyptians cannot be disregarded. The inhabitants of the Nile valley were earlier by at least a thousand years in their use of the simpler of the two fundamental principles of architecture, as exemplified in their great temples, such as those of Karnak and Luxor, and in the structures of Queen Hatshepsut, all of which were erected between the 16th and the 12th century before our era. Compared with the Greek temples of the 5th century B. C., the Egyptian temples of a thousand years earlier are like the skeletons of certain great animal species, preserved or imitated in our museums, but now extinct, because they could not adapt themselves to the progress of terrestrial life.

The Temple of Karnak. This comparison cannot but suggest itself to one who observes the plan and the proportions of the Temple of Amen-Ra at Karnak, which so conspicuously lacks co-ordination and cohesion, but, at the same time, conveys a sense of the superhuman. To the propagation of fear and awe among a craven people, the works of the Egyptian builders, at the very first, lent themselves, as is instanced in the pyramids and in the rock-cut tombs of the Old and the Middle Kingdom. The same intention animates the structures of the Empire (1580–1150 B. C.), although it is hidden beneath the exuberance of display then demanded by the arrogant, splendor loving Pharaohs.

The Confused Plan of Karnak. Symptoms of an inorganic state of society are visible in the colossal House of Amen-Ra, which lacks a co-ordinated plan, created once for all and admitting of no material change. Here pylon has been added to pylon, so weakening the first impression of an entrance to a holy place. Other temples, with their smaller forecourts, hypostyle halls, and sanctuaries, have been allowed to meet or to pierce the lateral walls of the great structure or even to rise within its very body, to the detriment of order and symmetry. It remained for the Greeks, the creators of the city-state, to formulate an architectural expression, the harmony of whose parts should attest corporate effort, and whose elevated, restrained beauty should be eloquent of an elect people daring to converse with Divinity in terms of philosophy, of ethics, and of art.

The Architecture of Ancient Persia. But, in passing, there must be mentioned very briefly the use of the column and lintel made by the first Indo-European people to hold dominating power in western Asia. These were the Persians, who seem to have been in many ways the forerunners of the Hellenic Greeks, as appears particularly in their

religion, Zoroastrianism, which required each man to choose a positive position in the fundamental questions of life and faith.

Religion, as exercised by the Persians, demanded no temples, properly speaking, nor even tombs; for their sacred writings, the *Avesta*, far from encouraging the preservation of the bodies of the dead, prescribed their exposure. This custom, however, was not followed by the great sovereigns of the 6th century B. C.; so that the royal sepulchers of this period are among the important remains of ancient Persian architecture—those at Persepolis having columnar porches, entablatures, and gable roofs. But it was in the palace type that the Persians put forth their best structural efforts. They united in one area of different levels fortress, residence, and audience halls. The Palace of Darius contained a hypostyle hall, which served as a throne room, set with a hundred columns nearly as high as those of Karnak, and far more slender; while the Palace of Xerxes, son of the preceding monarch, covered a site of 7500 feet, and was, therefore, larger than any Gothic building subsequently erected in Europe, with the exception of the Cathedral of Milan.

Persian Porticoes. In these Persian structures, the open porticoes occasion comment, as having no precedent or models in either Egyptian or Assyrian architecture. They are originals, the principle of which was destined to modification and splendid expansion under the supremacy of the Greeks and the Romans. And, quite apart from the architectural principle here involved, interest attaches to the special form under which it is displayed. First, the spacing of the columns in the palace at Persepolis is much wider than in the hypostyle hall at Karnak. Thirty-six columns suffice in the former for the area occupied by one hundred thirty-four in the Egyptian temple. The small number used by the Persians is permissible because their roofs appear to have been formed by timber beams reaching from one column to another, rather than by massive stone blocks, supported, as in Egypt, by the enclosing walls and the closely set stone columns of great diameter.

Egyptian and Persian Gifts to Greece. Toward the attainment of Hellenic perfection in the use of the column and lintel, the legacies of the Egyptians and the Persians contributed. The primitive clustered reeds of the Nile cabin, the colossal stone roof-supports at Karnak, the slender, widely spaced columns, and the open porticoes at Persepolis and Susa, as well as the structures of the Homeric cities of Asia Minor, were groping, tentative efforts toward the perfect results attained on the Acropolis at Athens in the second half of the 5th century B. C.

Greek Architecture. But the Hellenic perfection in architecture did not suddenly manifest itself in maturity, as Pallas Athena, according to the myth, issued in full panoply of armor from the head of her all-powerful father, Zeus. The development of the column-and-lintel principle among the historic Greeks was gradual, although constant, for at least two centuries. It was effected by two tribes of opposing qualities, whose concurrence produced the most happy results, not alone in architecture, but in sculpture and in the drama as well, with the work and influence of each tribe distinct and parallel in the three arts. From the second quarter of the 8th century, the Olympic games called together at stated, not infrequent, intervals the male population of the Greek world. Gradually, other similar festivals were inaugurated through the enterprise of various leagues, the objects of which were religious, political, and athletic. And, for the use of such corporations, temples and treasuries were needed.

Early Greek Temples. The earliest of these structures were of wood, for which stone was substituted when the tools of the builders had become more accurate. The periods of the use of the two materials overlapped each other in the Temple of Hera at Olympia, where the archeologists discovered that the older wooden parts, as they decayed, had been separately replaced by corresponding members of the more durable substance. It is accepted also that the earliest Hellenic temple constructed entirely of stone was erected on the isthmus of Corinth in the middle of the 7th century B. C., and was dedicated to Apollo, the god especially revered by the Dorians. But of this building no traces remain, and for archaic architectural types it is necessary to pass outside of Greece proper, eastward to Asia Minor and westward to Sicily and to lower Italy, known in classical geography as Magna Græcia. These latter lands were colonized by the Dorians, who, four centuries previously, had, as barbarians, come to peninsular Greece. They had been attracted by the riches of the race who, between 1600 and 1100 B. C., built the polygonal walls and the "beehive tombs" of Mycenæ, besieged and conquered Troy, and wrought the marvelous objects in gold unearthed in 1876 by the German excavator, Schliemann.

The Dorians, on their arrival in the Peloponnesus, either enslaved or expelled the conquered inhabitants, and closed their ports to foreign commerce. Then, during the so-called Homeric age (900–750), while a cognate people on the shores of Asia Minor, leavened to a certain degree by the exiles from peninsular Greece, were producing the *Iliad* and the *Odyssey*, the greatest of epics, the Dorians were developing militaristic states and were rapidly multiplying their own numbers. At last, but a single way remained open for their further development. This was colonial expansion, the main current of which turned to the fertile, volcanic lands lying toward the Pillars of Hercules, the western limits of maritime enterprise, named from the national hero of the Dorians.

Dorian Temples in Sicily. The eastern and southern coasts of the island of Sicily received their earliest important colonies, which became the cities of Syracuse, Selinus, Segeste, and Akragas (Agrigentum), the last three being noted for their archaic temples still existing in a ruined state. Of these ancient cities the most interesting architecturally is Selinus, with its acropolis and neighboring areas, the site of seven temples of uncertain dedication.

Greek Democracy and Art. The structural elements of the Greek temple having been chosen in the column and lintel, and the plan definitely fixed before the middle of the 6th pre-Christian century by the Dorian race, nothing more was required, in order to bring these barely formulated ideas to maturity, but a great event which should unify the rising city-states into a strong federation and create a common treasury by means of which to advance civilization. This event was provided by the wars which rose between Persia and Greece in the early years of the 5th century and continued for two decades. Toward their close, occurred the naval battle of Salamis (480 B. C.), fought in the bay of Athens and won largely through the sagacity and brilliancy of the men of that city, who, as a result of the brief conflict, obtained a leadership of the Greek world, which lasted for eighty years.

Age of Pericles. From this victory, as from the hand of a sower, a sentiment of national consciousness was broadcast, and, where it penetrated most deeply, it was subjected to a gradual, healthy period of germination. Then it bloomed in the three arts which, during the age of Pericles, attained, each of them, one of the greatest climaxes of its history: in architecture, the Parthenon; in sculpture, the group in the eastern pediment of that temple, representing the birth of Pallas Athena; in the drama, the Orestean trilogy of Æschylus, the *Œdipus King* of Sophocles, the *Alcestis* of Euripides, and the satiric comedies of Aristophanes.

Under the Athenian democracy, immortal types of art were created, as they were also called into being in France of the 13th, and in Italy of the 15th

and 16th centuries. For in these periods also genius and talent were supported by the esteem, the understanding, and the applause of the entire people,—as when the problems of the rapidly developing art of perspective, drawn in large proportions, were exhibited in the public squares of Tuscan towns.

But the Hellenic art of the 5th pre-Christian century—especially the art of the Parthenon—differs from all other climaxes that have followed it, in the possession of two qualities: simplicity and subtlety, both carried to the extreme. The plan of the temple is easily read by a child, while for more than a century and a half its curves have given to mathematicians material for discussion and even acrimonious controversy.

The Parthenon. The ruins of the Periclean Parthenon are those of the fourth building to occupy on the same site. The older foundations were skillfully treated by the last architect, Ictinus, who changed the long rectangle of the archaic period into a more compact structure, the proportion of length to breadth standing as nine to four. Further, in place of the porous limestone of the 6th century, readily absorbent of polychrome, marble from the quarries of the not distant Mount Pentelicus was chosen for its close texture and brilliancy. The chief architect had as his coadjutor Callicrates, designer of the beautiful miniature Temple of the Wingless Victory, destined a few years later also to rise on the rock of the Acropolis. The director of the entire work was Phidias, one of the greatest of sculptors, irrespective of time, nation, or school.

Plan of the Parthenon.—The conception of the Parthenon would seem to have been the result of a brief artistic ecstasy, since it is a whole, concentrated and co-ordinated, such as could not have been impeded by hesitations and afterthoughts. Its actual construction, begun in 447 B. C., was advanced nine years later to a point which permitted the use of the temple; detail work and embellishment were continued upon it until 432. But in 438, as we know from documents, the colossal gold-and-ivory statue of the titular goddess, Pallas Athena, created by Phidias, was placed in position in the cella, facing the eastern entrance.

The western façade of the structure was first seen by the visitor to the Acropolis after he had passed through the monumental gateway called the Propylæa. It presented to him a breadth corresponding in our system of measurement to 101 feet, and, because of this considerable expansion of an older proportion, eight columns were aligned across the porches at front and rear, instead of the traditional six of the true Doric type.

The Colonnade.—The peristyle, or fully surrounding colonnade, was completed by seventeen columns at the sides, making a total of forty-six, the treatment of which presents a refinement already observable in archaic temples, although there existent in a much less developed state. These supports, having a height of thirty-four feet, incline inward three inches toward the cella walls; the latter also following the same direction, and the whole thus offering the suggestion of a pyramid, as the Greek architects intended their structure should do, in order to proclaim its stability. Further, the upward diminution of the shafts was such that the diameters just below the capital measured more than one-third less than that of their base; while the angle columns were made slightly thicker than those ranged between them, in order to overcome what a French critic has called the "devouring" quality of the sunlit atmosphere of Athens.

Again, every apparently horizontal line of the Parthenon, as, for instance, the three steps of the stylobate (platform serving as the continuous base of the colonnade) show, if measured, an exceedingly slight convex curvature. This device appears to have been used by the architects in order to correct the optical illusion of "sagging," produced in a horizontal when seen from a distance, provided the line be extended and met by a number of evenly spaced verticals. At least, such is the explanation accepted by most experts, although a certain few—among them the American, Professor Goodyear, in his *Greek Lines*—present other reasons for the existence of these curvatures.

Sculpture and Color on the Parthenon.—To these subtleties on the part of the architects, the sculptors who were employed to embellish the temple responded with an equally delicate appreciation of the possibilities of their own art. In the external frieze of *triglyphs* (projecting blocks marked by vertical grooves) and *metopes* (intervening spaces filled with figures in relief), they emphasized rhythm, the basic principle of architecture, as well as of music. But, lest the clear, firm uprights of the triglyphs should appear too aggressive, these marks of accent were tinted to a deep blue, which the Greeks regarded as no color, since it belongs naturally to free space and makes the objects which it clothes seem to retire into the background. Blue also was given to the *tympana* (triangular areas enclosed by the cornices of the pediments or gables), and, within this refined setting, groups of superb figures, representing myths of intense patriotic interest to the Athenians, were so placed that, to use borrowed words, "the sun played melodies upon them from dawn to dusk." Nor was red excluded from the scheme of color. It was used in the metopes to receive the shadows cast by the relief sculptures, just as the Moorish ornamentalists of the 13th Christian century placed it on the walls of the Alhambra in the lowest plane of their starlike linear combinations, so that the rich gold applied to the highest level might, with its fusing power, eliminate crudity of tone.

Greek Ornament Independent of Structure. All these embellishments, so exquisite in themselves and so harmoniously adapted to one another, as well as to the structure regarded as a whole, nevertheless played no functional part in the building. The pedimental groups could have been removed without injury to the prevailing fineness of line and of profile. The Panathenaic frieze, compassing the cella walls at their top, was an applied ornament, serving the same purpose as a detachable tapestry. Finally, the metopes of the exterior or Doric frieze were mere artistic treatments of former voids, the purpose of which in archaic temples was the admission of light. Consequently, it is plain that in the column-and-lintel or trabeate (beam) construction, all embellishments are nonstructural; that the Greek architects, having secured stability, sought in their designs to emphasize the column to which that essential was due; that they allowed no detail, however beautiful in itself, to impede the "vertical movement" of these supports; that their chief aims were clarity, simplicity, restraint, and accurate, harmonious expression,—precisely those qualities that are found in the language, the drama, and the sculpture of the Periclean age.

Decline of Greek Architecture. But perfection is of brief duration. In common with the other arts cultivated by the Hellenic Greeks, architecture reached its highest development during the eighty years following the battle of Salamis (480 B. C.). And, as the political supremacy of Athens ended with the 5th century, so, beyond that point, the productions of the artists, if they did not wholly cease, were hybrids, departing farther and farther from type and becoming more and more wayward; although, especially in the 4th century, they were often most attractive, brilliant, and beautiful. Of the truth of these statements the second Temple of Artemis (Diana) at Ephesus and the Temple of Apollo at Miletus bear abundant evidence.

Transition to Rome. It is useless to follow the column-and-lintel system farther than its appearance in the Doric temple erected on the Acropolis at Athens, with its extreme, virile qualities harmonized and softened by Ionian influence. For, as world leadership transfers itself to the Romans,

it becomes necessary to seek among them the development of a second architectural principle capable of varied application, as well as to observe its fruitful union with the first.

The founders of Rome were a pastoral people who, having exhausted the grazing lands of an earlier residence, were attracted by a site set with hills and watered by a stream sufficient to supply their flocks. To their first stockade, dedicated to Pales, the god of sheepfolds, they gave the name of *Roma*, "city by the river." And, within this primitive citadel, their leader established in crude form a paternal government.

From the time of this early settlement (about 753 B. C.), there have been preserved, deep in the accumulated débris of the Roman Forum, small earthen receptacles, containing human ashes, which have been named by the archeologists "hut urns." These objects have, significantly, the form of the primitive dwellings of those who fashioned and dedicated them. They represent in their incised ornament a structure built of river reeds or tree boles supporting a thatched roof and having walls, supposedly of clay, filling the spaces between the uprights. To complete the resemblance between the model and the suggestion of the original, but one detail is lacking,—an aperture at the summit of the domical roof for the escape of smoke. This detail, it is plain, could not be repeated in the cinerary urn.

Another variant of the same structural idea appears in two so-called temples of Vesta—one in Rome and the other not far from Hadrian's Villa, Tivoli. Both of them are cylindrical structures and also lack the aperture. Of these, the prototype, according to Lanciani, was the hut containing the single fire of the stockade village on the Palatine hill, which was devoutly tended by the girl children, while the adult members of the community, with their young sons, were away feeding their flocks.

The Pantheon. The temples of Vesta, although important in the history of the dome, must yet yield in point of interest to the rotunda of the Pantheon. In this building we find the simplest, most logical application in all architecture of the principle which it represents, not excepting the admirable example occurring in the Basilica of Santa Sophia, Istanbul, which is later than the Pantheon by four full centuries.

The great rotunda was erected in 124 A. D., under the reign of Hadrian (117–138), whose architect destroyed an older, rectangular three-cella (Etruscan type) temple, standing on a portion of the same site and having as a frontispiece a portico of ten granite columns, over 45 feet in height, with capitals of Pentelic marble. In order to preserve these valuable materials, the later builder had them transferred to his rotunda, that they might aid in the composition of a new portico. But, he used only eight columns, in accordance with his adopted scale. In the *tympanum*—the triangular field enclosed by the horizontal and the inclined cornices—raised to a very acute angle, he placed a superb bronze group. Above this group on a screen wall of the same length as the portico, he set a triumphal chariot (*quadriga*), also of bronze, together with a number of human figures, arranged so as not to mask the outline of the dome. The last named feature had as its object internal lighting, rather than external effect. Therefore, it is without exaggerations and without structural error, such as mar the integrity of the majority of the domes of the Italian Renaissance.

Origin of the Dome. All the later experiments grew, the one from the other, responding to the personal imprint of the architects who designed them or to the demands of the people who bore the expense of erecting them. The rotunda of the Pantheon, however, sprang directly from a model which, although allied to that of the temples of Vesta, and, like it, of domestic origin, had never an acquired religious significance. This dome, in the opinion of Perrot and Chipiez, repeats exactly, in more resistant, durable materials, the clay baking oven of prehistoric Mesopotamia, which was built of stepped rings of river clay, with provision made for the escape of smoke.

Source of Roman Dome. The oven, so fashioned, would seem to be an invention of northern Mesopotamia, that is, of Assyria: consequently of Semitic origin. Therefore, the student of the history of architecture gropes his way through centuries, seeking to connect the humble baking oven with that imperial Temple of All the Gods which was erected in the wealthy and populous quarter of the Campus Martius at the period of the greatest splendor of Rome.

At first thought, the column-and-lintel system would seem the one traditionally to have been preferred, especially because of the style of the earlier Pantheon and of the valuable materials remaining from it, which were to be employed in the newer temple. On the other hand, the emperor Hadrian was widely traveled and of necessity had mingled with Semites during his visits to Alexandria. Besides, one important cylindrical building of concrete already existed in Rome,—the mausoleum of Augustus, which, from the death of that emperor in 14 A. D., had continued to serve as an imperial burial place until the last vacancy was filled in the year 98 by the ashes of Nerva. Then, after the interval of the reign of Trajan (98–117), its functions were replaced by a similar structure erected by Hadrian himself, and described by the Byzantine historian Procopius as a work of great magnificence, having its tufa walls faced with Parian marble and being surrounded by a colonnade enriched with many statues.

Significance of the Pantheon. Although of the first of these cylindrical structures only the bare core now remains, and although the second, defaced from the time of the Gothic sieges of the 6th century, serves today as a municipal fortress (*Castel Sant' Angelo*), the Pantheon is structurally intact and has never lost its sacred character. This great rotunda has been called by the eminent Englishman, Frederic Harrison, in his book, *The Meaning of History*, "the central building of the world." Lest this assertion should appear to be rhetorical and unwarranted, it is well to justify it, apart from its general historical sense. For architecture also the statement is valid, understood in reference to the structural type represented by the rotunda. The statement being so interpreted, no critic will venture to deny the following claims made for the dome of the Pantheon:

First, that it is unique in showing in a building of prime importance one of the three existing principles of architecture, presented in its primitive form.

Second, that it is the parent of all structural (not *apparent*) domes which have been created since the date of its erection in the year 124 of our era.

The Pantheon Dome; Primitive Form. To prove the former of the two claims, one has but to glance at a sectional drawing of this dome and then to call to mind the clay oven earlier described as of immemorial use in Iraq. Both structures, it will be seen, rise in stepped circles toward a summit never realized; its attainment being forbidden by practical requirements in both instances, and, in the case of the Pantheon, also by the necessity for impressing the visitor with his proximity to God and Nature. Further, in the two constructions—the one small and domestic, the other monumental—the materials used are the same, except that in the Pantheon they have been subjected to processes devised by man in order to render his work more permanent. Therefore, the masonry of the great dome was made of Roman brick, set in almost horizontal courses, which were interrupted, perhaps, near the summit, by a series of arches to relieve pressure upon the interior substructure, and again resumed just below the *oculus*

(the aperture at the summit); the whole, through the use of concrete, gradually becoming monolithic.

Pantheon, Parent of Structural Domes. As to the second claim made for the rotunda of the Pantheon, it cannot be questioned. To prove that this dome is the parent of all structural devices of its kind that have followed it in the history of architecture, only a few words of explanation are necessary.

Santa Sophia. Its first descendant is the admirable construction occurring in the Basilica (now mosque) of Santa Sophia, at Istanbul, erected more than 400 years later than its parent. The authors of the scheme were two architects, uncle and nephew, of the cities of Tralles and Miletus, Asia Minor. Like the dome of the Pantheon, that of Santa Sophia was devised for internal lighting. Therefore, when viewed from the outside, it offers a flattened aspect, rendered yet more massive by flanking semidomes which are each buttressed by paired smaller ones of similar figure. This assemblage, disappointing as it may seem in description, is but a necessary preparation for the interior, acknowledged to be one of the finest in existence, by reason of its proportions, its curves, and what may be termed the buoyancy of its soaring ascent. The small half domes pass into the larger, and these in turn apparently evaporate into a great central canopy, which is smaller in diameter than that of the rotunda at Rome, but the summit of which marks a height of 179 feet above the pavement.

The dome of Santa Sophia is without oculus. The function of this opening, through which, in the Pantheon, the serious mind escapes to reflect upon the Infinite, is here assumed by a series of windows encircling the base of the dome. The latter, instead of rising from a circular wall, is set upon pendentives—that is, spherical triangles of masonry with downward pointed apex, springing from four great piers to support the concave mass above them.

Byzantine Central and Subsidiary Domes. The massing of domes, entailing the opposition of abutting to disruptive forces, is the principal structural legacy of the Byzantine builders to architecture. By such means they pointed the way toward the Gothic, as they did also by giving lightness and flexibility to their domical constructions, such as those at Ravenna, notably San Vitale, by making an ascending spiral of slender clay jars closely fitted one into the other and held in place by cement. The thin shell so devised did not require the heavy centerings of the Roman vault; while the menacing thrust was still further averted by binding the sturdy supporting piers of the octagonal dome to arches leaping to the external wall, and by strengthening the salient angles with buttresses.

Therefore, because of their clever devices tending to diminish and distribute thrust, through the employment of the impost block (an inverted truncated pyramid of stone placed above a capital of similar form) to receive the load weighing down upon it from above, the Byzantines have come to be regarded by the most modern and discerning critics as the creators of the second of the three structural types which have developed during the entire course of civilization. Before them the Greeks perfected the use of the column and lintel. After them the stonemasons of western Europe, following a long period of experiment, brought into being the elastic, truly vitalized Gothic or pointed-arch system. But they, receiving in heritage the clay dome from prehistoric Eastern peoples and having present in their imagination the example of Hadrian's Pantheon, proceeded to mathematical subtleties; displaying a genius quite apart from that of the sturdier, more candid, and more materialistic Romans of the West. They succeeded in giving the name of Byzantine to the domical principle, and of late their architecture has been recognized, not only as a logical transitional style, but also as "a powerful and self-sufficient art."

The Dome Set on a Drum. The dome on pendentives, the second stage in the evolution of the principle, was followed inevitably by the dome set on a drum. This latter arrangement was conditioned in great measure by the plan of the building of which it was to form the most striking feature. The circular Roman plan had given place to the Greek cross, in which were inscribed five domes raised on spherical triangles and presenting a complicated assemblage of reciprocally hostile forces assuring equilibrium. In the same way, the Byzantine dome, dating, in its chief example, Santa Sophia, from the 6th century (532–548), gradually yielded to a third device, which contained an element of instability, greater or less, according to the skill of the constructing engineer. In the new phase, the dome rose singly, as if free from restraining lines, soaring with pointed section far upward into space. Its object was external effect, as was demanded by the citizens of the Florentine Republic, at the beginning of the Renaissance, from Filippo Brunelleschi (1377–1446), architect and engineer of the dome of the Cathedral of Florence.

Construction of Brunelleschi's Dome. When Brunelleschi received his commission, he had already visited Rome and had studied the rotunda of the Pantheon. But to seek direct inspiration from this scheme was impossible, since a low dome would have been rejected by the authorities in charge of the work. His problem, as he correctly saw it, was to create a monument which should be conspicuous far away in the valley of the Arno, rising as a just assertion and acknowledgment of the power of republican Florence. Beyond this, he should obey the warnings of his intuitions, in order to produce a lasting memorial to his own genius. He took as his model a building of disputed age, an adjunct of the cathedral, which, before the erection of the latter, had itself served as the seat of the bishop. This building is a baptistery, which had been made separate from the church, properly speaking, according to early Christian precedent.

The Lombard or Comacine Builders. The example studied by Brunelleschi, in common with all others of its class, is of Lombardic type, owing its origin to those progressive Comacine builders who, in the 8th century, received letters patent from the pope, permitting them to pass into any country where their services might be required.

Developing from stonemasonry, their work, if massive and rigid, was yet honest and durable. From their rise in a body of Eastern Roman legionaries defending their island in Lake Como from barbarian invaders, they had been acquainted with the domical principle. This they later applied, though at first in crude fashion, to their own constructions.

The Baptistery of Florence. But experience teaches. By force of constant practice, the untutored masons acquired skill, especially in adapting an interior dome to an exterior polygonal covering or roof. This device appears in modification in the Baptistery of Florence, and, if intelligently observed, offers no difficulties to the layman who would understand it. Here the building material is stone, and plan, dome, and roof exactly correspond in form; the octagonal dome being sprung from a level below the top of the enclosing walls. Therefore, the roof, rising from the vertical wall, meets the dome after it has passed more than halfway to its summit, and forms with it a solid stone construction; leaving, however, a void between the wall and the point at which the dome springs. This void widens to the top of the wall and then narrows to the junction of roof and dome. The upright walls of the octagon are re-enforced by strong buttresses at the angles, between each two of which two secondary buttresses are placed. Each side is thus divided into three equal spaces. Upon the buttresses, barrel vaults are set, properly inclined to the roof, under which all voids are filled with masonry; the whole constituting a thoroughly stable construction.

The Baptistery and Brunelleschi's Dome. The device in the baptistery, by which the dome and the roof are partially consolidated, suggested to Brunelleschi a dome with double shell, which he proceeded to construct in the character of a really great translator, who first seizes the spirit of the original and then clothes it in his own idiom. At the same time, he created one of the most admired monuments in the history of architecture. Moreover, as if to mark the Renaissance apart from the middle ages, Brunelleschi, although without intention, succeeded in attaching his name to his work; while the Gothic masterpieces which preceded it must always be regarded as results of corporate effort and of the travail of many minds.

The mere structure of the dome of Brunelleschi is a very clever adaptation of the roof and dome of the baptistery, as may be determined from a comparison of cross-section drawings of the two systems. But to end the judgment of the former at this point is to spurn that imponderable quality of genius which vitalizes and gives wings to the heaviest matter. This the most prosaic of observers must realize, when his eye follows the soaring, elastic curve of the great cupola, from its springing at a level of 175 feet above the pavement to its crown at an additional height of 120 feet, where it is surmounted by a "lantern," the Renaissance device for closing the aperture (oculus) of a dome.

The Lantern. Nor is the lantern itself so unimportant in domical construction as to need no word of comment. As used by Brunelleschi and his successors, Bramante and Michelangelo, it is a cylinder or polygon built of stone, provided with openings for light, encircled by engaged columns or pilasters, and capped by a finial ornament. To this feature, allusion was made by Brunelleschi in his discourse before the building committee of the cathedral, when he argued: "Most worthy gentlemen: Having considered the difficulties of this construction, I find it absolutely impossible to build a hemispherical dome, since the upper surface, there where the lantern is set, would be so extensive that, if weight were applied to it, the structure would soon collapse"—a remark which in itself is a criticism of the second Renaissance scheme for a great dome, produced a century later by Bramante, at the court of Pope Julius II (1503–13), but never executed.

Weakness of the Dome of the Renaissance. From these examples, the truth may be inferred that the dome of the Renaissance tended toward instability; that its new object, external effect, had in a measure deprived it of the admirable qualities imparted to it by the Roman and the Byzantine builders. Its thrusts were no longer opposed by stepped rings of masonry, as in the Pantheon. Neither was it firmly upheld on pendentives, nor was it flexible and elastic in itself, as at Constantinople and at Ravenna. It was now set upon a high drum, and, in the first great instance, all the mathematical and mechanical ability of a Brunelleschi was required to render it measurably self-sustaining, both by its shape and by its structure. These technical points were ignored by the contemporary public, except such few engineers as were delegated from time to time to report upon the stability of certain buildings. Consequently, the dome of the Cathedral of Florence, externally imposing, majestic, suggestive of aspiration, was praised for its very defects. Milizia, one of its enthusiastic admirers, wrote of it: "It is worthy of special mention that in the construction of this cupola there are no visible abutments."

The marvelous and the mysterious were the natural, nourishing intellectual food of the Italians of the Renaissance, which dawned during the lifetime of Brunelleschi. The soaring dome was of right demanded by the men who conquered the outer world by navigation and the inner world by speculative philosophy set on the bases of physical science. The form and setting of the dome in its third phase was determined as much by instinct as by considerations of structure and material.

The Roman Renaissance. A half century after the death of Brunelleschi (1446), Florence yielded her artistic supremacy to Rome, as the result of complex, interdependent causes, prominent among which was the civic strife prevailing in the former city and rendering it unfit as a place of productive labor. Men of genius, not only those of declining Florence, but others from northern Italy, answered the call of Pope Julius II, who, from the moment of his election (1503), determined to make memorable his own reign and to glorify his family by fostering the production of works of art with rapidity and in great number. His principal schemes were to restore the old basilica of Saint Peter, which he had chosen as his burial place, and to enlarge the Vatican, which, although the residence of the popes from the time of the barbarian invasions, owed to Nicholas V its development into a palace at the middle of the 15th century. Lastly, it was the intention of Julius II to commission the first painters of Italy to decorate with the utmost magnificence the chapel built by and named from Sixtus IV (uncle of Julius, who had preceded his nephew in the papal office by only a few years), as well as to illustrate the history of the Church on the walls of the *Stanze*, or series of ceremonial chambers in the same palace of the Vatican.

Restoration of the Old Basilica of Saint Peter; Bramante. To restore the Church of Saint Peter, choice fell upon a native of Urbino, who, according to unverified rumor, was an uncle of Raphael. This was Bramante, in his early youth a student of perspective and a painter, who was destined to be remembered chiefly for his work as an architect. Obeying the promptings of his positive nature, he left his own province of Umbria, then subject to the sensuous, ecstatic art of the painter Perugino. He traveled northward, pausing to study the instructive architecture of the Lombard plain, and finally fixed his residence in Milan, where he remained for more than twenty years. From this city, whose brilliancy had been obscured by the French wars, he traveled to Rome, where he established himself under the pontificate of the Borgia pope, Alexander VI (1492–1503).

The Tempietto. According to the most authoritative historians, a miniature domical building, called the Tempietto, is the first attested work of Bramante in Rome. This interesting little monument is situated in the cloister of the church erected at the supposed place of Saint Peter's martyrdom (San Pietro in Montorio), in the district beyond the Tiber (Trastevere). Intended as a receptacle of sacred relics and providing the focal point of an architectural composition, it demanded a design corresponding to its importance. Bramante, therefore, employed the dome and took as his model the Temple of Vesta at Tivoli, which, like the Pantheon, has the thrusts of its dome abutted by stepped rings of masonry, and a circular cella surrounded by a colonnade of the Corinthian order. This model, plainly of the period of the Pantheon, suffered, at least in structural integrity, through interpretation by Bramante. For the Italian, aiming, like all his artist contemporaries, for external effect, set a dome of hemispherical section on a high drum without abutment. He was saved from disaster only by the toylike proportions of his scheme.

By order of Pope Julius II, Bramante prepared plans for erecting on the site of an early Christian chapel a great basilica dedicated, as was the original building, to Saint Peter, apostle and martyr. At the middle of the 15th century, the chapel was included in a great scheme for the reconstruction of Rome planned by Pope Nicholas V (1447–55). But that enlightened pontiff, prevented from realizing his projects, died a broken-hearted man, and the work

of his architect Rossellino counted for nothing. So that when, after the lapse of a half century, Bramante received his commission from Julius II, he entered upon a new scheme which, when completed by his successors, constituted one of the most noted works in the history of architecture.

Bramante's Model for the Dome. Following Byzantine precedent, Bramante submitted a plan showing a Greek cross with a dome at the junction of the arms. The dome, as may be seen from the model which is still preserved, was to be hemispherical and abutted, like that of the Pantheon, with stepped rings of masonry. But, in order to gain an imposing external effect, which he sought as an architect of the Italian Renaissance, he transferred the interior colonnade surrounding the base of the dome in the Pantheon to the exterior of his own model, adding also the Renaissance feature of a crowning lantern.

Construction of Saint Peter's Begun. Having produced the plan and the model, Bramante engaged in the actual construction of Saint Peter's, building one bay of the nave and the piers which now support the great dome. He worked with the utmost diligence and fervor. The complicated influences of the court interfered to slacken the interest of Pope Julius, and prevented him from urging the completion of either the basilica or the monumental sarcophagus. The latter, for which a commission had been given to Michelangelo, was, from its position beneath the dome, to present in contrast Moses, the lawgiver of the Hebrews, and the pope, the successor of Saint Peter.

Errors in Bramante's Model for the Dome. In the opinion of the competent, Bramante's scheme is excellent in so far as it follows Roman precedent, as exemplified in the Pantheon. On the other hand, all departures from that model are to be condemned as weakening the structure. Such is the transfer of the Order to the exterior, since the colonnade, being so placed, interrupts the solidity of the masonry. Such, also, is the higher level at which the dome is made to spring, losing thereby an important part of the support of the abutting wall. Such, again, is the use of metal clamps to avert the danger of collapse, which should have been eliminated by a dome of proper shape—in this case, one of pointed section—since it would have exerted a greatly diminished thrust.

Bramante's scheme, although it failed to be realized, yet occupies an important place in the evolution of the architectural principle which it represents. It allies itself, so to speak, with the Roman and the Byzantine dome, as compared with the Florentine example of Brunelleschi, which served to inspire the last and most ambitious of the series of three devised in the Italian Renaissance—the existing cupola of Saint Peter's.

Michelangelo, Architect of Saint Peter's. Under Pope Paul III, a member of the Farnese family, distinguished as nobles and as patrons of art, Michelangelo was appointed chief architect of the basilica. He had finished his career as both sculptor and painter. His spirit had been broken by long litigation with the heirs of Pope Julius, as his physical frame had been weakened by difficult journeys. Yet he did not in his decline abandon the practice of mural painting, an art which, at that period, demanded such assurance and dexterity of touch. He continued to work in the Pauline Chapel of the Vatican, with interruptions caused by grave illnesses, until he finished his commission at the age of 75. His advanced age is made the subject of comment by the contemporary art historian Vasari, who said: "Painting, and above all, painting in fresco, is beyond the capacity of old men."

This comment cannot so forcefully be applied to architecture, the least imaginative of the major arts, and Michelangelo was justified in his acceptance of the great work left unfinished by Bramante more than thirty years before. The plans and the model of his predecessor he praised with a warmth quite foreign to his nature, which would seem to indicate a diplomatic action on his part, especially since he changed them immediately and so radically.

Precedents Followed by Michelangelo. For Bramante's hemispherical dome, Michelangelo substituted one of pointed section, recalling in outline that of Brunelleschi, which had lived in his mind from childhood. Furthermore, he replaced the dome of solid masonry, conceived by the former architect, by one of three shells, the inner of which was to be hemispherical and the two above it of pointed section. And, recalling the Lombardic Baptistery of Florence, in which dome and roof are fitted together, leaving voids, Michelangelo's small extant model shows the cap as solid up to a point nearly at the level of the haunch, and there separating into three shells which diverge from one another; the lowest one being semicircular and the two upper ones of pointed section. Still following Brunelleschi, Michelangelo used eight heavy ribs to pierce the two outer shells and bind them together, but he did not continue the resemblance by carrying the internal structure to the extreme of security, as did the earlier Florentine architect.

The innermost shell, destined to be of hemispherical section, but never executed, was probably so devised in order to assure an interior effect similar to that of the vault of the Pantheon, whose spreading expanse is much more inspiring to one who passes under it than is the steep, contracting ascent of Brunelleschi's cupola.

One other feature Michelangelo adapted from a Roman precedent. As Bramante, in his design, transferred to the exterior the interior colonnade surrounding the base of the dome of the Pantheon, so Michelangelo changed Bramante's colonnade into a series of sixteen isolated buttresses masked by coupled columns. By these changes, both the Italian architects, in their desire for external effect, weakened their structures. But Michelangelo committed the far greater error. By isolating his buttresses, he did not oppose the continuous resistance to the thrust of the dome. What is still more to be regretted, he placed his columns at too low a level to receive properly the thrust of the enormous ribs which it was their task to buttress.

Delay in Execution. This design, commissioned in 1546, was committed to drawing and long remained in that state, owing partly to the artist's press of occupations, but largely to his habits of delay. A number of years elapsed before he could be brought to prepare a wooden model, and, when he finally proceeded to the execution of his scheme, his life was nearing its end.

Death of Michelangelo (1564). Michelangelo died in 1564, at the age of 89, leaving his dome completed only to the top of the drum. The cap remained to be finished. It was constructed, under the direction of Fontana and Giacomo della Porta, according to the original models and drawings; but two small lateral domes, which are fine in themselves, although ineffective in their relation to the whole composition, were added by the noted architect Vignola (1507–73).

The Petrine Construction. As completed, the dome has an internal diameter of 137½ feet, and the apex of its lantern measures a height of 405 feet from the pavement. The entire scheme, including the revised plan of a Latin cross, under the name of the Petrine Construction, became a world model. It gave the inspiration for the French domes of the 17th and the 18th century, as well as for that of Saint Paul's, London.

The Church of Saint Peter has an outside length of 727 feet. Its façade is 369 feet wide and 145 feet high. Its interior width across the transepts is 451 feet. The floor covers an area of 163,728 square feet, or nearly 4 acres.

Threatened Disruption of the Dome. Michelangelo's dome was admired by his contemporaries, like the creation of Brunelleschi before him, because it rose high in the air without visible abutments. But, for the reasons already given, it was faulty in construction and lacking in stability. Nor were its defects long in betraying themselves.

By the middle of the 17th century it threatened disruption, and a council of experts was called by Pope Innocent XI (1676–89) to devise means by which to avert a possible disaster. This first commission seems not to have acted, but the dangers increased so progressively that, in 1742, three distinguished mathematicians were charged by Pope Benedict XIV to examine the dome and to make drawings of the lesions existing in its fabric. Their work finished, these mathematicians declared the disruptive cause to be the form of the dome itself rather than any weakness of the piers and pendentives constituting the substructure. As a substitute for efficient buttressing, the commissioners recommended the use of iron clamps and of additional chains, as they believed those originally employed to have fallen into the masonry with an entire loss of their restraining power. Still later, the same pope appealed to one of the most competent engineers of the period, the marquis di Poleni of Padua, who, while expressing a more hopeful opinion of the stability of the dome than the three earlier commissioners, criticized its shape and suggested that a new system of chains be applied to it.

This suggestion came like a match to inflammable material. Advice, ranging from serious to the most radical, suggested expedients of equal diversity, until a revolutionary spirit demanded that both dome and drum be demolished, for the purpose of rebuilding the former in a more pointed form, by which to diminish the thrust. It is enough to add that Poleni's advice prevailed and that today the much discussed structure is stanchioned by the binding chains which he advocated, in order to supply a resistance to disruption which should have resided in the fabric itself and rendered it entirely self-supporting.

Transference of Artistic Capital from Rome to Paris. Like Florence at the end of the 15th century, so Rome, in the 16th, lost the artistic supremacy of the world, which passed to the French people. Wars politically disastrous for France began when Charles VIII, king of that country, invaded the duchy of Milan in 1494. They continued for thirty years, during which period the changeful relations among the principal European states resembled the interesting combinations of a kaleidoscope in being no sooner formed than dissolved. These wars had the beneficent result of advancing the economic development of France, as is demonstrated in the Cluny Museum, Paris; since there the industrial products of France, such as pottery and textiles, are placed side by side with those of Italy and show a progressive refinement as a result of contact with the country south of the Alps.

Finally, long after the restoration of peace, when the heir of Francis I, the prince who succeeded as Henry II, married the Florentine Catherine de' Medici, Italian influence became dominant. The Gothic cathedrals, perhaps the greatest artistic glory of France, were condemned as barbarous, while the charming impetuosity of the French tongue submitted temporarily to the more rhythmic suavity of the closer Latin derivative.

The So-called Italianate in France. This period, often called the Italianate, culminated under the widowhood of Catherine de' Medici, when she commissioned Philibert Delorme to build the Tuileries (1564); bidding him create an Italian palace with flower gardens and fountains, rather than a feudal castle with moat and drawbridge. The queen could command but not control. In the work of Delorme, the French genius asserted itself, as it had done before in Pierre Lescot's Louvre of the preceding reign (that of Francis I, 1515–47). A new style was born naturally, as are all styles worthy of the name. And it was original, although it was made up from borrowed elements: a statement capable of being proved in few words, were it not outside the present purpose, which is to deal exclusively with structural principles.

Early or Valois Renaissance in France. The palaces above mentioned struck, as it were, a modulating chord. The Early French or Valois Renaissance passed into the Bourbon Style, the most important subdivision of which was the period of Louis XIV (1643–1715). Under this absolute monarch, architecture assumed a grandeur and dignity that were neither hollow nor absurdly pompous. The Louvre was continued, and Versailles, as we now know it, was planned and executed, with its ruinously extravagant water system, and its landscape gardening. The latter was the work of Le Nôtre, perhaps the greatest of his profession until his time, as well as the artistic ancestor of those who plan the embankments and the boulevards of our modern cities.

Use of the Domical Principle by the Architects of Louis XIV. Under Louis XIV the domical principle was twice used in Paris to create imposing external effects, and in both instances by members of a family whose name, Mansart (Anglicized, Mansard), has become a household word. The earlier of these two domes is that of the Val-de-Grâce, a votive church erected as a thank offering by Anne of Austria, wife of Louis XIII, for the birth of the heir to the throne who became the "*Grand Monarque.*" This church, as a whole, is the work of three distinguished architects. Levau and Le Muet each had a part in its creation, but Mansart (François) the Elder began the dome, which was completed by his nephew, who was much the greater of the name. The latter, Jules Hardouin-Mansart, erected also the second building of the Hôtel des Invalides, entirely distinct from the original plan and known in his time as the Church of the Dome.

Dome of the Hôtel des Invalides. This cupola, judged by the critics of today as showing externally the most graceful lines of all similar structures in France, recalls Michelangelo's dome. When seen from a distance sufficient to obliterate an overelaborate ornament, which has been scathed by expert French opinion, the lines of the structure as a whole assert themselves as a pyramid which apparently retracts its sides to spring the higher into the air above. At such points of view, the composition has a dignity which belongs to Roman, rather than to Renaissance, architecture.

Dome of the Pantheon by Soufflot. From the cupola of the Invalides, the student passes naturally to consider that of the Pantheon, Paris, a work executed in the 18th century by the architect Soufflot (1713–81). Externally, the dome of the Pantheon marks a new departure for the continent. Except for the pointed section of its cap, it only remotely suggests its predecessors in Florence and Rome or even the dome of the Invalides. The reason for the departure or difference lies in the influence which had arisen during the intervening century, consequent upon the erection of the dome of Saint Paul's, London.

The dome designed by Soufflot shows a very high drum surrounded by a continuous colonnade: a treatment for which the first suggestion was derived by Bramante from the interior of the ancient Pantheon of Rome and transferred to the exterior of his model for the cupola of Saint Peter's. Through the emphasis given by Soufflot to the free standing colonnade, the parts above it suffer by comparison; yet the transitions are well effected, and the outline of the whole, as it contracts in ascent, is very agreeable to the eye. It is not, however, harmonized with the cruciform building, to which it appears to be applied and from which it is easily removable,

instead of being an essential, even the principal, part of the composition, as are the domes of the Cathedral of Florence, of the Invalides, and of Saint Paul's, London. But, in spite of certain obvious faults, the exterior of the Pantheon is imposing in both architecture and position. It is not unworthy of its neighbors—that picturesque anachronism, the Church of Saint Etienne du Mont, and the Library of Sainte Geneviève, the rhythmic, modern design of Labrouste, comparable in effect with a Greek temple of the best period.

Dome of Saint Paul's, London. The final European example of the dome to be treated is that of Saint Paul's, London, completed within the half century following the Great Fire of 1666. Even before that disastrous event, Sir Christopher Wren had been commissioned by Charles II to examine the Norman (1066–1154) and Early English (1189–1273) structure of Old Saint Paul's and to report upon its condition, a work which the architect-mathematician accomplished with great thoroughness and detail. He included in his demonstrations the plan, elevation, and section of the cathedral, all of which he had formulated as the results of his survey.

Together with his report, Wren submitted a radical scheme for the restoration of Saint Paul's, which was never executed, owing to the outbreak of the plague, a few months later, and to the rapidly following fire. As a consequence of changed conditions, he almost immediately presented plans for the reconstruction of London. These, owing to their disregard of former property lines, were never realized; but the same architect was appointed to restore the churches of the Strand and to build a new and greater Saint Paul's. The latter, as completed in 1710, ranks as one of the finest Renaissance cathedrals in Europe and is the masterpiece of Wren. Externally, it is majestic and restrained, unmarred by the elaboration so characteristic of the late 17th century. It has, however, been unduly praised by certain Englishmen, who have lacked the sense of justice and the breadth of view shown by Sir Christopher himself in his judgments of foreign art and artists, as expressed in his letters from Paris in 1665.

Wren's Designs for New Saint Paul's. Obedient to his admiration for continental design, Wren presented, for the restoration of Saint Paul's after the fire, a scheme which was censured by the clergy. The architect, following Bramante and Michelangelo, had proposed the plan of a Greek cross, with a great dome at the intersection of the arms, and an emphasized narthex at the western end. But this simple and familiar figure of his predecessors Wren complicated with the visual power of a geometrician. He filled the spaces between the arms of the cross with segmental curves struck from the corners of an imaginary square enclosing the entire composition; setting also small domes on pendentives between the great cupola and the curved walls of enclosure.

The model, constructed from this plan and showing a dome with double shell, may still be seen at Saint Paul's. It was regarded by its author as his best conception and was approved by King Charles II. But it is open to the same criticism as is Bramante's model for the dome of Saint Peter's. The section of the cupola is such that it would have lacked stability, had it been executed in large dimensions and in heavy building materials.

For ecclesiastical rather than for technical reasons, this first scheme was rejected. Then, to satisfy ritual requirements, as defined by the clergy, Sir Christopher reverted to a so-called cathedral form; that is, a long nave with a short transept near the middle, a semicircular apse (eastern end), and two western towers. Finally, in obedience to the king's command that Saint Paul's should be "conspicuous above the houses of the City," he created the great existent dome, quite similar in outline to his first conception, but differing essentially from it in structure.

Structural Details of the Dome of Saint Paul's. Following architectural precedent, the architect first formed a circular bed by means of arches sprung from eight piers, and on these supports set a tall and massive drum. From this point, Wren became original, making the drum double and using its external wall as a stylobate or platform on which to set the lofty, imposing Corinthian colonnade already mentioned. The inner wall of the drum, separated from the outer by a passage and strongly abutted, he used to carry a dome of masonry which springs at a point much below the top of the wall. This dome, moderately elliptical in shape, with a circular aperture at its summit, he surmounted with a hollow cone of masonry devised to bear the weight of a heavy stone lantern fifty feet in height.

Finally, having assured the stability of his construction, he raised the wall of the inner drum above the entablature of the colonnade set on the outer drum wall; giving to the exterior surface of the former an antique attic or frieze treatment, above which he erected a wooden dome covered with lead and appearing to support the lantern.

By these devices, the architect-engineer obeyed at once the king's command and the voice of his own conscience. By the revision of his plans, he gained the approbation of the clergy, the jealous guardians of tradition. By the sustained dignity of the completed edifice, he won the admiration of his compatriots, which is expressed in a Latin inscription carved on his tomb and repeated over the door of the north transept of Saint Paul's: the adjuration to the reader being in translation, "If thou seekest a monument, look about thee."

This great Renaissance cathedral, completed at the end of the first decade of the 18th century, contains the latest example of domical structure necessary to be treated; the more recent domes presenting no interesting problems and certain of them, notably that of the Capitol at Washington, being of metallic substance.

Third and Last Architectural Principle. From the achievements of the Roman, Byzantine, Italian, French, and English engineers who successively treated or modified the principle of the hemispherical or half-ovoid roof, the student is now free to pass to the third architectural element which, properly speaking, has created a style; that is, an outward manifestation of an inner shaping and determining force. This element is the arch, developed in its most interesting form by the builders—it were better to say by the master masons—of the middle ages.

Arch Principle in Its Primitive Form. But as all the world knows, the arch principle was used in remote antiquity. The arch appears as a voided triangle (to lighten superincumbent weight) over the entrance to sepulchral chambers in the Pyramids. Later, when the Egyptians and the Assyrians had mingled in war and trade, the developed arch marked the structures of Rameses II (Empire, 13th century B. C.). Further, it is now recognized that a system of arches, some of which were 75 feet high, supported the Hanging Gardens of Babylon, which were constructed nearly 600 years before our era. Again, the excavations of Dr. Schliemann in peninsular Greece (1876) demonstrated the use of the voided triangle by the builders of the Mycenæan age (about 1600–1000 B. C.). This device appears above the lintel of the Lioness Gate at Mycenæ and also similarly placed in the neighboring "Treasury," the finest of the domical or so-called "beehive" tombs. Finally, the same archeologist, in association with another learned German, Dörpfeld, laid bare the palace at Tiryns (1884-85), in the circuit wall of which occur pointed-arch openings. These shapes are secured by setting massive stones separated by a wide void at the lowest tier and then by gradually narrowing the void until the topmost stones meet. In this instance, the arch principle is

ignored, but the attainment of the shape is in itself significant.

Consequent upon the Dorian invasion of peninsular Greece (about 1100–1000 B. C.), an age of chaos followed, and, when the Hellenic civilization rose, experiments upon the arch principle were not renewed. It remained for the Romans, through the influence of their Etruscan builders, to revive and develop them.

Lintel and Arch in the Colosseum. Toward the end of the 1st Christian century (69–96), the Flavian Amphitheater, more commonly, but incorrectly, called the Colosseum, was constructed by the order of those emperors whose name it bears in adjective form. Built of concrete, brick, and travertine, it joined in fruitful union the arch and the lintel. It was erected at a period when the building principles of the Greeks and the Orientals had met in Rome, that great crucible of the antique civilizations.

The arch, although used in developed form in the 3d pre-Christian century, within the limits of the Hellenized world, at Pergamum, Asia Minor (arched bridge with span of 27 feet), was yet a device of Eastern origin. On the other hand, the column-and-lintel was, as we have seen, an element brought to perfection in Greece during the age of Pericles. When the two opposite structural principles were united in Vespasian's amphitheater, their union formed a point of departure at which the student of today may begin a survey of the architecture of at least fifteen centuries. A unit or single bay of the great building just named is the first member of a progressive, practical series by which the free standing column was gradually taught to maintain the arch in equilibrium.

In the Flavian Amphitheater, the arch appears as if framed within columns and their entablatures; the whole constituting the so-called "arch order." In this instance, the element is not counteracted by buttresses but, to a very considerable degree, by the great thickness of the walls and by the vertical pressure of the uppermost story, which is not arched, but is a solid wall pierced at regular intervals by windows.

Before the middle of the following century, in the Pantheon of Hadrian, the entablature served as an impost for the arch. Still later, in the Baths of Caracalla (211–217), a fragment of the entablature increased the height of the column and made a larger bearing upon which to spring the arch. In the buildings of Diocletian, erected on the Dalmatian coast about 300 A. D., the entablatures disappear and the arches spring from the Corinthian capitals.

Within the limits of the succeeding century, Christianity was legalized (313) and the Empire was divided (395). These two events completely changed the course and the purpose of architecture. Byzantium, under its new name, Constantinople, became the capital; while Rome, beginning with the 5th century (410), suffered repeated siege and sacking. Thus threatened, the rich patricians fled toward the Adriatic coast, Ravenna becoming their principal place of refuge. This seaboard city served as a dike against the barbaric invasions, which, however, with the coming of Theodoric the Ostrogoth, in the last decade of the 5th century, ceased to be destructive and began to upbuild a new civilization whose religious faith demanded and determined new expressions of art.

Establishment of the Lombard Kingdom (568–774). Among these invaders were the Lombards, of Scandinavian origin, who descended into the fertile valley of the Po, like "a stream of stagnant mud," as the English historian Hodgkin has described them. Still pagans, they brought with them the cruel myths of the North, and, in the scathing opinion of Pope Gregory the Great (590–604), they were in all things *nefandissimi*, "most abhorrent." Overcoming the population, they did not mingle with it, yet they established themselves securely at points reaching from Pavia in the North, which they made their capital, to Naples in the South; everywhere giving evidence of their will to supplant and to dominate. Gradually, however, responding to climatic as well as to moral influences, they so softened their natures as to accept Arianism, a Unitarian form of Christianity, and they finally became orthodox toward the end of the 7th century. A hundred years later, they began to erect crude temples of their faith. In certain instances, as at Brescia, they converted those of the pagans to their own uses.

The leader of this movement was Queen Theodolinda, wife of the grandson of the invading king Alboin. The builders themselves have already been described under the name of the Comacine masters and as the architects of domes. Furthermore, they were the creators of the Lombard or northern Italian Romanesque; the relation between the creators of the style and the style itself being such as to recall the lines of Victor Hugo in his drama *Hernani*, when he describes the Teutonic Charlemagne molding anew in his powerful hand a formless mass of bronze, which, in this instance, corresponds to the ruined institutions of the antique world.

The Lombard Basilica, Baptistery, and Campanile. The barbaric Lombard style was created spontaneously. Its birth was inevitable. Its very name explains the principles upon which it was based. Its elements were the round arch, the barrel vault, and the dome, crudely fashioned and covered externally by a conical or polygonal roof. Combining or choosing from these elements, the Romanesque builders of upper Italy, between the 8th and the 12th century, aligned across the Lombard plain, from Milan to the Venetian territory, a series of religious structures, consisting in many instances of basilica (church proper), baptistery, and campanile (detached bell tower), which render that region one of the three or four of the world most interesting from the point of view of architecture.

The Basilica. The first member of the trifold type, the basilica, is the Greco-Roman law court applied to a new use. This the Lombard received from the early Christian architects of the 4th century. In its primitive form, as a church, the basilica was rectangular in plan with a width not exceeding two-thirds its length and at one end a semicircular expansion called the apse. The latter was set at a level slightly higher than the rectangle and was separated from it by a breast-high wall with entrance gates, beyond which the laity could not advance. Further, the rectangle was divided by columns into three longitudinal sections; the central being the most spacious. The early roof was flat, but subsequently the lateral divisions (aisles, that is, "wings") were covered with barrel vaults, and, still later, the central space (nave, "ship or keel") was similarly treated. Properly to vault the wide nave and to assure, at the same time, stability to the buildings, as well as sufficient light to the interior, became the chief architectural problem of the middle ages. But the solution was not reached until the 13th century had half passed and the principles of the Lombardic Romanesque had been absorbed into the French Gothic.

The second member of the tripartite type is already known to the reader by the previous reference made to the Baptistery of Florence. The third member, the campanile, must be omitted, since it does not involve the arch principle.

The Lombardic Façade. But it is the Lombardic façade which vitally interests the student of the history of architecture, since it is so obviously the forerunner of the same imposing and distinctive feature of the French Gothic. The same structural elements, displayed at their beginning and at their highest stage of development, may be seen in the western front of Saint Michael's at Pavia (the

old Lombardic capital), in the façade of the Abbaye-aux-Dames at Caen (Normandy), and in those of the cathedrals of Paris, Amiens, or Reims.

The Façade, Exponent of the Interior. The Romanesque—that is, the barbaric—example states, with the distinctness of words, the divisions of the interior into nave and aisles. And this fact is expressed twice: first, by the three separate and distinct portals, each serving one of the longitudinal divisions of the interior rectangle; then by the slightly raised, narrow bands of masonry running from base to cornice at the ends of the façade, and also between the portals. One glance of the observer suffices to explain to him the interior arrangement and to invite comparison with a clear sentence construction, the strength of which is increased by proper punctuation. Further, the western front of Saint Michael's is pierced by a number of round-arched windows and by one unimportant circular opening; while later Lombardic examples show a more precise and concentrated manner of lighting in the great oculus, opening immediately above the central portal.

Façade of the Abbaye-aux-Dames. In the French Romanesque example of a structural façade—that of one of the two Norman abbeys built at Caen by William the Conqueror and his queen Matilda—the pilaster strips have become strong tower buttresses. In this form, they serve to resist the thrust of the interior and to consolidate the building into an indivisible organic whole, instead of allowing the façade to remain a mere screen wall without function, as is true of many vaulted structures in England, notably of the Cathedral of Peterborough.

Façades of Notre Dame, Amiens, and Reims. In the third example, the façade of Notre Dame, Paris, of the Cathedral of Amiens, or of the Cathedral of Reims, now restored after its war-time ruin, the organic quality is still stronger, still more visible, even to the examiner of slight training. Furthermore, it appears to be progressive in the above-named sequence. For the solid, massive masonry of Notre Dame, Paris, producing a definite rectangular effect, Amiens substitutes a more elastic, springing line, firm and tense as living sinews; while Reims, with its piercings, bold and beautiful, suggests the body of a perfectly trained athlete from whose frame judicious exercise has removed every ounce of superfluous, clogging flesh.

Once again it must be insisted that the structural problem of the middle ages was to vault the basilica; also, that only by following the stages of this problem can the nonarchitect hope to realize the significance of the third and last historic style and then to proceed to the study of modern buildings.

But, before discussing the problem and the devices which led to its solution, it is necessary to understand the function and the nature of the arch, as well as its relations to the dome and the barrel vault, together with which it constitutes a single principle.

The Arch Defined. The arch, so strong in its æsthetic appeal to all classes of observers, is a necessary means of spanning openings too wide to permit the use of the lintel. And, unlike the latter principle, which depends for its stability upon adequate support, the arch demands proper abutment or resistance. Also, while the lintel, if too heavily pressed from above, yields and breaks near its middle point, incurring the vertical fall of the pressing mass, the arch, insufficiently resisted, spreads laterally and succumbs to a disruptive force inherent in its form. Consequently, this effort, called the "thrust," must be counteracted by immovable masses which will permanently assure equilibrium and stability.

Gothic Arch and Buttress. The arch-device, as used for centuries by the Romanesque and the Gothic architects, was an interior feature; leaving the buttresses, that is, the resisting masses, for the exterior. This arrangement, according to an English authority, is, to a large degree, responsible for the singular interest excited in the minds of the sensitive by the sight of a Gothic structure. For, seeing at first only the supporting members, the observer desires to enter the portals that he may determine, by means of his own senses, the concealed, ponderous burden so mysteriously announced.

Opposition to thrust, as understood by the Romans, was passive resistance: such, for example, as that offered by walls of great thickness in the Flavian Amphitheater and the Pantheon at Rome. But, by means of constant, patient experiment continued for centuries, the medieval architects, in dealing with the arch problem, were able to transform the passive resistance to thrust into an activity equal to that of the disruptive force itself.

Development of Vaulting. The medieval experiments in vaulting began naturally with the aisles, or narrower, lower, lateral, longitudinal sections of the interior. The architects threw a continuous barrel vault over the aisles. This construction was really but an arch prolonged laterally, whose usefulness was found to be greater than was at first suspected. By this means the nave, or central division, could be raised much higher, forming a clerestory (clear, light) which could be pierced by numerous windows, as is implied in its name.

When the builders had succeeded in vaulting the nave by means of diagonally intersecting arches (first example at Vezelay, Burgundy), the half barrel vaults over the aisles were found to act in the most effective way as buttresses, counteracting the "thrust" or disruptive force of the nave arches. Then, only the following and final step remained to be taken in the development of a device which was to be the most striking, as well as the sole original, *structural* contribution made by the Gothic system to architecture. The half barrel vault, in principle at least, and in the form of an arm of masonry, was transferred to the exterior. It was set firmly on the top of each of the massive buttresses which indicated, along the sides of the building, the interior division into bays, a bay being the space between two supports. It was then flung over the aisle roof to meet and to re-enforce the pier buttress or mass of masonry whose function was to resist the thrust of the soaring arches of the nave.

The Complete Flying Buttress. Thus transferred and having assumed a new form, the arm of masonry acquired also a new name. It is known in English as the flying buttress, while in French it is designated more picturesquely and accurately by *l'arc boutant*, a phrase which suggests the idea of an aggressive animal, like the ram or goat, in the act of thrusting back the enemy with his horns. So treated, this device served to transmit the thrust to the aisle buttress below it. In instances of extreme development, as in the Cathedral of Reims, it appears in two stories and in two flights, with an intermediate upright; so that the second exterior buttress, which receives the remnant of the thrust, stands at a considerable distance from the walls.

Through the development of the flying buttress, that is, the organ of the transmission of thrusts, the Gothic system became complete. The strains were directed and carried by the ribs to certain points, where they were met by masses of stone, which, if not sufficient in themselves to prevent the collapse of the interior arches, were re-enforced by other arms of masonry reaching to other supports; these latter being weighted at their summits by pinnacles or cone-shaped figures, at once structural in their function and most ornamental in aspect.

The Ribs and Their Functions. The ribs of the Gothic structure were named from the offices which they exercise: the "wall" or lateral; the transverse, or those springing at right angles to the wall; finally, the diagonal or groin ribs, which are the most important. This arrangement can be

easily visualized without the aid of a diagram, and its meaning is at once clear, if the definition of a bay be remembered as the space between two supports or buttresses. Each of these buttresses, consequently, receives from the ribs five thrusts: two from the wall or lateral ribs, one from the transverse, and two from the groin ribs, or diagonals. To assure stability, therefore, became a matter of simple calculation. Through the proper direction of the ribs and the accurate transmission and annulment of the thrusts by means of the flying buttresses and of the real or supporting buttresses, it became possible to tear away the mass of wall between each two of these organs of resistance; so leaving a skeleton recalling that of the human body.

Climax of Gothic System. The wide voids left by the suppression of the masonry could now be filled by arched windows corresponding in form to the interior vaults. The entire structure so became, as defined by the great French authority of the 19th century, Viollet-le-Duc, "a framework of stone with walls of glass." The architect absolutely controlled the forces brought into play by the use of the vault. Having eliminated all inert masses, he had reduced the structure to its active parts.

By means of a static mechanism constructed from point to point as laboriously as a legal argument, he had overcome the comparative poverty of his materials and resources. He had produced a system of skillful, ingenious devices in which the principle of poise was substituted for that of dead weight; thereby perfecting one of the most admirable schemes ever conceived in the history of architecture, as well as one of the greatest creative works of the human imagination.

The Gothic system reached its climax in the 13th century. The years 1220–22 witnessed the foundation of cathedrals in several widely separated cities: Amiens, France; Salisbury, England; Toledo, Spain; and Cologne in the Rhineland. And each of these edifices symbolizes in its own terms that wonderful hundred years of great actions and great thought.

The Gothic System Developed in France. Although practiced widely on the continent of Europe and in the British Isles, the Gothic structural system was developed in France. Like the roots of a great tree, so its nourishing sources are concealed and interwoven with an intricacy defying solution. They are flung far backward into the building art of the Romans and of the Byzantines, absorbing massiveness from the former, and, from the latter, flexibility and elasticity. These sources became, as it were, the trunk of the tree, when the Comacine or Lombard master masons reared their churches and baptisteries across the breadth of upper Italy. But there the growth lost its vigor, and its life was transferred into France, to be fostered in Burgundy, in Normandy, and in the monarchical lands of the Capetian kings, whose capital was Paris.

From France the germinating Gothic principles were carried into England by the clerical architects of William the Conqueror, and they, in their adopted country, showing advancement in their art, gave color to the unfounded belief that the system there received earlier development than in their motherland. Later, but for a brief time only, France, England, and the regions threaded by the Rhine became a single architectural country. The Rhineland, however, was reluctant to abandon its impressive Romanesque, which had produced the cathedrals of Worms, Speyer, Bonn, and a group of interesting churches at Cologne similar in all essentials to those erected in northern Italy by the Lombards.

The Rhineland and Spain Learn from France. The Germans, it would appear, were three-quarters of a century later than the French in producing complete Gothic. No church east of the Rhine shows a groin rib before the beginning of the 13th century; while the apsidal vaults of the Abbey at Morienval date from the end of the first quarter of the 12th. In Spain, the Romanesque of the just mentioned period was robust and massive, with many Lombardic resemblances. But even stronger in these Spanish examples are the Burgundian influences, which had been carried from France into the Iberian peninsula by the architect monks of Saint Bernard, the reformed Benedictines, renamed Cistercians. Further, it is true that the development of structural Gothic was not progressive in Spain; since, in the same building, the earliest devices are frequently to be observed side by side with the more advanced. Nor can it be denied that the great Gothic art of France, as it is evidenced in Paris and Bourges, Amiens and Reims, is reproduced in the practically contemporaneous cathedrals of Toledo, Burgos, and Leon. These are, as to French influence, the parallels of the Cathedral of Cologne on the Rhine. They furthermore offer proofs that French architects and workmen had some share in their actual construction.

English and French Gothic. In England, for three centuries following the Romanesque period (1189–1519), architecture followed an independent development. The designer and the builder were not united in one and the same person, as on the continent of Europe, the former being often a bishop or the prior of a monastery. From this fact resulted strong individuality, each cathedral receiving a treatment different from that of every other and so impeding the progress of structural, organic Gothic.

The Chapter House. On the contrary, the English Gothic architects vindicated themselves admirably by the creation of their distinctive chapter house, polygonal in plan, with its stone vaults supported by one immense clustered pier. Of this great member, each of the multiple colonnettes becomes, above the foliage capital, a vaulting rib; so that little imagination is required to make the visitor believe himself to be standing beneath a tall palm tree whose fronds extend in graceful lines to touch the enclosing walls. Also, in the later secular Gothic, the English again produced a most useful and beautiful device in the "hammerbeam truss," a fine example of which occurs in the Hall of the Middle Temple, London, dating from the reign of Queen Elizabeth, when the pointed style was rapidly passing into that of the Renaissance.

Estimate of English Cathedrals. Supported by these two very important contributions to structure, especially by the creation of the polygonal chapter house, the English producers of Gothic have claims to distinguished consideration. To them is due also the 13th century Cathedral of Salisbury, a structure of such perfect consistency and proportion that, in these qualities at least, it invites comparison with the Parthenon itself. But even if the great Gothic piles of England—Canterbury, Ely, York, Durham, Lincoln, and Westminster—could be denuded of their historical associations, their architectural attractions would not appreciably diminish for the majority of Anglo-Saxons. Their irregular plans with chantries and chapels—added apparently as by afterthought, but in reality to fulfill the vows of the pious or the penitent—their tranquil arcaded cloisters, their stylistic stone tracery and wonderful foliage treatment of the same material, satisfy the demands of the majority of observers.

The French Cathedrals. Students of architecture alone are able fully to enjoy the frankness and the simplicity of structural statement which prevail in the cathedrals of northern and eastern France. They only can appreciate the logical reasoning, the patient experiment, which governed the progress of French Gothic in such details as the successive profiles of the buttress, or, best of all, in the panel-and-rib system arrested at the very moment of its functional maturity, and not allowed,

as in English Gothic, to decline into ornamental tracery, like the fan vaulting of the Chapel of Henry VII at Westminster. Receptive and trained observers are compensated for the absence of the English close and cloister, with all their green serenity, by the powerful suggestiveness of the French exterior, which to them reveals in clear, concise terms the structure, nay, even the arrangement of the interior.

Corporate Effort in French Cathedrals. The very setting of the religious edifice in the turbulent market place becomes acceptable to the student of history, when he reflects that the French cathedrals of northern and eastern France are the material expression of the corporate and civic impulse of the 13th century. They were not only the temples, but, in reality, the museums and the communal guild houses of the great middle class developed in the age of charters. Theirs is an art actually created by the people for the people. For, in the local absence of proper stone for building, nobles and peasants, abbots and abbesses with their subservient bodies of monks or nuns, allowed themselves to be harnessed to the heaviest of carts, which they drew to the nearest quarry, where they excavated and loaded the blocks. Then, having transported the stone to the chosen site, with their own hands they constructed the walls of the House of God. Of these so-called "cart cathedrals," that of Chartres, with its interesting towers and unrivaled painted glass, is perhaps the most brilliant example.

The Slow Growth of English Cathedrals. In contrast to this prompt and telling effort, the growth of the English cathedrals was long protracted and often interrupted. It began when the monk Augustine, sent by Pope Gregory I in the year 597 to Christianize or re-Christianize England, landed with his companions near the present city of Canterbury and founded the first of the many Benedictine abbeys established by that order along the coasts of the island. Not only were these religious houses places of prayer and study, but they were the abodes of self-sustaining communities. They were schools of instruction in the industries and in agriculture. They were, so to speak, oases in the deserts of barbarism. Throughout the period of Scandinavian invasion they served as fortresses, into which flocked those who were pursued by fire and sword, and, in memory of these times of peril and distress, the English cathedrals, as an architectural survival, still frequently show battlements on tower and wall.

Ecclesiastical Architects. At the coming of the Normans, late in the 11th century, certain of the French prelates, appointed to the bishoprics formed from the abbey communities, were both churchmen and architects. They, it would seem, concentrated their deflected natural affections upon the growing buildings committed to their charge, shaping them with paternal pride, and, at their death, bequeathing them to successors similar to themselves in condition and sentiment. Thus it was that Canterbury, with its Saxon foundation and the French influence given to its plan in the 12th century by the French archbishop, William de Sens, came to show in its now venerable body examples of each successive period of English medieval architecture, until, in the latest phase of insular Gothic, the Tudor, it stood practically complete.

French and English Cathedrals. By thus setting the typical example of Canterbury against any similar structure of the Ile de France, the student may immediately realize the differences separating the English from the French cathedral. The stone fabrics may be likened to two plants. One grew perennially, surviving the rough storms of winter, overcoming the stress of tempests, and seeming to acquire therefrom a peculiar beauty, subtle and intimate. The other was of brief development, rising in response to a single season of favoring influences and attaining the perfection of its species. The English appeals through its very waywardness. The French impresses by the concurrence of its parts to the formation of a plainly visible whole. As a last word, one may say that in France alone Gothic reached a thoroughly active, vitalized state of being. But it is not true that the French is the only Gothic worthy to be admired. Like the music of Bach and of César Franck, it is favored by the professional and by the critic; while the English interpretations of the system allure all artistically sensitive persons with a romantic charm like that of Chopin.

The Gothic Legacy to Architecture. Neither species can grow stale or wither, and Gothic, as a whole, has bequeathed much of itself as a legacy to our own day. Its lessons in equipoise, flexibility, and skill in masonry, and in economy of material have become an integral part of every modern student's instruction in the art of building. But they cannot be separated from the knowledge which has been subsequently added to the practice of that art. They lie hidden from the world's appreciation, like the names of the majority of those who put them into visible form throughout western Europe of the middle ages.

Architecture and Modern Invention. The principles of Gothic, although they have changed their outward aspect, their envelope, as it were, still live and act. But the frail devices of that system represent a society of limited resources and an age of faith almost inconceivable to the minds of the present day, emboldened by the miracles accomplished in science and biased by the habit of seeing all things in large.

This point of view is not unnatural, nor is it wholly unjustified, in view of the conditions that for the last three or four decades have prevailed in the world, and especially in the United States. The annihilation of space effected by wireless telegraphy, the great development of systems of transportation by land and water and through the air, are the outward manifestations of the conquest and permanent control of forces which, but a century ago, were believed to be not only hostile to man, but absolutely invincible.

The Skyscraper; the Metallic Frame. As a corollary to the inventions able easily and quickly to assemble the necessary materials, the immense building called playfully the "skyscraper" has risen in the American cities. It possesses characteristics which are, perhaps, destined to pass into history as those of a fourth distinctive structural system in architecture. To the series, which heretofore had included the lintel, the dome, and the pointed arch (Gothic), there is now added the problem of the metallic frame.

Predecessors of the Skyscraper. Within the present limited space, it is impossible to trace the origin and descent of this latest species. But it will suffice to say that it differs from the European building of somewhat similar frontal aspect in the retention of a shell of masonry necessary because of its appalling height. Steel combined with brick, concrete, mosaic, and colored glass began to be used by the architects of Belgium in the last decade of the 19th century and in the style known as *l'Art Nouveau*. Thence passing westward into France, the same style appeared in the entrance to the subway stations in Paris, constructed of glass and steel, designed by Hector Guimard, and erected at the beginning of the present century. In Austria and in Germany, less subject to tradition than the Latin countries, the new structural system and the new material, concrete, obtained a wider use and a more durable popularity. A noted example of a steel framework masked beneath a marble plating or veneer occurs in the Postal Savings Bank, Vienna, built in 1905, after the designs of Otto Wagner, the pioneer of the artistic movement known as the "Secession"—that is, the revolt against historical precedent. To

Wagner, also, are due the stations of the Metropolitan railway of Vienna, constructed largely of concrete and showing almost no affinity with any authorized building type.

Turbine Factory in Berlin. The North German parallel of the subway stations in Vienna, although of later date than they, is the Turbine Factory of the General Electric Company in Berlin, the design of the architect Hoeber. This building, in its exterior, displays yet more fully than the Austrian examples the character called by the modern critics functionalism; that is, it reveals unmistakably the manner of its construction and the part contributed to the whole by each structural member. Its materials are glass, concrete, and steel, and the façade at first shocks the observer by reason of what he regards as its crudity—pretentious, affected, and only partially achieved. He reasons that the vertical space division is faulty, as including the species of temple or hall, besides an extension on one side, which throws the composition out of axis. Further, he scorns the pediment with its indistinctly polygonal contour. He seeks, without finding, an emphasized entrance or approach, and, at the end of his survey, is quite willing to rank the modern movement in architecture, as here represented, with the results of the "futurists" in painting and in sculpture.

However, before voicing his condemnation, his opinion wavers. His eye, recovering from the shock of the unadorned—in some cases, obtuse—contours, accepts them as characteristic, perhaps necessary, expressions of materials newly combined in architecture. He grasps the meaning of the single hall of the interior whose space is actually permeated with light by means of great areas of glass set in masses of concrete. He is made to feel the solidity of the structure as set forth in the steel columns and in the very forms of the hard-pressed trusses. At last, he cannot but acknowledge that architecture has passed into a new phase, into a fourth style, if that word may be applied to active, informing principle, rather than to external effect.

Functionalism in Architecture. However, properly to study functionalism one must pass to the steel-frame or steel-skeleton building, as it exists in the larger cities of the United States, in the financial areas of New York, Chicago, Philadelphia, Boston, and other centers of population. In these cities, some thirty years since, there began a movement to increase the height of office structures; the then existing laws permitting such increase, if the successive floors were supported adequately on iron or steel columns and the walls left with only their own weight to maintain.

The World Building. This system produced in New York the World building, with its height of 375 feet above the pavement. But, in order to attain such a point with safety, it was necessary to thicken the walls at their base to such an extent that the area—consequently the rental value—of the lower stories was diminished. To eliminate this defect, the architect-engineers began to support the wall itself at intervals on the steel frame, and to reduce the masonry to a thin shell. By this means, they effected a distinct difference between the European and the American combination of steel with stone and glass. At the same time, they protected the tall structures from peril in the case of exposure to fire, the destructive element which had previously caused the metal work to twist and bend.

This advance in stability and safety having been made, the problem entered a new stage. Functionalism, or structural sincerity, demanded that the façade should reveal the truth that the masonry was no longer self-supporting. This demand was first met by the distinguished architect, Louis Sullivan, who substituted for the squared and finished building stone of previous similar structures a mere casing of the metallic members of the frame. To avoid a false expression of structure in the casing, instead of employing stone or concrete, he used terra cotta with a molded surface ornament; while, to announce the great functional importance of the supports, he emphasized the vertical line throughout the design of his elevation.

The Woolworth Building. The vertical accentuation devised by Sullivan, so descriptive, so transparently truthful, was at once accepted and followed by his brother designers, not always successfully, but so widely as to give a certain measure of monotony to the business districts of a city. This was perceived by the American architect, Cass Gilbert, who in designing the Woolworth building in New York, built in 1910-12, endeavored to overcome this aridity by adapting perpendicular Gothic line and detail to the 792-foot structure. The Woolworth building was for years considered one of the finest existing examples of its type. It was called the "cathedral of commerce."

But praiseworthy as Cass Gilbert's effort was, we live in an age that is acutely conscious of the merits of simplicity. We know about functionalism, the true æsthetic economy in using materials, and we are aware of the absurdity of misapplied ornament. The architect of yesteryear had all kinds of lavish devices to distract one's eye from his lack of constructional sense, but the demand now is that all these shall be stripped, so that the architect will have to get down to the roots of his art—proportion. Hence the Woolworth building has been superseded by such simple, uplifting structures as the Empire State building, the Chrysler building, and the RCA building in New York, to say nothing of the skyscrapers in other cities.

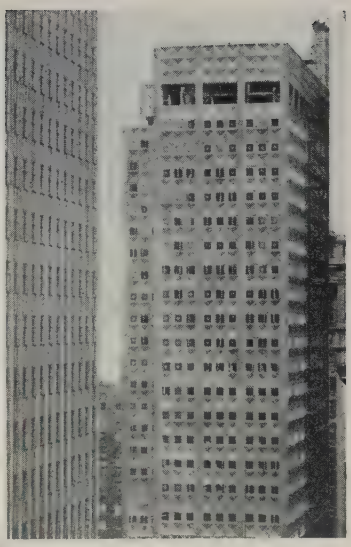
From the New World the "skyscraper" passed eastward over the Atlantic to London, where it has been skillfully adapted to its surroundings and made actually to chord with the Wren-Gibbs type of church, emphasized by a narrow, classic porch and a conical "steeple." In this trying location the great American office building has proved its usefulness, as well as its æsthetic value.

Housing. An outstanding feature of building construction in the United States since World War II has been the mass production of dwellings. New low-cost housing projects, both public and private, have sprung up everywhere, accounting for four-fifths of the millions of new homes built within the past few years. All previous building records were beaten in 1949, when upwards of 1,000,000 new nonfarm homes were begun. This was largely the result of government financing.

So acute was the housing shortage after the war, when 5,000,000 new units were urgently needed, that the government was obliged to act. It could have gone into the construction business itself, but instead encouraged private enterprise to undertake the work by placing billions of dollars in credit at the service of the building industry. The Federal Housing Authority (FHA) by generously insuring loans on houses enabled builders to borrow the money needed to build. At the same time, by liberally insuring the purchasers' mortgages, particularly those of veterans, the government made it equally easy for people to buy their homes. Established in 1934 as a New Deal anti-depression measure to encourage housing loans, FHA had by mid-1954 helped 4,500,000 American families to buy their own houses, without costing the taxpayers a cent.

Apart from slum clearance and low-cost rental housing under state or municipal auspices backed by Federal aid, most of the middle-income building programs have certain characteristics in common. Generally they occupy bare tracts of land on the outskirts of cities, and the houses are mass-produced to a single pattern, usually the so-called "ranch house" style, with all the rooms on the ground floor. While some of the developments are well laid out, with recreational facilities for children and adults, many are badly planned, and from the architectural point of view there is little virtue in the houses.

Left The new Johnson Wax Laboratory in Racine, Wisconsin. In this building, designed by architect Frank Lloyd Wright, basic research is being conducted. Twenty-one miles of horizontal glass tubing circles the tower between bands of red brick. The building in the foreground adjoins the tower and completes the administration and research center.



Above Two recent Wallace Harrison architectural structures are the U. S. Steel Building at the left and that of the Aluminum Company of America on the right. Located in Pittsburgh, these buildings represent functional architecture of the present day. The U. S. Steel building stands 500 feet high and has 42 stories; somewhat smaller is the ALCOA building with 30 stories, standing 425 feet high.

Below Towering 39 stories above New York City's East River is the Secretariat Building of the United Nations. At its base is the domed Conference Building for the U. N.'s councils and committees. Five years of planning and building by architect Wallace Harrison plus 67.5 million dollars were required to complete this structure. In order to air condition the building 14,000 gallons of water must be pumped into the cooling system per minute.

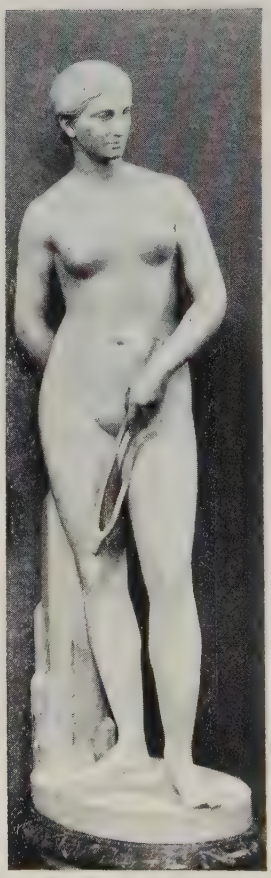
Barrett Gallagher

AMERICAN BUILDINGS

Left "Lobster Trap and Fish Tail" by Alexander Calder. Created in 1939, this is an example of mobile art. It is composed of steel wire and sheet aluminum. The mobile stands 8½ feet high and is 9½ feet in diameter. *Courtesy of the Museum of Modern Art.*

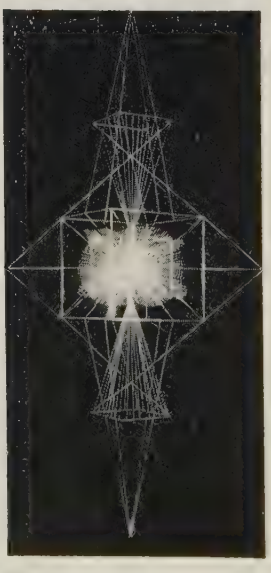
Right "California" by Hiram Powers, one of the leading American sculptors of the nineteenth century. This piece of art was created in Florence, Italy. *Courtesy of the Metropolitan Museum of Art.*

Below "Dancer and Gazelles" by sculptor Paul Manship. Suggestions of Greek sculpture characterize Mr. Manship's figures. In 1922, the American Academy of Arts and Letters elected Mr. Manship to its organization. *Courtesy of the Cleveland Museum of Art, John Huntington Collection.*



Left The "Two Natures," an allegorical work of art by George Grey Barnard in 1894. The artist is famous for his statues at the capitol building in Harrisburg, Pennsylvania. *Courtesy of the Metropolitan Museum of Art.*

Right "Variation No. 7, Full Moon" created by Richard Lippold in 1949-50. It is made of nickel-chromium wire, stainless steel wire, and brass rods. The figure stands 10 feet high. *Courtesy of the Museum of Modern Art.*



AMERICAN SCULPTURE

SCULPTURE

THE history of sculpture may be reduced to the development of the two figures, male and female. These appear among all peoples in the early stages of their worship and cults. They represent the qualities and attributes of Divinity divided and apportioned among many separate individualities, since the concept of a Supreme Being, a Great First Cause, cannot yet be understood. The symbolic figures progress in resemblance to human forms as the tools by which they are fashioned pass from rough to smooth stone and thence through bronze to iron.

Portrait Sculpture in Egypt. As in architecture the cabin of reeds and clay built in the Nile valley offers to the student the first structural type; so the sculptures in clay and wood of the Old Kingdom of Egypt (3400–2400) afford the beginnings of the art which they represent.

For many reasons, the most important extant example of such works is "The Sheik," a figure, now in the museum at Cairo, portraying a high official of the government. Its substance is wood, with the body and head of a single block, while the arms are carved separately and attached; the left one, since it is bent at the elbow, being formed from two pieces. As finished by the sculptor, this device was concealed by a thin sheet of the finest linen glued to the surface of the wood and itself covered with stucco, to which various pigments were applied. Still further to heighten the appearance of life, the artist did not leave the eyes "blind," but inserted in the socket cavities fragments of opaque white quartz with pupils of rock crystal, at the centers of which are highly polished bronze nailheads; the whole outline of the eyes being traced by narrow rims of the just mentioned metal. Realism and portraiture, it is plain, were the aims of the author of this figure, as they were also the qualities demanded by the authorities for whom he labored. But he attained his object and has been able, after 4000 years, to communicate with the descendants of his race. So permanent and accurate was his realism that, upon the excavation of the portrait statue of the official, the modern Egyptian peasants, as the features and the pose of the statue were revealed to them, exclaimed: "Sheik el Beled" (The Village chief)!

Of the same period there remain two other admirable pieces which, like "The Sheik," are self-explanatory—"The Scribe" and "The Dwarf." The former of the two, carved from limestone (colored red), is widely familiar, because of its conspicuous position in the Louvre, where it is observed by thousands of visitors, instead of being reserved for the enjoyment of the comparatively few travelers who exert themselves to study Egyptian art in its birthplace. The scribe is represented, as a specialist should be, in the exercise of his office. He is seated on the ground, with his legs crossed beneath his body. He holds on his knees a tablet, and his face is slightly lifted, as if he were receiving dictation from a person standing before him. Without the slightest claim to beauty, of uneven—in some parts of the crudest—execution, and in spite of the repellent Orientalism of its attitude, this figure is yet interesting to the modern eye. The face suggests a clear, receptive, and alert intelligence. It is plainly the portrait of an efficient accountant.

"The Dwarf Knemuhetep" is another primitive masterpiece. Carved from limestone, the disproportions of his ugly shape are reported with the faithfulness of a Dutch painter, but he is quite free from any flavor of the sinister, which is so pronounced in the portraits of dwarfs by the Spanish masters. The head is consistently and abnormally large, with a face expressing patience and determination. The subject of this admirable portrait was an upper servant of the royal household, perhaps the keeper of the linen, as has been suggested by the Egyptologists. His personality has been preserved through at least 45 centuries, so that it is still instantly comprehensible, the artist having pierced through a hesitating technique and attained a precision of statement rare even in periods of high development.

Egyptian Colossal Sculpture. Nor among the early Egyptians was successful portraiture limited to the representation of middle-class or humble subjects. The figures of the sovereigns were presented in awe-inspiring proportions, either standing or advancing or else seated in an attitude which suggested eternal, avenging, merciless, and immutable presences; the elevated spirit of art dissolving, as it were, the obstacles offered by the narrow mind and the limited resources of the artist. And not only do the statues in the round, of the Old Kingdom, awaken an admiration almost inconsistent with their archaic quality, but a similar emotion is produced by the sight of the contemporary relief sculptures. In these, the clear contours, the broad, slightly raised surfaces, and the vigorous action offer a pleasing stimulus which is afforded only by masterpieces.

Later in Egyptian history, under the building Pharaohs of the 18th, 19th, and 20th dynasties (1580–1150 B. C.), the desire for the colossal in sculpture prevailed at the court, as it did also in temple architecture. In fact, the seated figures of Rameses II, projecting from the rock-cut façade of the Temple of Abu-Simbel, nearly equal in height the tallest columns of the Great Hall at Karnak erected by the same Pharaoh. This taste, refined by its entrance into the Greek mind, prompted the creation of the gold-and-ivory statues of the age of Pericles (450–400 B. C.), and the very technique of the last-named works was developed from that of the bronze figures of the Egyptians, made by carefully fitting and fastening a thin sheet of metal to a wooden core. But this strong tendency toward display did not vitally injure the art of the empire, which, in spite of a certain lack of vigor and spontaneity, is to be regarded as the best produced in the long course of Egyptian history; since the expressions of the Ptolemaic period were Hellenized and those of the period of Roman domination were hybrids.

Mesopotamian Animal Sculpture. Among the peoples whose supremacy succeeded that of the Egyptians, the Mesopotamians—especially the Semitic Assyrians—excelled in the minor or decorative, rather than in the major, arts. They, although remaining primitives in the sculpture of the human figure, treated the larger animal forms with great impressiveness, as may be learned from the reliefs in stone of the 9th to the 7th century B. C., representing hunting scenes, and now in the British Museum. Of these, the finest example is the widely known "Wounded Lioness," with her body transfixed by a spear, and other javelins hanging from her flanks; with her hind legs useless and dragging, and the line of her back hollow, indicating that her spine is broken. The agony of the beast is noble and pathetic. Surely, the sculptor who portrayed it was among those from whom the 19th century Frenchman Barye learned his art!

One masterpiece of advanced modern spirit, such as this is, even were it not companioned by many others of equal merit, would atone for the archaic conventions long used by the Assyrians and copied by them from the Egyptians. Included among such devices is the eye seen as from the front, with the head in profile, and the introduction of a fifth leg in animal forms, so that, when viewed in frontal aspect, they might not appear to have but three. Yet again, it is only justice to add that these careful and childish provisions were no longer in force at the moment when the "Wounded Lioness" was created.

Finally, in order to distinguish between the methods of sculpture of the two most ancient

peoples whose art is yet today deserving of study, the remark of a French archeologist, M. Perrot, will suffice: "The Egyptians saw as through a veil; the Assyrians as through a microscope." Or, less figuratively stated, the sculptors of the Nile valley emphasized outline, which formulated itself in black against an atmosphere saturate with light; while the Assyrians in the misty Mesopotamian plain naturally observed the projections and depressions of objects and translated them into modeling.

From the Assyrian reliefs to the Hellenic Greek statues the passage is not one of time, but of place; since Ashurbanipal, or Sardanapalus, reigned at a period considerably later (668–626 B. C.) than that of the foundation of the Olympic games (776 B. C.).

Genesis of Greek Sculpture. From the moment of that great event the male population of the Greek world flocked every fourth year, in the late summer, to Olympia in the northwest of the Peloponnesus. There, the sight of the youthful, pliant bodies of athletes, seen in the most graceful exercises and poses, caused the rapid development of sculpture. Dorian centers of this art were created in the not distant cities of Argos and Sicyon. Thence, as well as from certain islands, went out figures, the earliest of which are classed under the one title of "Apollo types"; the god of light (intellect) and of music (rhythm—that is, law and order) being the patron of the Dorian race.

Simultaneously, on the shores of Asia Minor, on many islands of the Ægean, and on the mainland of Greece, another wholly different figure was developing. This was the female draped type, not, like the athlete, original with the Greeks, but showing resemblances to the cult statues of early Eastern peoples. In this creation, necessarily, the energy of the sculptor was concentrated upon the face and the drapery; the whole evidencing much more plainly than the Apollo type the evolution of the statue from the rudely carved tree trunk, which had served as an object of worship for earlier generations. The difference separating the two figures is a significant one and is paralleled by the other contributions of the Dorians and the Ionians to the remaining two arts in which the Hellenic Greeks excelled. For in each instance the former gave force, structure, restraint; while the latter refined the force of the opposite race, embellished structure, and, for restraint, substituted emphasis.

The earliest stone statues in the Greek world probably appeared toward the middle of the 7th pre-Christian century. And from that point of time down to our own day the history of sculpture can be followed as easily as the growth of a tree with widely divergent branches.

The Apollo Type. From the first, the Apollo type, that is, the Dorian statue, was conceived as walking. It suggested, rather than represented, a human form. The arms hung closely pressed to the sides and ended in hands clenched and presented in displeasing triangular form. The torso or trunk was flat, seeming to be the result of four views taken separately from the front, the back, and the two sides, and then clumsily combined. The neck gave the effect of a cylinder set on the shoulders, and was made thus heavy to avoid fracture of the stone through imperfect tools and unskillful manipulation. The face aggressively displayed widely opened eyes and a mouth of which the two lips followed the same concave curve, so producing the grimace known as the archaic smile; both of these effects being unsuccessful efforts on the part of the sculptors, who were endeavoring at once to follow nature and to master their chisels.

The Ionian Figure. In the Ionian type the pose was similar, but the figure was conceived as stationary, so far as may be determined from an archaic, fully clothed body and from the idea of a goddess presented in a shrine and demanding adoration. The drapery was interesting in its accurately defined, perpendicular folds, which, without doubt, represented the grooves of the bark in the tree trunk stage of the racial statue. Further, the texture of the drapery was indicated as that of a fine woolen fabric, a product of the looms of the East.

In the Ionian type the arms were not invariably both pendent at the side; one being sometimes laid on the breast with the hand holding a fruit or flower. As to the faces of preserved examples, they are coarse of feature, and they have the archaic conventions already noted in the Apollo statues. Also, as in the latter, the heads are set on the same columnar necks, and the hair similarly falls in strands on the breast or the back, in order to lessen still further the danger of breaking the stone.

Archaic types, such as those just described, are not earlier than the middle of the 6th century B. C. These, having lost their religious and symbolic significance, offer no interest today except for the deep student. They are mere links in a long chain of development. They were produced in a formative period of society, which ended in the almost fortuitous naval victory over the Persians, at Salamis, in 480 B. C.

After that decisive event in world history, as was logical, the rise of national consciousness tended to fuse together the differing types of Hellenic art. In sculpture, the Dorian and the Ionian influences acted reciprocally, and a new spirit came to inhabit and vitalize the bronze and the marble figures of the Periclean age. During the 80 remaining years of the 5th century, the Greek sculptors produced, almost exclusively, monumental types, such as were fitted to adorn the temples and served to foster the religion of the state.

Myron. Pre-eminent among these master sculptors are three, each of whom contributed to what may be termed the capital fund of sculpture. The oldest of the three, Myron, working largely in Athens, chose preferably the athletic figure, showing it set for action, but in the brief instant which precedes the act, or, in one remarkable instance at least, in the first overwhelming instant of defeat, with the muscles responding to the mental shock. Yet Myron did not seek to leave the spectator with an impression of violence. Had he done this, he would have been unworthy of his period and of Athens. The poses and gestures so emphatic in themselves, when accepted merely as parts of a whole, concur in the production of sweeping, contrasting, and harmonious curves, grateful and tranquilizing to the eye. Myron was above all else an accurate, profound observer of life and movement. In common with the architects of the period, he made his eyes his chief instruments. As the builders scorned the use of the compass, so did he, without ever having dissected, render the play of muscle with a precision that has never been surpassed. Judging him correctly, the ancient critics wrote: "Myron gave *anima* (the appearance of life) to his statues, but he failed to give them *animus*," that is, the suggestion of mentality. The decision still stands, affirming the admirable qualities and recognizing the limitations of the man who may with propriety be called the first world sculptor.

Phidias. The second who deserves the same title was Myron's contemporary, Phidias, the close friend of Pericles, and the director of public works at Athens. Master of both bronze and marble, as also, on occasion, in gold and ivory, he possessed the rare ability of treating with equal success the male and the female figure. More distinctly Ionian than Myron, he usually presented majestic, clothed figures, standing at rest; expending his artistic energy upon the head and upon the drapery, considered both as mass and as texture. But, since it is from Greco-Roman copies, more or less remote or debased from the originals, that we know his single statues, we have no means of judging his quality of linking "the human with the Divine," as it was described by the observers of antiquity.

The Parthenon Frieze. However, we may form a direct opinion of this master's power of composition from the partially destroyed processional frieze which surrounded, like a tapestry, the exterior walls of the Parthenon. It was intended to be seen by the visitor who followed it either by walking around the pteroma (passage between the columns and the wall) or by looking through the spaces between the columns themselves; his position, in the latter case, being at a point more than 40 feet below the sculptures. Of its special class, this frieze is the most successful example ever produced. Its problem was to join fast and slow moving bodies of human figures and animals in unbroken sequence, and, also, to reach a climax over the eastern entrance, through which access was obtained to the statue of the patron goddess, Pallas Athena.

To accomplish this result, the festival procession was divided at the northwestern angle of the temple; one division moving across the western end and up the northern side, while the other paralleled its passage along the southern side; the two going forward to meet the company of the Olympic council of the gods seated in calm dignity above the principal portal. As participants in the procession, youthful knights are represented, now tying a sandal, now restraining a restive horse, again cantering or in full gallop. Then, crowned victors of the great games are seen advancing proudly in their chariots; following are old men and aliens bearing tokens of their submission to Athens; cattle to be sacrificed, sent from the colonies to the mother city. Here we see aristocratic young girls who had embroidered the mantle of the goddess, to be dedicated on the day of the ceremonial; lastly, there are the frequently recurring marshals and magistrates, whose gestures act, so to speak, as modulations between each two differing units.

One such personage marks the beginning of the procession and, by his gestures of head and arms, invites the youths nearest him to follow the bodies moving along the southern side, although they evidently belong to the company of horsemen gathering on the western end, who will eventually pass northward. Similar gestures effect the transition between the rearing, bounding horses of the knights and the dragging chariots. The pose of the marshal at this point indicates that the horsemen must further accelerate their pace—a subtlety which deflects momentarily the attention of the observer and maintains his interest in the procession, even though the climax of movement be past.

This subtlety of composition was equaled by the fineness of technique. Further, calculation was made to assure the visibility of the design from below and under reflected light, by deeply incising a line around the lower portion of the figures and by making the relief greater at the top than at the bottom, although at no point did it exceed the depth of one and a half inches; while the height of the frieze was slightly less than three and one-half feet.

The Parthenon Pediment. Beyond all doubt, the design and, in part also the manual work of Phidias, the processional (Panathenaic) frieze has its peer in the composition of the eastern pediment or gable of the Parthenon. Here, too, the artist, defiant of established rules, plays with difficulties: setting the statues toward or away from the axis, as he wills; but, by the force of his genius, attaining a rhythm as clear to the mind of the student, as if it were beaten out by the baton of an orchestral leader. In point of mere execution, this pediment far exceeds the frieze. In the group wrongly styled the "Three Fates," it contains the finest draped statues of antiquity, and, in the carving of the horses' heads of the chariots of "Day" and "Night," delicacies of texture, such as may be detected only at the closest range of vision and by touch.

The works just described should be regarded as those determining the rank of Phidias among the sculptors of history. But his fame, as it is affirmed in popular oratory, rests upon his two decorative statues of Zeus and Pallas Athena, intended as cult objects, of colossal proportions, and formed from gold, ivory, and precious stones, applied upon a wooden core. After some thousand years of existence, these figures disappeared, but their types of countenance are still renewed in every modern drawing whose author seeks to present the idea of supreme power or of wisdom under an austere and noble aspect.

Polyclitus. Thus enriched by Myron, who gave vitality to his figures and an inspiring eloquence to the represented action of muscle, and enriched still more amply by the monumental works of Phidias, the art of sculpture advanced to further development by Polyclitus.

The last-named master, younger than the other two, seems yet to have reached his artistic maturity midway in the 5th century B. C., and he is known to have had an exceptionally long career. He was typical both as a Greek and as a Dorian. As a Greek, he sought perfection within a narrow frame, choosing to repeat proportions and poses with a uniformity which, except for his skill, would have been monotonous. As a Dorian sculptor, he naturally treated the athletic male figure; developing the traditional "Apollo type" into such statues as his "Youth with the Fillet" (*Diadumenos*) and his "Lance Bearer" (*Doryphorus*), the latter of which was an epoch-making work. In fact, it illustrated perfectly the principles to the elaboration of which Polyclitus devoted his life, and he gave it the name of the "*Kanon*" (Law), in allusion to his own table of anatomical proportions. These he studied after the manner of an architect of his own race, with the result that the "Lance Bearer" can be compared to a Doric temple, in all that concerns the adaptation of parts to a given whole, constructed upon a unit of measurement. For Polyclitus, this unit was the head, which he made one-seventh the height of his figure, precisely as the semidiameter of the column employed had been accepted as a constructive gauge for the temple.

Innovations of Polyclitus. But the chief interest of the figure does not lie today in the more or less academic question of proportions. Instead, it resides in an innovation which, as now regarded, carried Polyclitus to a position equal to that of Phidias, as a sculptor (not of course as a master of composition), and, perhaps, even to a higher level. Abandoning the traditional pose, the Dorian master threw the weight of the body upon one foot; thus creating a contrast between the two sides, emphasizing on one the contracted and supporting muscles and, on the other, those which were supported and elongated. The right leg was thus made to resemble a column, upright and firm; while the left, bent at the knee, offered a pleasing curve, and the toes of the raised left foot grazed the ground.

This pose, also adapted by the sculptor to the female figure, as in the "Wounded Amazon," was the principal legacy of Polyclitus to his art. A secondary contribution, and one permanently valuable to students, was his practice of breaking his muscular structure into large, clear, and distinct masses, grateful to the eye and conducive to the quick grasp of the sculptor's meaning by the observer. The same treatment he extended to drapery, which, as a Dorian, he used very rarely, and never indicating the texture, woolen or silken, as was the custom of Ionian artists.

Nor were athletes and maiden warriors his only themes. In his old age, he turned to the gods, leaving as the chief accomplishment of his second manner the colossal gold-and-ivory statue of Hera (Juno), seated on a throne and wearing a crown adorned with figures of the Graces and the Hours. This work equaled in richness of material the Zeus and the Athena of Phidias, and it was as highly esteemed as they by the critics of the Periclean age. It fixed for all time the features and the figure of the

consort of Zeus, such as we know them through the statues and medals of the Roman Empire and the period of the Renaissance.

The beginning of the 4th century was marked by a lessening of restraint in Hellenic life, under whatever aspect it may be regarded. In sculpture, the masters of the two contributing races had already given the impetus and direction which the younger enthusiasts followed without question. Again two Ionians and one Dorian distinguished themselves above all their contemporaries, creating masterpieces whose charm cannot wither.

Praxiteles. The name of the first of the three, the Athenian Praxiteles, recalls the marble "Hermes," discovered during the excavations conducted in 1876 at Olympia, under the auspices of the German government. This, a statue of the utmost distinction, is, in fact, a natural evolution from the Dorian figures of Polyclitus. But it is the work of an Ionian artist whose preferred medium was marble, instead of bronze. The pose, that is, the disposition of the weight, is merely emphasized by causing the figure to lean on a support, like a pillar or tree bole, in order to obtain an undulating line and a greater contrast between the two sides, one of which now presents a strong convex and the other a deeply concave curve. The face reflects the intellectual and social culture of Athens. The glance is meditative, bespeaking elevated thought, and concurring with the physical pose to awaken immediately in those who stand before it a sense of tranquillity, like that which is secondarily produced by the "Discobolus" of Myron, but more intimate and more rarefied.

Of the female figure treated by Praxiteles numerous reflections and reminiscences remain; the most trustworthy being variants of the "Aphrodite (Venus) of Cnidus." For the goddess, the sculptor used a pose similar to that of his "Hermes" as to the torso and lower limbs, which entailed the extraneous support, but gave a different position to the arms. He heightened the sensuous appeal of the face, as befitted the subject. But, while making the head admirable in construction and outline, he omitted the slightly projecting bar of muscle which accentuated the brow of Hermes; purposing by this omission to diminish the suggestion of intellect and thoughtfulness.

This statue and that of "Eros" (Cupid), similarly conceived, were held in antiquity to be the masterpieces of Praxiteles. The "Aphrodite of Cnidus" especially became the parent of a long series of derivatives, of which the Vatican statue of the same title is, perhaps, the most faithful to the nonexistent original. Another example is the "Bathing Venus" of the Capitoline Museum, Rome, and a third, the universally known "Venus de' Medici," now in the Uffizi Gallery, Florence.

The last-named would appear to be a Roman work of the 2d Christian century, which, while retaining certain qualities of the Praxitelean type, displays aggressively the affectation and falsity of the empresses and the imperial favorites of that period. An additional blemish upon the beauty of this Venus is made by the forearms and hands added in the 17th century by the architect and sculptor Bernini, who copied the excessively tapering fingers of some mincing aristocrat received at the papal court. Apart from these flaws, the "Venus de' Medici" is an invaluable example of classical art. The undulations of its modeling were a source of the deepest delight to the great French sculptor, Auguste Rodin, who used the figure as a proof that, contrary to the general belief, the Greeks did not limit themselves to the rendering of the essential and the typical; but, at the climax of their civilization, presented, in all forms of their art, individuality and detail, according to the demands of their chosen subjects.

Scopas. To the school of Praxiteles, with its contemplative figures radiating the joy of living, that of Scopas stood in direct contrast, portraying tragic incidents and climaxes of enthusiasm, although none of these lacked the truly Greek quality of restraint. The master of the new movement, although presumably a native of the island of Paros, seems to have studied first in the Peloponnesus, where he is known to have executed the pediments of the temple of Tegea, one of which represented a battle and the other a heroic hunting scene. Of these two compositions, each of which contained 15 figures, there remain fragments of compelling interest. These are heads massive in structure and breathing a sentiment unknown in previous Hellenic sculpture. They are inclined upward, with the eyes made short, round, and having above them a projecting muscle, which rolls about the outer corners. In observing them, one cannot but recall the tragic playwright Euripides, who, less than 50 years earlier than this work of Scopas, had introduced into Greek drama characters human and pathetic, which are modern because they are universally significant. A different passion, rising from the practices of nature worship, was also portrayed by Scopas, in his figure of a mænad (maiden votary of Bacchus), which is known from a copy in small proportions preserved in Dresden. From the statuette may be developed in imagination the larger figure, with the backward strain of the legs, torso, and, above all, of the neck, which causes the head to lie in an almost horizontal line. This pose, it must be admitted, did not originate with Scopas. It was traditional in Greek art, and probably first appeared in vase paintings long prior to the 4th century. But in these the intention was purely decorative, so that the figure was merely mapped out in flat, black blocks on a smooth, light background. The rudimentary suggestion does not detract from the elaborated figure or even from the inspiration of the sculptor who conceived it in such evident ecstasy of spirit.

In the most monumental labor of his career, the royal tomb of King Mausolus at Halicarnassus, Asia Minor, Scopas was associated with three other sculptors of great reputation. This information, together with a description of the structure, was given by the Roman writer, Pliny the elder (died 79 A. D.), whose statements are too general to be adapted to the remaining mutilated fragments. But among these are blocks from a frieze representing battles of Greeks with Amazons, which have, to a degree, the emphasis and the exalted quality of the "Mænad" of Scopas. The same characteristics are apparent also in the dignified portrait statue of King Mausolus, treated correctly as a non-Hellenic type, with beard, long hair, and distinctive robe.

The Niobe Group. Thus it will be seen that at the middle of the 4th century two schools of sculpture, equal in advancement and refinement, but of opposed sentiment, were active in the Greek world about to be extended by the conquests of Alexander. Their influences mingled to produce the interrelated figures interpreted as "Niobe and Her Children," a work in which the emotional power of Scopas is joined to the incomparable Praxitelean line. Among these figures is that of a youth in profile, with his body, from head to extended right foot, making a single, sweeping curve. His right forearm and hand are enveloped in drapery, projecting far beyond his brow: a device used to create an emphatic shadow, which reappears in Michelangelo's "Thinker," as also in a modern figure of "Grief," by the American sculptor, Augustus Saint-Gaudens.

Lysippus. In observing the results of the mingling of the Praxitelean and Scopian schools, we have passed the limits of the 4th century. But a return must be made, in order to note the influence of the Dorian master, Lysippus, who became the court sculptor of Alexander the Great. As the heir of the traditions of Argos and Sicyon, he excelled in the portrayal of the athlete. He was, in fact, a reincarnated Polyclitus who, working under new conditions, produced a new ideal figure, more slender, more sinewy, and with smaller head than the "Lance Bearer" of the earlier sculptor.

Like his great predecessor, Lysippus preferred bronze to marble, according to the traditions of his school and as better showing the relations of the muscular to the bony structure of the body. In that metal he wrought exclusively, from a figure of Zeus, 60 feet in height, to a statuette of small proportions. But none of his original works has survived until the present day, although several of them were standing in the public squares of Constantinople at the beginning of the 13th Christian century, when the doge, Enrico Dandolo, having seized the city, sent them to the crucible, that he might coin them into money wherewith to pay his soldiery.

In marble, however, the "Youth with the Strigil" of the Vatican museum, until recent years, was believed to be a very close, if not a studio, copy of the masterpiece of Lysippus. But this error was rectified from a discovery made by the French, at Delphi, of a series of marble statues known to be replicas of bronze originals in Thessaly, one of which bears on its base the name of the pancratiast (wrestler and boxer) Agias, as also that of the sculptor Lysippus. It is, therefore, upon this figure, rather than upon the "Youth with the Strigil," that an acquaintance with and estimate of the Dorian master must be based. In the "Agias" the muscles have a more even flow, as if observed from the exterior by a sympathetic artistic eye. In the Vatican figure they are rendered with a knowledge which savors of the dissecting room and is characteristic of the decline of Greek art.

These athletic figures strongly influenced the sculptors contemporary with Lysippus and still more strongly those who followed him in the Hellenistic (declining) period. But during his lifetime his peculiar prestige was due to his position at the court of Alexander, and it is principally from his portrait statues and busts, through many replicas and variants, that we derive our knowledge of the features of the youthful conqueror.

The Dying Gaul. Lysippus was the last of the six great masters; the minority in numbers being on the side of the Dorians, although possibly not the lesser excellence and influence. For, if the school of emotion and passion produced, after the death of the major artists, the "Niobe Group" and, as well, the "Victory of Samothrace" vibrant with wind-swept motion and poising as if her wings were of feathers rather than marble, these masterpieces did not stand alone. Out of the first school of Pergamum, Asia Minor, at the middle of the 3d century B. C., came the figure of the "Dying Gaul," Lysippan in type and technique. Noble and restrained, although representing death agony, this statue, as it is treated, shows its descent from the great art of the two preceding centuries. It was created at the order of King Attalus I, who shared in the distribution of Asia Minor among the successors of Alexander. And its purpose was to commemorate the king's victory over the predatory Gauls who had harassed the Mediterranean countries for more than a century. As presenting death in a cruel, physical aspect, and as conducive to sentiments quite different from those evoked by the pediments of the Parthenon, or even by tragic works with death imminent, the "Gaul" belongs to a declining civilization. But the sculptor has given to the face, to the pose of the head, and even to the action of the muscles, a reflection, as it were, of supreme fortitude.

Altar of the Gods, Pergamum. Another work of the same school, and later than the "Dying Gaul" by a half century, continues the superb Dorian technique, while, at the same time, it carries passion to the maddest paroxysms of violence. This is the frieze of the "Altar of the Gods" at Pergamum, which was discovered by German excavators late in the 19th century and is now in the former Kaiser Friedrich Museum, at Berlin. It is a continuous series of relief sculptures portraying battles of gods with giants. These scenes are artistically infinite in variety, and they display all the resources of Hellenic sculpture; ranging in type from the most dignified to the ultra grotesque, and including nearly every deity and every monster known to classical mythology. The finest of the blocks represent Zeus and Pallas, evidently developed from Phidian concepts, and each in conflict with a misshapen giant. The subjects reflect the turbulent, irrational spirit of a period following upon decisive wars. But the composition and the execution have the incomparable beauty attaching alone to Greek masterpieces.

The highest qualities of this work are rightly placed emphasis and the suggestion of rapid motion, a combination which a French sculptor of the 19th century presented, with the same superb results, in a strangely similar composition. The latter is a relief executed on one of the eastern piers of the Napoleonic Arch of Triumph, Paris. But the modern artist, François Rude (1784–1855), cannot be charged with imitation, since he died more than 20 years before the discovery of the Greek marbles.

Laocoön; Farnese Bull. The frieze of the "Altar of the Gods," produced toward the middle of the 2d pre-Christian century, shortly before the reduction of Greece to a Roman province, had few worthy successors, since the once highly praised "Laocoön" and the "Farnese Bull," dating from approximately 100 B. C., cannot be counted as such. The first of these is a work of the school of the island of Rhodes; the second, of that of the city of Tralles, Asia Minor; each of them presenting an act of vengeance and a revolting scene of torture.

Venus of Melos. But consolation and atonement for such brutality exist in a statue belonging to the time which has been called, not inaccurately, the "Autumn Days" of Greek art. This is the "Venus" or, better, the "Aphrodite," discovered a century since by a peasant who was digging a well on his own holdings in the island of Milo (Melos). To the critical estimate of this figure, Furtwängler, a high modern authority, devotes much space in his *Masterpieces of Greek Sculpture.* He believes it to date from about 100 B. C.; describing it as the production of an artist who had studied the works of his great predecessors, and who, with a rare selective power, combined their best qualities into a figure of more than human beauty. The critic further observes that, had the "Aphrodite" belonged to the 5th century, she would have been fully draped, like the statues of Phidias; that in the 4th century she would have been wholly nude, like the figures of Praxitelean type; but that by being partially draped, without emphasis upon the texture of the draping material, she evidences a master who lived late in the course of Hellenic art—indeed at the very end of its independent course. Finally, Furtwängler, in assigning her, by reason of pose and countenance, to the victorious Venus type, places her in a long series of variants from a lost original by Scopas. This argument is worthy of consideration, at least, and that the "Venus of Melos" is a "Victory," rather than an "Aphrodite," appears credible. Especially does this seem true if one recalls the silver bronze statue in the museum of Brescia, also a "Victory," which embodies an ineffable virginal charm, and appears to be a younger sister of the "Venus of Melos."

The figure at Brescia is the chief treasure of a small collection of objects of art and archeology, salvaged from the ruins of a temple dedicated to the emperor Vespasian (69–79), who established at this point of Italy a Roman colony on lands taken from a Celtic tribe.

It is regrettable that these statues capable of awakening fervent emotion should not have been the only ones to mark the end of Hellenic sculpture. Yet, they, in their small number, are able to compensate the lover of art for the many decadent and vicious products of their times; while, beyond all doubt, they themselves stood on a level with the masterpieces of the 5th and 4th centuries.

Transition to Rome. This hybrid art, properly called Hellenistic, with its excellences and its great defects, gradually transferred its seat in the Greek world to the single city of Rome, after Corinth had been seized by the consul Mummius, and Greece politically had ceased to be (146 B. C.).

When established in Italy, the Greek art came into contact with the Etruscan, in which Phœnician influences were blended, especially in all that concerns the technique of bronze. In this metal the native artists executed their public statues, such as the dignified "Orator" (preserved in Florence) draped in mantle and tunic, with his right hand and arm raised in exhortation. For family tombs, they employed stone, often placing on the covers of the sarcophagi or coffins figures resting on one elbow, as if they were reclining at a banquet. They also produced in terra cotta much sculpture in relief and in the round, destined to embellish the pediments and the roofs of temples which they built for the Romans, such as that of Jupiter Capitolinus, widely familiar through illustration.

Sculpture under Augustus. As in architecture the Roman style grew out of the union of the Greek with the Etruscan, so from these same elements Roman sculpture developed. The latter, under Augustus (27 B. C.–14 A. D.), became an official art, the object of which, like that of the Egyptian graving, was to glorify the emperor. Consequent upon the utter destruction of Carthage and the fall of Corinth, both of which events occurred at the middle of the 2d century B. C., Rome became the crucible in which all peoples were fused together. The majority of foreigners in the capital were slaves, with among them many literary men and artists, who served their masters devotedly in the hope that some exceptionally successful effort on their part might give them freedom. At the same time, the Roman poets were glorifying, in measures founded upon Greek prosody, the one-man power that had replaced the republican form of government. Therefore, the *Æneid* of Virgil, the *Carmen Sæculare* of Horace, and the Vatican (*Prima Porta*) statue of Augustus in armor intone the same hymn of praise.

This last work betrays what might be termed a *petrified* Greek manner. The figure is of heavy proportions and the pose labored and awkward, if compared with that of Greek masterpieces. Further, the narrative ornament of the armor, although beautifully carved, dulls the effect of the *ensemble* and would have been rejected from the design by Hellenic sensitiveness. Yet the statue is dignified and imposing. It must have afforded an intimate satisfaction to the people for whom it was a symbol. The gesture of the uplifted arm would seem to accompany the lines of the *Æneid*:

> "Remember, O Roman, to rule the nations with thy power! These shall be thine arts: to create the permanent habit of peace, to spare the subdued and to defeat the haughty."

The same spirit appears in the Altar of Peace, erected by Augustus, which is interesting to the art student because of its processions in relief treated in different planes, as are those of the Panathenaic frieze of the Parthenon.

The Arch of Titus. Both artistically and historically however, the sculptured reliefs of the Altar of Peace yield to those of the Arch of Titus, finished in the closing years of the 1st Christian century. In these the imperialistic propaganda is seen at its climax. The sculptures occur in two opposite panels beneath the vault of the archway, and the interest of each composition is strongly centralized with a view to political and moral effect. No spiritual triumph is here chosen for portrayal like the victory of a Greek over a bestial centaur. In its stead there are war, pillage, and desecration. In one panel the emperor stands in his quadriga, attended by Victory. In the other the Romans are bearing away from the altar of the Temple of Jerusalem the sacred seven-branched candlestick. However, from the point of view of technique, these panels contain admirable features. The relief is so treated as to give an impression of space and air. The pulse of the observer is quickened by the implied resistless advance of the horses. But the artist failed in perspective, since, in the one panel, the four aligned animals move at right angles to the emperor's chariot, and in the other composition the soldiers are directed toward the side, rather than to the entrance, of the arch.

The Column of Trajan. In common with these reliefs, the spiral, sculptured bands of the Column of Trajan (98–117 A. D.) offer enlightenment in history, but of a nature quite different from the species presented in the Arch of Titus. Winding like a ribbon about the column (the height of which is 140 feet), scenes illustrating the Roman conquest of the Danubian regions show in detail the landscape, the races of men, the military and domestic customs there existent. In these subjects—and quite correctly—natural proportions have been destroyed and everything, except the figures, reduced to the minimum in size and detail. This treatment, which has been named the "continuous style" and is adapted especially to bronze, has been frequently used in modern times, and most successfully, perhaps, in the Colonne Vendôme, Paris.

Roman Portrait Sculpture. In another branch of sculpture, that of portraits—figures and busts—the Roman artists gained distinction. There remains today a varied series of imperial likenesses, reaching from Julius Cæsar to Constantine and including many of the empresses and favorites, which corroborates written history. No visitor to the galleries of Rome can possibly forget the typical Latin (brachycephalic) head of Augustus, the lustful face of Agrippina the younger, and the swinelike mask of Caracalla.

Symbolic Sculpture. From the works of the decadent Empire of the West, sculpture passed into another phase, the symbolic, consequent upon the new ideals of Christianity, the barbaric invasions of Italy, and the Oriental influences emanating from Constantinople.

In the 8th century, figure sculpture in the round virtually ceased to be practiced, through the decree of the emperor of the East, which forbade the use of images in worship and commanded the destruction of those then adapted to such purposes. This decision was to a greater or less degree opposed by successive popes, but marble and bronze were largely discarded as artistic materials. For these, ivory was substituted, in which plant forms, birds, and monograms, all of symbolic meaning, were carved in relief and most delicately upon sheets or plates of slight thickness. The ivory was afterward applied to a foundation of wood, in order to form chests, chairs, and missal covers, examples of which are still extant in Byzantine centers like Ravenna.

As a result of the controversy between the Eastern and Western churches, thousands of Byzantine craftsmen passed into Italy, where they worked side by side with crude artisans of untamed spirit, as is evident in the Basilica of Saint Mark, Venice. There capitals of almost melon shape with finely undercut netlike ornament may be contrasted with others which issued from the hands of clumsy semibarbarians. But it is emphatically in the cathedrals of Parma and Modena and in Saint Michael's, Pavia, that Italian Romanesque sculpture, 5th to 11th century, shows itself to be reduced to a system of animal symbolism.

Sculpture Tributary to Architecture. This decline and transformation of sculpture, verging even upon the semblance of death, was but a season, like winter in the natural world, justifying Robert Browning's aphorism, "Decay is richer life." When the year 1000 had passed without bringing the long announced destruction of the world, Christendom

wakened from its lethargy, and churches multiplied throughout western Europe. Architecture, which, as necessary to human existence and to worship, had never ceased its activity, called sculpture to its service. The latter art became, as it were, the qualifying adjective of the former.

In France, where the questions of structure were most deeply studied, a long line of heavily draped, bearded figures, wearing crowns, were deployed across the façades of cathedrals. Again, other figures, with heads projected against great disks which proclaimed them to be saints, were aligned on the sides of monastic cloisters. Architecturally, they served to emphasize the horizontals of the building on which they were seen and so gave the appearance of solidity to the design.

Similar figures, always accompanied by special attributes, such as the picturesque miter and staff of the bishop, followed the moldings (archivolts) of the faces of the arches. These moldings were placed one behind the other (recessed), sometimes to the number of seven, and the arch head itself rested on a great pier, the face of which was thrown back at the same angle and was carved on its upper half with closely set figures. Those of the moldings stood within delicately chiseled shrines, with the whole scheme of ornament obedient to the structural lines; so that, while the first members of the series were upright at the springing of the arch, they inclined inward as the curve contracted, until the upper figures were rendered at an improbable inclination. In the 12th and 13th centuries, sculpture was truly the handmaiden of architecture and virtually without a separate existence. Its function was not purely æsthetic. Through its agency the cathedral front was a pictorial Bible, an open encyclopedia before the age of printing. There were offered the stories of the Creation and the Redemption, the genealogy of the Virgin, the procession of the seasons, the signs of the Zodiac, and, most frequently, above the principal portal, the terrors of the Last Judgment. Sculpture then concurred with the pulpit and the liturgical drama to instruct and direct the illiterate.

Influence of Medieval French Sculpture. In the Latin countries the art struggled to resume its independent position, the attainment of which the student is pleased to follow from the blunted contours of a Romanesque relief to a statue in the round. And, while the first successes were unavoidably obtained by Italians, the Abbey of Saint Trophime, Arles, and the cathedrals of Paris and of Chartres contain most valuable examples of progression.

In the first-named edifice, the figures of ecclesiastics show a flat, blocklike, angular modeling, a Byzantine elaboration of details, a lack of suggestion of skeleton or flesh beneath the drapery, an absolute *stoniness* of rendering. At Chartres, another body of sculptors, as if they had discarded a formula of production, recorded their perceptions of persons and things in a rounder, softer, more detailed modeling of bare forearms, hands, and faces, and in a simpler, more truthful presentation of fabrics and folds. Still more vitality appears in the beautifully calculated statue of the Virgin in the porch of the northern transept of Notre Dame, Paris. Although yet, beyond denial, an adjunct of architecture, this statue marks the renewed independence of sculpture. The figure is no longer perfectly upright, with shoulders level to assure the vertical fall of the drapery. Rather, one knee is slightly bent, one shoulder lowered, and the cloak so disposed as to give on one side a swelling curve, which is finely emphasized by the severity of the architectural support made very assertive on the other. In consonance with the subject, the face of this statue, framed in crown and wimple, expresses a sympathy, a sweetness, and a fortitude that Hellenic sculptors could not give and that would not have been fitting to the countenances of their divinities.

As a whole, the architectural sculpture of medieval France surpassed that of Germany and Spain, and in many cases the first-named country lent its workmen, as well as its inspiration, to its neighbors of the east and of the southwest. But, in the study of the work of the 11th and 12th centuries, too much stress should not be laid upon the imitation of French work by the Germans, since both peoples then derived much of their art from the Neo-Greeks or Byzantines. Later, since the Germans, satisfied with their fine Romanesque, did not themselves develop the Gothic, they accepted from the French, not alone structural principles, but also the ornament which so well harmonized with them. To a certain degree, the same statement is true of Spain. Into that country French influence spread through immigration and through the transference of bodies of Burgundian monks (Cluniacs and Cistercians); so that Spanish Romanesque, as well as Spanish Gothic, reflects in its accompanying sculpture the skill in composition, the dramatic power, and the poetry possessed by the artist masons of France.

Of the Romanesque, the finest Spanish example exists in the portals of the cathedral of Santiago (Saint James) de Compostella (Gallicia), signed by a certain Master Matthew in 1183 and recalling the porches of Chartres and of Vezelay. The subjects portrayed in this great work are the 4 evangelists, the 24 elders of the Revelation, the Tree of Jesse (genealogy of the Christ), scenes from the life of the Savior, and the Last Judgment, all of which were later treated by Gothic and Renaissance sculptors with more delicate but not more expressive chisels. Among Spanish works dating from the 13th century, several portals of the cathedrals of Burgos and Leon show the purest French influence of the period. In the second of the two buildings especially, the figures stand clearly detached one from another, with a considerable intervening space. The anatomy is felt beneath the churchly vestments, but with no suggestion of the swollen abdomen or leg muscles so prominent in German work of the same age, as in the choir of Saint George, Bamberg, Westphalia.

Medieval English Sculpture. Of the architectural sculpture of medieval England we possess less extended and detailed knowledge. Originally less important than in France, partly because of the relatively secluded situation of the monastery-cathedral, it suffered in the 16th century from the bitter dissensions between the historic and the reformed Church and, in the 17th, from the fury of the Puritans. Nevertheless, in spite of wanton destruction, much beautiful material remains at Canterbury, Lincoln, Exeter, and Wells, and at other points of the island. These examples illustrate the exterior use of statues made by the English, as differing from the custom prevailing on the continent, where recessed portals were usual. On the façades just mentioned, the figures are ranged in rows, but not as in the French "gallery of kings" to emphasize horizontal effect. Instead, each is set beneath a hood and in a niche or tabernacle contained between two projecting perpendiculars either rounded or angular. Then, since in a porch composition the rows of figures are superposed, sometimes to the height of four stories, the perpendiculars are continued from base to cornice, and the whole assumes the character of a magnified reredos, or altar back, erected in the open air.

Sculpture Independent in Italy. Thus, to the north of the Alps, sculpture continued to be an accessory art until the end of the first quarter of the 16th century. But, early liberating itself from architecture in Italy, it there progressed continuously, until, while the Valois kings were reigning in France and the Tudor sovereigns in England, it attained spiritual and emotional qualities which it had never before evidenced.

The anatomy of the human figure attracted the early Italians as the inheritors of the classical tradition, but it was not until the end of the 14th century that this branch of instruction was given forth from the University of Bologna. With the revival of

pagan learning, the presentation of the nude became more and more frequent, until the last years of the 15th century, when, through the influence of the Dominican, Savonarola, it received a temporary check, affecting painting only.

Throughout the Renaissance the sculptural nude alternated with draped figures, which were appropriate to certain biblical and historical subjects. Yet, early in the 15th century, in the work of the Sienese, Jacopo della Quercia (1371–1438), the figures of "Adam and Eve" in the nude are much more agreeable to the modern eye than is the same sculptor's archaic Madonna swathed tightly in the twisting folds of her mantle.

Donatello's "David." The next stage of advancement is apparent in the "David" of the Florentine Donatello (1386–1466), the sculptor whose great influence upon modern art has been second only to that of Michelangelo himself. In this bronze statue, the pose is Praxitelean Greek, with the head of Goliath supplying the place of the tree trunk in the "Hermes," the "Faun," and other antique works. But above the hips the figure ceases to be stylistic. The torso, the attenuated arms, and the face are those of a scantily nourished Tuscan peasant; the straw hat and its garland of vine leaves adding the last realistic detail. As a composition, the "David" is disappointing through its lack of unity. On the contrary, it incarnates the working principle of Donatello: "One should labor always with the antique in mind and the living model before the eye." And further, between the beginning of the 6th and the middle of the 15th century, the "David" was the first statue to be executed wholly in the round and free of architectural setting.

Just as painting developed in Italy, so sculpture advanced in a straight, progressive path for more than 200 years—from Niccola Pisano (1206?–78) until the death of Verrocchio (1435–88). Its course—which may be compared to that of an impetuous river ending in a delta—was then deflected and weakened by Michelangelo (1475–1564), whose genius in this one art was immeasurably superior to that of all other Italians of the Renaissance.

Michelangelo. Rising from the virile school of Donatello, Michelangelo first revealed his own genius in the "Pietà," or group representing the Virgin supporting on her knees the dead Christ, which he finished during his first residence in Rome (1496–1501). Open to criticism in the disproportionate size of the two figures and the archaic complication of drapery, this work is yet pathetic and powerful. Further, the rendering of the cadaver evidences accurate, impassioned study, differing from the Greek in being founded upon dissection rather than upon observation.

But this group, while profoundly emotional, is self-explanatory and strictly traditional. The latter comment applies also to the following major work of the young sculptor, the "David," which is a freer, more modern interpretation of the adolescent male than the still rising Italian art had yet been able to produce. To the same period is to be attributed the lost cartoon of the "Battle of Cascina," or "Bathers," which was a purely artistic study of figures in violent action, absolutely statuesque in treatment.

Thus far had Michelangelo been constructive in his art. As he approached maturity, his genius turned aside to enter a new path wherein no sculptor could follow him without loss of mental poise. Struggling with heavy personal griefs, but titanic in power, he expressed himself in the "Moses," the "Slaves," and the "Thinker," and in the "Day" and the "Night."

"*Moses*".—The first of these statues, which has been alternately ridiculed and ignorantly praised, is not wholly an enigma. As a man of his century, Michelangelo confused classic and Semitic archeology. For the head of the supreme Jewish lawgiver he chose a modified Phidian Zeus, emphasizing the lionlike frontal locks and adding the beard of a Roman river god. The lower drapery of the figure he imitated from the statues of barbarian kings on the Arch of Constantine; while the torso, arms, and hands have immortalized those of some humble man of toil who served as a living model. Such is the genesis of the "Moses," from the point of view of its physical proportions. As to its informing spirit, it sprang from the godlike, travailing brain of Michelangelo in an effort which could not be repeated or imitated by artists of weaker imagination.

"*Slaves*" *and* "*Thinker*".—The element of grotesqueness, undeniably present in the "Moses," is entirely eliminated in the "Slaves" and the "Thinker." In rendering the former figures, Michelangelo forgot all save to make them artistically expressive. Swerving aside the torso, he drew the legs together and bent them forward in order to produce deep shadow and also an effect of struggle quite unwarranted by the slight band which either girdles the body or binds the arms behind it. The "Slaves" mark a new period in the history of sculpture, in which some psychic process is implied in the statue presented. The men of the Renaissance had opened for their own higher necessities new worlds of matter and of thought. To these men the concepts of Michelangelo's maturity made their appeal.

The anguish of spirit so acute and paroxysmal in the "Slaves" relaxes into an absorbing introspection in the "Thinker" of the Tomb of the Medici (new sacristy of Saint Lawrence, Florence), executed by Michelangelo between the years 1523 and 1531. In this statue the meaning of the attitude is instantly clear. The extremities are contracted and drawn inward; the face, lest, if fully visible, it should fail in expression, is partially thrown into shadow by the advanced visor and cast downward, with the index finger of the right hand placed on the lips. Less subtle than the "Slaves," the "Thinker" has received more ample admiration, and has been the object of much resonant oratory. But the presence indwelling in the statue chides idle words with authority and invokes silence.

"*Day*" *and* "*Night*".—The opposite wall of the mortuary chapel serves as a background for the remaining tomb, on the entablature of which are sculptured in reclining poses the figures of "Day" and "Night." These accompany the statue of the "Warrior," symbol of the active life, as "Dawn" and "Twilight" amplify the significance of the "Thinker." The feminine figure, "Night," like all others (if youthful) of its sex created by the same master, can be passed over in silence. The "Day," on the contrary, is rightly criticized by the most uninstructed observer for its faults in anatomy. Together with other details of the entire composition, it was never finished, but its incompleteness fails to account for its departure from all that is normal. Its trunk is so swollen as to dwarf the head and the extremities and to defy the laws of nature. That this challenge was made voluntarily must be admitted, for Michelangelo was the first draftsman and the first artistic anatomist of his time. Therefore, his irrepressible desire to set forth the intense, individual, necessarily secret anguish incident to human life must have overpowered his sculptural vision. It has been suggested that he expanded the seat of the vital organs in order to express a grief too great to be borne by normal man.

Michelangelo's affinities with the Greek poets and philosophers were strong, in common with those of many other Italians of his time, but they lay more deeply and obscurely in his being. His purpose, never for a moment abandoned, was to deprive art of its power to produce sensuous pleasure. As a consequence, he but lightly esteemed painting. He worshiped form as conveying an idea denuded of everything foreign to its nature. By infinite variations of line he expressed differences in thought which make his compositions comparable to the throngs of a populous city. Logically, therefore, he was a solitary man seeking only to incarnate the

crowding concepts of his brain. His energies and his time thus absorbed, he developed no pupils. Nor, had he sought these, could he have formed them, since receptivity for what he offered would have been lacking in those who might have attempted to learn from him.

Influence of Michelangelo. Upon all artists of Latin race who were his immediate successors, Michelangelo's influence was nothing short of baleful. The most talented of them, such as John of Bologna (1530–1608), comprehending at least the former's mastery of the human figure, produced admirable studies of pose and poise, mere physical expressions of the joy of living, like the "Flying Mercury" and the "Rape of the Sabines" (both preserved in Florence). But none of them was moved to interpret a thought, an emotion, or a state of being, purely by line or by the presentment of a specialized muscular condition. In the 17th century, to overemphasize and overelaborate became the chief purpose of Italian sculptors, among whom Bernini holds the first place.

Bernini. He is remembered, above all, for his group of "Apollo and Daphne" in the Villa Nazionale (Borghese) Rome. The sculptor has here treated with great delicacy the myth of the nymph pursued by the god and of her transformation into the laurel tree; making to the impossible occurrence the slightest allusion that is compatible with the universally known tale. And further, his group is clearly a study of line based upon late Hellenic treatment, rather than upon the work of his epoch-making predecessor. It is regrettable that the taste shown by Bernini in the just mentioned group was not one of his stable qualities. In his sacred subjects he was wont to represent, in the heavy substance of marble, clouds and draperies symbolizing the vaporous dwelling places and diaphanous garments of angels. Such inanities multiplied rapidly in Italian sculpture until at the middle of the 18th century it had lost, not only its grandeur, but even its serious qualities.

Renaissance Sculpture in France. In the other continental countries the development of sculpture during the Renaissance was influenced by Italy to a greater or less degree. In France the beautiful Gothic architectural subsidiary figures continued to be created until far into the 16th century, culminating in the work of Ligier Richier (1506–67), whose last piece, a free standing "Entombment" (Church of Saint Stephen, Saint Mihiel, near Verdun), derives almost equally from the French and from the Italian schools, adding a German element in the faces of the personages represented.

Jean Goujon. This truly racial style died, it may be said, by strangulation, and under the so-called Italianate a sculptor of genius appeared in Jean Goujon (about 1515–66), whose still existent works maintain today an almost popular admiration. As court sculptor to Henry II, he collaborated with the celebrated architect, Pierre Lescot, in transforming the feudal castle of Charles V (1364–80) into the palace of the Louvre. Under this commission he executed the four superb "Caryatides" of the tribune in the Hall of the Renaissance, which many critics have regarded as Hellenic in spirit, although in Goujon's time the treasures of the Acropolis at Athens were unknown to the French. It is certain that his knowledge of such figures was derived from the Roman architect Vitruvius, who, in his great treatise, devotes an entire chapter to their proper treatment. But to the antique theory Goujon, in practice, added a flexibility, a fluidity of line, characteristic of his own genius.

Germain Pilon. Among the artists of the French Renaissance, Goujon is numbered with the strict classicists, while his gifted contemporary, Germain Pilon, is reckoned as a descendant of the naturalistic native carvers (*imagiers*). True to his artistic ancestry, the latter sculptor preferred the individual to the type, and excelled in portrait statues. These he executed in bronze for monumental tombs, and, while giving the faces striking resemblance to their originals, in disobedience to the spirit of antique art, he rendered the draperies with a stylistic elegance gained from the Italian masters of his own period. To this division of his work belongs the imposing, kneeling figure of the persecutor of the Huguenots, the "Cardinal René de Birague," which is now in the Louvre, together with his beautiful mortuary piece, known as the "Three Christian Graces" (Virtues). Recalling vividly the Greco-Roman statue, at Naples, called "The Farnese Flora," Pilon's "Graces" are lighter of limb and more suggestive of agile motion. Their draperies are rhythmically disposed, and a contrast to their marble bodies is offered by the bronze casket, balanced on their heads, which was destined to receive the heart of Henry II of France and that of his queen, Catherine de' Medici.

Judged by the characteristics of his work, Pilon is associated in the mind of the student with the architect Philibert Delorme, designer of the palace of the Tuileries, which was destroyed by the Paris Communists of 1871. Consequently, in the third quarter of the 16th century there were two highly distinguished Frenchmen who, had they lived three hundred years later, would have ranged themselves on the side of the Romanticists in the artistic-literary controversy which in 1830 began to divide Paris. Both refused to accept the brilliant generalities of external form which then represented the classic. The architect anticipated modern structure and reached out toward new combinations of materials. The sculptor recognized the claims of individuality as superior to a formula by which an insipid, monotonous beauty, falsely called antique, could be given to all statues.

The Versailles Sculptures. Within the following century, this significant, incipient romanticism was blighted for a season by the political development of France. Art became, as in Imperial Rome, a governmental instrument, the principal use of which was to glorify the ruler. The absolute monarchy expressed itself through all æsthetic mediums, especially during the fifteen years (1670–85) when Mansart, Le Nôtre, and Lebrun were concentrating their efforts at Versailles. The last-named of the three, endowed with surprising versatility, designed much of the ornamental sculpture there required, but the relief of the "Bathing Nymphs" of François Girardon (1628–1715) shows the unmistakable touch of an artist who thought in terms of solids. In this work the gradations of relief, marking the various figures, the rocks, water, and aquatic plants, indicate the study of the Italian *quattrocento*; while the drawing, developed beyond that period, is without exaggeration and has the French realism. The scene is a possible one, yet it is abundantly provided with poetry emanating from sheer line.

Another sculptor of the Versailles group was Antoine Coysevox, the mention of whose attainments cannot be omitted from any history of his art. Born in Lyon, he possessed the vivacity associated with the natives of that city of France, and by his assertive originality he forms a link in the chain of those self-reliant exponents of his art, who have rejected the binding traditions of the French school. He worked in both marble and bronze, modeling portraits in the latter medium with the Florentine spareness suggestive of "plain living and high thinking."

This spirit of analysis and penetration rarely found utterance under the reign of Louis XIV. It was the natural language of the talent of Coysevox, but, as an artist favored at Versailles, he expressed himself admirably in decorative sculpture, as is witnessed by the winged horses mounted by Fame and Mercury, which are now in the gardens of the Tuileries. The same spacious open area also contains the widely known "Horse Tamers" ("*Les Chevaux de Marly*") of Guillaume Coustou (1677-1746), pupil of the previously mentioned sculptor.

These are two spirited groups, each composed of a man and a horse, placed facing each other at the entrance from the Place de la Concorde to the Avenue of the Champs Elysées. The nude youths are so posed that one displays a superbly modeled back with outstretched arms, while the other presents a straining profile, as he grasps the cords of the bit in the mouth of his rearing animal, which is evidently of Spanish breed.

Pierre Puget. In contrast to this official art, polished as the elaborated, balanced prose of the writers of the "great century," the gifted sculptor, Pierre Puget (1622–94), stands alone. Born of humble parentage at Marseille, he became a wood carver of figureheads, and later worked at the actual construction of ships. He appears to have been equally talented in the three arts of form, but his modern reputation rests upon his sculpture, to which a room, bearing his name (*Salle Puget*), is devoted in the museum of the Louvre. Strictly classical in subject, the statues in this collection are rendered in the style of Michelangelo, but with greater exaggeration. Into all his figures Puget infused a certain boastful quality peculiar to the populace of Marseille, and his models would seem to have been chosen from among the sailors frequenting the docks of that city.

True to that type is his "Gallic Hercules" and, above all, his "Milo of Crotona," which represents, according to the legend, an aged athlete of Magna Græcia trying, with his ebbing strength, to rend asunder the trunk of a tree. Having inserted his hand into a yawning crevice, the wood has suddenly closed upon him, and all efforts to free himself prove unavailing. Then, alone in the forest, he is attacked and dismembered by beasts of prey. Skillfully condensing the story into a single attitude, Puget has thrown the head and torso of the man into the pose of one of the "Slaves" of Michelangelo; while the tree trunk and the lion lacerating the thigh of his victim afford necessary support, without confusing the composition. This group, still often reproduced in statuettes, is regarded as the masterpiece of perhaps the greatest French sculptor of his time, who was a realist and did not disdain to flavor his art with the crudities of his region and of his original station in life.

The careers of the three preceding sculptors being ended, their art was continued worthily, to some degree, by their immediate pupils, who resembled them, as in painting Boucher resembled Lebrun. But, as a consequence of social conditions and in common with the other arts, French sculpture declined, until the great Revolution (1789–1800) fanned it into new flame. In truth, the 19th century witnessed in all countries a new departure in the fine arts. But, before considering this general movement, we have briefly to follow the progress of sculpture in Spain, Germany, and the Netherlands, from the end of the middle ages to the first effort of the common people toward "liberty, equality, and fraternity."

Spanish Renaissance Sculpture. As might be inferred, the Spanish sculpture of the Renaissance was submitted to many influences. Elements of the Moorish (*mudejar*) ornament were still strong in the 15th century, when there also developed the plateresque (*plata*, silver) style, resembling metal smithing in precious substances and finely adapted to architecture. Through political and commercial relations, Flemish, Dutch, and German art became most highly esteemed, and much of the fine wood carving of altarpieces, screens, and stalls was executed by foreigners from the North; while marble and alabaster were freely used by the Italians—principally Florentines and Milanese—who worked on altarpieces and tombs at Valencia, Saragossa, Granada, and Seville.

Among the native sculptors, the greatest were those of northern origin, under the primacy of the school of Burgos, which gave three masters to the specialized art of the altarpiece (*retablo*) and the tomb of the sovereign or grandee. The earliest of the three was Gil de Siloa, whose work (1489–99) in the Carthusian monastery at Miraflores (near Burgos) is that of an artist occupying the border line between the Gothic and the Renaissance. An almost contemporary work by Felipe de Borgoña is the very important altar screen in the Cathedral of Burgos, which includes several hundred figures, arranged with perfect clearness; one of the panels—the "Crucifixion"—constituting a superb emotional piece.

The third sculptor, regarded as the greatest of the Spanish Renaissance, Alonso Berruguete (1480–1561), studied at Rome under Michelangelo, and, on his return to Spain, worked in the Italian style, although emphasizing and exaggerating the characteristics of his master. His marble tombs gave him a high rank among his contemporaries, but modern opinion gives preference to his wood carving in the choir stalls of the Cathedral of Toledo.

The influence of Berruguete, spreading from Castile into Aragon, dominated the Iberian peninsula before the end of the 16th century. Late in the 17th, Spanish sculpture was oppressed by the overelaboration introduced from Italy, which, long raging like a virulent pestilence, subsided, to be succeeded by the mannerisms of affected simplicity then prevailing in the art of France.

The German Renaissance. In Germany the liberation of sculpture from architecture was slowly accomplished, but it was attended with many happy intermediate results. Such, for example, is the Tabernacle or Sacrament-House of Adam Krafft (about 1455–1507), in the Church of Saint Lawrence, Nuremberg. If judged too lightly, the classification of this work under the period of the Renaissance would seem to be an error. Yet it came into being during the early youth of Michelangelo, and it must be remembered that the northern development was much slower, the temperament less sanguine, than in the Tuscan and Lombard regions.

Nor was the sculpture of the German Renaissance unmolested in its growth. It was first blighted by the Reformation and then thrown into premature decadence by the Thirty Years' war (1618–48), which began as a religious struggle among the peasants of Bohemia. But during a brief period of bloom the schools of Franconia and of Swabia were fruitful in good works. The former, besides Adam Krafft, produced Veit Stoss (1440?–1533) the wood carver who delighted to represent the Tree of Jesse, as appropriate to the Altar of Mary (Cathedral of Cracow), or to frame the Virgin with the Angel of the Annunciation in a wreath of roses (Church of Saint Lawrence, Nuremberg). And if by the emphasis placed upon these details he, at times, seems to retire to the class of expert craftsmen, just as clearly he elevates himself to the title of sculptor by his treatment of the figure and the face.

Somewhat younger than Stoss, and of much broader artistic vision, was the metal smith, Peter Vischer (1455–1529), whose masterpiece, or that of his school, is the statue of the Celtic King Arthur. This work stands in the Franciscan church at Innsbruck in the Tyrol, and is one of 28 bronze statues surrounding the sarcophagus (vacant) of the Habsburg emperor of Germany, Maximilian, who died in 1519. Of all these figures, "King Arthur" is beyond comparison the finest, and, in technique, it ranks as one of the best ever produced in its substance. In pose, however, it is ungraceful, and, in contrast to the lifelike quality of the magnificent head and torso, the legs suggest museum pieces of armor.

Later in the 16th century the school of Swabia produced masters working in both metal and wood, who showed strong affinities with the earlier Burgundian sculptors of France. Such resemblances are especially evident in the choir stalls of the Cathedral of Ulm and in the splendid oaken busts of the Abbey of Weingarten, one of which presents a workman whose features and expression are those of many northern French peasants of the present day.

The Baroque Style. From this robustness of style and an informing love of nature manifested in the introduction of realistic specimens of fauna and flora, German sculpture declined, to experience, a century later, a period of revived activity. Unhappily, the new movement cannot be described as an awakening. It was rather a nightmare which, sweeping over Europe, destroyed the balance of the artistic mind and gave birth to the malformed, abnormal Baroque. While everywhere pompous and abounding in ill-adapted ornament, this style assumed in Germany a violence which is most displeasing when displayed in the resistant substances of stone and metal. Therefore, the Baroque disfigured the public monuments of the time and blinded to its glaring faults highly gifted artists, such as Andreas Schlüter, sculptor of the monument at Berlin to the "great elector" of Brandenburg (ruler of the nucleus of territory which in 1701 became the kingdom of Prussia).

This unhappy influence exhausted itself after the middle of the 18th century. Its overemphasis was succeeded by a style lacking in masculine qualities, dominating all the arts and derived from France, the country in which, after a few decades, was destined to begin the third great period of sculpture in all history.

Canova and Thorvaldsen. The modern point of departure was not, however, fixed by Frenchmen. The honor of making this definite step belongs almost equally to two men of widely differing nationality. The elder of these, Antonio Canova, born in 1757, was a Northern Italian descended from several generations of fine marble cutters. The younger, of even more humble parentage, was the Dane, Bertel (Albert) Thorvaldsen, born in 1770, and in his boyhood a carver of figureheads in Copenhagen. The former, reared in surroundings favorable to his development, possessed untiring diligence and an unusual capacity for labor. He applied himself persistently to the study of anatomy, which he regarded as "the secret" of his art, as also to that of pose and expression, as they were demonstrated in the theaters which he constantly frequented. At length, formed as a sculptor largely by his absolute reliance upon nature, the young man came to realize the absurdities offered in the work of his older contemporaries and to emphasize in his own a long neglected simplicity. The reinstatement of that quality so accentuated by the 5th and the 4th pre-Christian century Greek and the 15th century Italian masters is now recognized as Canova's contribution to modern sculpture. By a change of taste resulting from political events, as well as from a satiated, cloyed artistic palate, not only Italy, but all cultured Europe, accepted his point of view.

Throughout the range of his works, mythological, heroic, and sepulchral, Canova has best expressed himself in the chaste figure of Psyche, who symbolizes the immaterial part of man. Praxitelean in type and pose, she bends her head over a butterfly, which she balances on her left hand, while she restrains it with her right by pressing together its wings. Many cognate figures he produced either singly or in groups of two or three, as also statues of heroes in combat with animals. By means of his tombs for the popes Clement XIII and XIV and the archduchess Maria Christina of Austria at Vienna and by his portrait bust of Napoleon, Canova widened his reputation and amassed a considerable fortune, the whole of which he expended in gracious and unusual acts of charity.

As one who returned to the stable principles of his art and, at the same time, pointed a new and safe direction for its further development, his name will never be forgotten. But seen through the perspective of a century the greatest of his works appear artificial. The same censure can be applied to those of Thorvaldsen, whose career, in all that concerns honors and recognition, closely paralleled that of Canova. But for the Dane the spirit of the classic was an acquisition, not a heritage; so that his renderings of the Greek pose and balance are often faulty.

On the contrary, his touch is of the lightest and his humor sparkling in his reliefs which relate the pranks of Cupid. His chief monumental work resides in the dignified but lifeless models for a frieze symbolically named the "Triumph of Alexander," which was destined to adorn a hall in the Quirinal palace, on the occasion of a visit to Rome purposed by Napoleon in 1812. He gave also the design for the memorial lion which was afterward cut in the living rock at Lucerne, Switzerland. Finally, he restored, for the king of Bavaria, the Hellenic marbles which were removed from the island of Ægina in 1811, and he erected them in the Glyptothek, at Munich, in a rigid arrangement which has since been greatly improved.

French Realism; Houdon. Thus, through the influence of Canova and Thorvaldsen, sculpture in all Europe had become classical in both subject and treatment. It remained for the French to render it vital and emotional. And it is but just to state that in France the reversion from the Baroque to realism was begun by a sculptor even older than Canova, although the new spirit is evidenced in but one phase of his art.

To illustrate the awakening of marble to life beneath a metal tool, a single example from the works of Jean Antoine Houdon (1741?–1828) will suffice. This is the seated statue of the aged Voltaire (now in the *foyer* of the *Comédie Française*), whose body beneath a loose robe is felt to be almost a skeleton. The legs from the knees to the ankles and the feet flatly posed on the base suggest the heavy slowness of old age. But the hollow chest appears to stir with life; the personalized hands grasp the chair, as if with feverish effort; while the head, although of marble, if compared with those of passing persons, seems more alive than theirs. The play of the facial muscles, the structure of the hands, are technically of such value as to serve as models in the art schools. But this accuracy is their minor excellence. As a study of the controlling, directing mind they are unique. Irrespective of time or country, Houdon's "Voltaire" is one of the greatest of statues.

François Rude. This power to penetrate a soul and then to render it visible was lost after Houdon, until it reappeared late in the 19th century in Auguste Rodin. In the intermediate time, however, several distinguished French sculptors made advances which can never be ignored in the history of their art. The first of these, François Rude (1784–1855), was a modern Scopas, a sculptor of passion, differing from the Greek in presenting emotion in a more objective, concrete form. His masterpiece, the relief of the southeastern pier of the Napoleonic Arch of Triumph, is known as the "Marseillaise" or the "Departure." Judged by its power of expression, it is a collective monosyllable. Within its pyramidal contour there is no single detail contributory to a secondary effect. In line, in light and shade, it vibrates, like the sentiment of patriotism visualized in the figures of three generations of Frenchmen, who are garbed symbolically as Romans, in order the more clearly to announce them as republicans.

Jules Dalou. The careers of Houdon and Rude added immeasurably to the glory of French sculpture, but the natural gifts of these men were such as to awaken despair rather than the spirit of emulation among their immediate successors. The analyzing power of the one, the communicable passion of the other, could never again be possessed. In compensation, Jules Dalou (1838–1902), as a man of the 19th century, made a contribution to his art such as would have been earlier impossible. At first a decorative sculptor in the style of the Renaissance, he abandoned work of this character, to choose his models among men and women of the people. He represented them in their acts of toil and in their working-day garments. From their bodies strained in useful effort, he derived results

more significant to a truly modern eye than the gestures of a Greek athlete or of a hero of romance. Under his plastic hand the ill-fitting clothing of the humble acquired an intensity of meaning, which of late years has been denied to the mantle and the peplos.

Dalou in his figures of peasants and artisans expressed himself purely as a sculptor, as did the Belgian, Constantin Meunier (1831–1905), in his industrial types, the "Stevedore" and the "Smith." But younger Frenchmen with the chisel and mallet began to plead the cause of the proletariat. And how effective is their language one may judge from the paired figures of the group named "Cold" by Roger Bloch in the gallery of the Luxembourg. For, with a power instantaneous in its action, but denied to the writer and even to the painter who deals with optical illusions, the sculptor, with his three dimensions, presents an entire tragedy, requiring no time for its comprehension. The faces, the quivering outline, the very folds and creases of the garments of the figures, express a despair appalling even to witness.

Auguste Rodin. By works such as this, French sculpture reached what may be called a climax of clear statement. But in the last quarter of the 19th century it suddenly advanced to a new phase developed by the art of Auguste Rodin (1840–1917). At the very beginning of the period just named died the greatest of the pupils of Rude, Jean Baptiste Carpeaux (1827–75), who in sculpture paralleled the naturalist painter Courbet, except that his art was less gross. Scorning the smooth surface treatment and the formulas of modeling employed by the French classicists, he delighted to indicate the reaction of the human body to impressions received through the senses. In this one aspect of his art he prepared the way for the genius whose existence was not recognized by French authority until he himself had passed from life.

But Rodin, poor, unschooled, deprived of guiding artistic counsels, developed in his long period of neglect and from sole observation a system of modeling which, in homely terms, he named the "art of the lump and the hole." Translated into conventional speech, these words explain that a muscle, called into action by the brain, expands so as to alter temporarily the outline of the member in which it is placed; also, that, by the act of rising, it causes depression in the adjacent region of tissue. In thus following nature, Rodin proved that he followed the ancient Greek sculptors, the undulating surfaces of whose marble figures Michelangelo, when blind, craved daily to caress with his groping hand. Pursuing this system, Rodin might often be surprised in his studio, circling his clay model, and bombarding it from a distance, after moments of deep study, with handfuls of wet material which he afterward kneaded into proper form.

However, in the formation of an adequate judgment of this sculptor, his surface treatment is a minor, almost negligible element. He was, above all, subjective, as compared with Houdon, Rude, and Carpeaux. And it was this quality that often forced him to neglect what he estimated as "a toe or a curl," but which, in truth, extended to leaving almost undetached from the marble important members of the frame. Rodin was an impressionist. He was satisfied with his work, if it but shadowed forth the concept of his theme. The workings of his spirit are most clearly revealed in his statue of Balzac, which certain critics regard as stirring and majestic, while it has been denounced by others as grotesque, revolting, almost base. Happily the latter opinion is passing, as the interest in psychology increases. A thinker may see in the statue the wraith, the disembodied spirit of the man who, throughout his life, wrestled with his own genius for expression and with the world for a bare subsistence. The sensual mouth is eloquent of the mortal struggle; the pose is that of a figure moving forward as if hypnotically controlled; the robe is without definite form, wholly concealing the form beneath it and, with a few long spiral folds, guiding the eye of the observer to the tragic countenance above. The genius of Rodin has fixed in this, its own creation, some reflection of the soul of Balzac, as the modern telephone reacts to the individual voice. Such impressionism is phenomenal. Its recurrence is not to be desired in sculpture, whose terms are too definite to be affronted save in exceptional instances. Therefore, in spite of Rodin, the traditional French school has continued for 40 years to develop as a hardy growth, which has nourished to an adult, independent state of existence our North American art.

Early American Sculpture. That Americans in Colonial days liked to carve and whittle is shown by their gravestones, ship figureheads, weathervanes, door portals, ornamentally carved furniture, and other examples of anonymous folk art. Talented as some of these early craftsmen were, they had little opportunity to learn the fine art of formal sculpture, as there was a lack of competent instructors in the country at that time. It was not until the nineteenth century that the United States began to produce sculptors worthy of the name.

The earliest of these pioneers were Horatio Greenough (1805–52), Hiram Powers (1805–73), and Thomas Crawford (1814–57), all of whom studied at Rome. As a result of the academic training they received there, these Americans became creators of many figures dealing with classical or sacred subjects.

Following these strict conservatives came Thomas Ball (1819–1911), who, at the age of 35, transferred his residence to Florence, but still devoted himself to patriotic subjects. He was the author of the equestrian statue of Washington in the Public Gardens, Boston, the "Daniel Webster," in New York, and the "Emancipation Group" in Washington, all of which are well studied and dignified, although not great productions. A contemporary of Ball, and like him of long residence in Italy, was William Wetmore Story (1819–95), a classicist in art, a lawyer by education, and gifted as a writer of prose and verse. His art is scarcely fresher than that of the first American sculptors, and the same reproach of dryness can be extended to the ideal subjects of William Henry Rinehart of Baltimore (1825–74), whose reputation as a monumental sculptor is heightened by his seated statue of the much revered Chief Justice Taney (Annapolis and Baltimore). Finally, within this group may be mentioned Harriet Hosmer (1830–1908), whose graceful talent brought forth the "Will-of-the-Wisp" (Boston Museum of Fine Arts) and its companion piece "Puck."

American Memorial Sculpture. The work of the American classicists, necessarily imitative and therefore weak to some degree, was yet thoroughly refined. These sculptors were followed, as a consequence of the Civil War (1861–65), by a generation of commercial makers of monuments, whose commissions were obtained largely through political favor. But this censure cannot be applied to all the patriotic memorials erected in the decade 1865–75. For even apart from several undeniable masterpieces among those of later production, a number of the earlier ones witness the excellent training, as well as the talent, of their designers.

So to be distinguished are the figures of military and naval heroes by Launt Thompson (1833–94), an Irishman by birth, but American by the artistic education which he received almost equally in the office of a doctor of medicine and the studio of the sculptor Erastus Palmer, at Albany, New York. Another Irishman, Martin Milmore (1844–83), a pupil of Thomas Ball, was the author of the Soldiers' and Sailors' monument, standing on the declivity of Beacon Hill, Boston Common. Admirably proportioned and of a design understood at a first glance, it has served, since its erection in 1874, as a model for most frequent imitation.

Although of slightly earlier birth than either Thompson or Milmore, John Quincy Adams Ward (1830–1910) belonged to the same group of monumental sculptors. Less talented, perhaps, than the Irishmen, this native American, who received no foreign training, attained technical excellence, as is shown in the draped body of his Washington, erected on the steps of the Subtreasury, New York City, and in his treatment of the nude in his "Good Samaritan" (monument commemorative of the discovery of ether as an anesthetic) of the Public Garden, Boston. He was a sculptor of simple lines and quiet gesture. Like his chief instructor, Henry Kirke Brown (1814–86), he must be numbered within the older school, but also like the former, he was among the best progressives of his time.

Augustus Saint-Gaudens. With the Centennial exposition at Philadelphia in 1876 new æsthetic influences reached us. In sculpture, France was discovered to be the leading force, and thereafter American youth gifted for that art turned to her. Then succeeded in our country a generation of sculptors, numbers of whom produced works of great distinction, while one, at least, has taken rank with the geniuses who belong to the world, rather than to any segregated portion of it. This exceptional man was Augustus Saint-Gaudens (1848–1907), who, born in Dublin of French-Irish parentage, was brought to the United States in infancy and at thirteen apprenticed to a cameo cutter. For six years he followed the minor art, throughout the period receiving evening instruction in drawing. At twenty he entered the Ecole des Beaux-Arts, Paris, and submitted for three years to the hard, practical, persistent work there demanded of students. The Franco-Prussian war of 1870-71 was responsible for ending his residence in Paris, and after another three years of study and labor in Rome he returned to New York, there to enter upon his remarkable career. His fame rests principally upon three monumental works, the first of which advanced him to the first place in American sculpture.

This piece is the "Admiral Farragut" of Madison square, New York City: a single statue standing on a high plinth which is itself the center of an exedra or widely extended seat. Rectangular, strongly accented, harmonious, and in effect tranquilizing, the composition by these qualities recalls the Parthenon; while the study of the figure does honor to the French training of the sculptor, and the delicate low reliefs, although of modern line, are founded upon study of 15th century Italian ornament.

For the fine architectural mass of this monument Saint-Gaudens was much indebted to the designer of the exedra, one of the most talented of American architects, the late Stanford White. With the latter, the sculptor also collaborated to the same degree in his great "Lincoln" in Lincoln park, Chicago, which has been too widely and authoritatively discussed to require further comment, as is true of the "Shaw Memorial" under the old elms of Beacon street, Boston. But the monument to General Sherman, Central park, New York City, cannot be so dismissed. In this work the concurrence of the elements—so different one from another—is marvelous. There is a single direction of line. The Victory, the man, and his mount appear to be drawn forward by a Divine, irresistible force, and the mere observer of their action wishes to follow them.

Daniel Chester French. The second place in American sculpture of the third period belongs without question to Daniel Chester French (1850–1931), a New Englander of the strong, original type. His matured art, broad, simple and serene, less profound, less ecstatic than that of Saint-Gaudens, has rendered him the most widely appreciated sculptor of our national school. Like the French master, Rodin, he was largely self-taught, not however because of poverty, but consequent upon the somewhat late manifestation of his talent and the lack of adequate art instruction in even the most cultured portions of the United States a half century ago. For the latter reason, his early works may be passed in silence and left to play an important part in the elevation of children to ideals of patriotism. But the statues and reliefs produced in the fullness of his powers have in them a heroic or a humanitarian quality that removes one who contemplates them from the actual world of contention and bolshevism. Moreover they show the technical education of the sculptor to have been based upon sound principles and unerring taste.

To this class belong the "Gallaudet Group" in Washington, which is a monument to the French doctor who devoted his life to bettering and making happier the existence of deaf-mutes. This work for the many is but a tribute to humane service. For the more thoughtful minority it is a suggestion, both strong and subtle, of psychic control, reflected in the countenance and the pose of the man who is seeking to bring to birth the struggling powers of the undeveloped child. The response equals the appeal. The face of the little girl is inspired with effort and expectation; while her forearm and her hand, the latter clenched to form a letter, reach a climax of expression.

Pathos of a more lyric quality resides in the design of Mr. French for the memorial to Martin Milmore, known as "Death Staying the Hand of the Sculptor." Its characteristics are strength of line, breadth of surface treatment, and, as a resultant, exquisite play of light and shade. It is worthy of the Hellenic art of the 4th century B. C., but, unlike that art, it has no flavor of decadence. Restraint is present in every element of the composition and the faces are left uncertain. That of "the sculptor" is turned in profile; while that of the majestic, yet gracious "Death" is darkened by overhanging drapery, like the head of the "Niobid" of Scopas and the brow of Saint-Gaudens's "Grief."

Frederick MacMonnies. While the two men just discussed are as yet the greatest of American sculptors, several others of native birth and Parisian training are but secondary to their distinction. Such is Frederick MacMonnies (1863–1937), the master of bronze technique, as seen in his figure of "Nathan Hale," in the City Hall park, New York, and the "Bacchante" of the Metropolitan Museum. Masterpieces of pose they both are, and, in this essential of sculpture, the first-named would appear to have no prototype. The youthful patriot is presented as bound, at the arms and ankles, for execution, yet the constrained attitude is aristocratic and even graceful; while the slightly drawn facial muscles offer the most delicate suggestion of torture. The statue is the performance of a virtuoso.

Far less original than the "Nathan Hale," the "Bacchante" is a brilliant study of line, tension, and balance. And, as the former statue has the refinement of certain phases of French art, this exuberant figure recalls the bronzes of Pompeii, but above all the female form in John of Bologna's "Rape of the Sabines." As a display of sculptural knowledge and skill, the "Bacchante" does singular honor to its author, who received no censure from the council that declined to place it in the interior court of the Boston Public Library. In that gravely cloistered atmosphere it would have struck a note of joy too acute and shrill.

George Barnard. In contrast to MacMonnies, American sculpture possesses in George Barnard (1863–1938) an artist akin in spirit to Rodin. This relationship is expressed in the varied treatment of marble aiming at a wide range of effects, as when the more distant members of a figure in relief or portions of a drapery or of some other accessory are left in the rough or even are barely indicated. But, beyond this material resemblance of Barnard to Rodin, a more subtle, intangible likeness exists between the "Count Ugolino" of the French sculptor and "The Two Natures" of the American. In these allied pieces there is the same tragic presentment of triumphant

animal instinct, coupled with what, at a first glance (but only apparently), is a defiance of the artistic laws of balance and symmetry. In another figure of his youthful years, "The Hewer" (1902), Mr. Barnard suggests a Hellenistic combatant, like the "Fighting Persian," who might have been transformed into a modern toiler by the touch of a Dalou. Yet the conception itself has nothing of the reasoned submission to racking labor which, but yesterday, was characteristic of Europe. It breathes out the freedom of wide spaces and of liberty belonging to a new world.

Lorado Taft. In contrast with the militant, struggling figures of Barnard, Lorado Taft (1860–1936), a sculptor of the Middle West, expressed in several groups and single figures and in hopeful, joyous terms the spirit of his native region. Among such groups the one named "The Great Lakes" is the most widely familiar. But the talent of Taft was not restricted to idyllic subjects, as he has shown in his colossal statue of the Indian "Black Hawk."

For his accomplishments as a sculptor, Taft was honored in 1911 with full membership in the National Academy of Design. Furthermore, his standing as both artist and man raised him to the directorship of the transformation into a superb boulevard of the Midway plaisance at Chicago.

A notable contribution toward the fulfillment of this ambitious plan was the erection on the Midway of this sculptor's own monumental "Fountain of Time," with its imposing procession of figures.

Paul Wayland Bartlett. The subjective and the abstract in sculpture give place to the objective in the work of Paul Wayland Bartlett (1865–1925), who has been able with vital force to recreate historical personages in his "Lafayette," his "Columbus," and his "Michelangelo." The equestrian statue of Lafayette stands in the court of the Louvre, Paris, and there is a replica in Hartford, Conn. The original was paid for by the school children of America as a gift to France. The sculptor delayed so long in executing the commission that, as a commentary on his slowness, he placed a plodding bronze turtle near the left hind foot of the horse. His "Columbus" and "Michelangelo" are in the rotunda of the Congressional Library, Washington.

Herbert Adams. In characterization lies also the strength of Herbert Adams (1858–1945), whose best works are portrait busts of women interpreted with intimate yet reverent sympathy. Of these pieces, the most noted and one of the earliest (1890?) is the bust of Miss Pond, who afterward married the sculptor. The portrait, it would seem, was called into being under the control of Houdon and of Rodin, yet the marble has plasticity and tonal effects that are all its own. The bony structure of the neck and face appears to be covered with yielding, elastic flesh, and the eyes illuminated with the life of the spirit.

Cyrus E. Dallin. A strong contrast to these busts and reliefs, with their delicate aroma of tradition, resides in the American Indian types of Cyrus E. Dallin (1861–1944), easily the best among our sculptors who have devoted themselves to the portrayal of the Red race. Born in 1861, in the Far West, he grew to adolescence among the primitive people whose life, both material and psychical, he has reflected in "The Medicine Man," "The Scout," "The Hunter," and, most clearly, perhaps, in the "Appeal to the Great Spirit." In this equestrian statue the rider and the horse show equally the sound technical training received by the artist from Parisian studios. The lithe anatomy of the Indian, the structure of his head, and his manner of bestriding his mount instantly awaken admiration. On the other hand, the location of the work is deplorable. It has been placed before the entrance of the Boston Museum of Fine Arts, although its subject and treatment demand the environment of a spacious park, such as is enjoyed by its companion piece, "The Medicine Man," in Philadelphia.

The Borglums. Devoted also to the delineation of aboriginal American types, but episodical in choice of subject, Solon Borglum (1868–1922), the younger of the two Danish brothers opened to his admirers a romantic life of perilous adventure. His earlier works portray scenes of frenzied movement, such as the "Stampede of Wild Horses"; while his later productions, "Burial on the Plains" and the "Last Roundup," show the sympathy of a Virgil or a Saint Francis with primitive man and Nature.

The elder of these brothers, Gutzon Borglum (1867–1941), through long study in France, learned to drape his thought with impressionism. In common with the French master Rodin, he presents to the student a concept of his subject, rather than a counterfeit of its semblance. Unconscious of imitation, he has, in the opinion of an authoritative critic, approached Rodin's "Burghers of Calais" in his Apostles for the Cathedral of Saint John the Divine, New York. But he is best remembered for his mammoth Mount Rushmore Memorial in South Dakota.

Anna Vaughn Hyatt. In pure animal sculpture, a number of contemporary Americans have excelled, in several instances beginning their careers in this branch of their art, later to develop into students of the human figure. Among such is Anna Vaughn Hyatt (1876–), whose finely studied descending "Panther" and "Butting Goats" were but a technical prelude to her "Joan of Arc," which invites comparison with the equestrian types of the great modern Frenchmen, especially with the statue by Frémiet, best known of all these from its commanding position in Paris. In the latter the face and pose of the Maid are consistent with her condition as a peasant; while the horse, regarded as one of the finest in the whole history of sculpture, is specialized as of historic French breed. In Miss Hyatt's work, the figure is more slender, lithe, and tense, and the highly intellectual face is seen to be obedient to a heavenly vision. Again, the control of the horse by the rider is admirable and the union between them complete. Finally, the animal anatomy is rendered with a masterly, virile hand, and the head, excepting the mane, is conventionalized after the Greek manner of Phidias.

Malvina Hoffman. Another American woman of great talent, Malvina Hoffman (1887–), has been signally honored in the acceptance of her group, "The Russian Bacchanale," as a gift from a wealthy amateur for the garden of the Luxembourg, Paris. The two figures of the composition are intended to perpetuate the impression made by Pavlowa and Mordkin, as they entered upon their interpretation of the dance which, in the infancy of civilization, fixed the basis of the Greek drama. The modeling of the figures, with its undulating surfaces and the consequent elusive play of light and shade, reveals instantly the influence of Rodin. The clear, bold, balanced composition proves the studies of the sculptor to have been thorough and broad.

Like painting, sculpture, which has been called the orphan of the arts, has been influenced largely by modern European art, and has shown great diversity and freedom of expression, particularly in the field of abstraction. New materials never dreamed of in the philosophy of the older sculptors have been used by the younger men, sometimes with extremely interesting results. All this has led to more attention being paid to sculpture and the organization of numerous exhibitions.

It is impossible in a brief survey to mention all the men and women devoted to this branch of art whose work would deserve extended notice in any history of art. But among contemporary masters are the following, with the works which have brought them fame. Paul Manship (1885–), "Centaur and Dryad," "Dancing Girl and Fauns," "Little Brother;" Jacob Epstein (1880–), "Adam," "Christ," "Duchess of Hamilton;" Robert Laurent (1890–), "Pearl;" William Zorach (1887–), "Mother and Child."

ART TERMS AND SUBJECTS

THE material in this section comprises a dictionary of the more frequently used terms belonging to the arts of painting, architecture, and sculpture, together with a reference list of noted works in these arts. The general discussions in the preceding sections are thus supplemented by more explicit definitions of the terms which are there used, and by brief descriptions of many masterpieces in addition to those works treated in the longer articles.

Each paragraph devoted to a painting or to a piece of sculpture contains the name of the artist, the collection or the locality in which the work is to be found, and a brief characterization of the subject. The list represents the great schools of art and the principal art galleries of the world. It is especially valuable because it includes a large number of the masterpieces, of both American and foreign artists, that are accessible in the numerous excellent and growing American galleries and museums of art.

Abacus (*ăb'ă-kŭs*). A tablet placed horizontally upon the capital of a column. By increasing the upper surface of the capital, it enables the column to afford better support to the architrave.

Abigail Meeting David with Presents. Rubens; Museum of Art, Detroit, Mich. A picture which tells vividly the biblical story, with an oriental richness of costumes and coloring.

Abutment. A solid piece of masonry used to support a body which has a tendency to thrust outward. Examples of the abutment are the solid pier, against which an arch of a building abuts, and, in bridge construction, the supports which connect the bridge with the river bank.

Accessories. Theoretically speaking, the accessories of a picture are all those details which are necessary for the realization of a scene, but which at the same time play a secondary part in the composition. In a portrait, for example, the drapery, the furniture, and the ground on which the subject is represented are accessories.

Acropolis (*ă-krŏp'ō-lĭs*). The name applied to the citadel in ancient Greek towns. The most famous acropolis is that of Athens, on which stood the Parthenon, the Erechtheum, the Propylæa, and the temple of Nike Apteros.

Adobe (*ă-dō'bē*). Sun-dried bricks, such as are in use in Egypt and in other countries of warm and dry climate. The use of such bricks was introduced into Spain from Africa. In Mexico and in the southwestern United States, the name is applied both to the bricks and to the clay from which they are made, as well as to structures composed of these materials.

Adoration of the Kings. Quentin Massys; Metropolitan Museum, New York City. The Madonna, holding the Child Jesus, is on the left. One king kneels; the other two, bearing jeweled vessels, stand behind him.

Age of Innocence, The. Sir Joshua Reynolds; National Gallery, London. A charming picture of a child, by one of the greatest of portrait painters.

Alhambra, The. A fortified Moorish palace on a hill near Granada, Spain. Built in the 13th and 14th centuries. The structure is notable for its elaborate architectural decoration, which is chiefly of wood and plaster rather than of more durable materials.

Alice. William M. Chase; Art Institute, Chicago, Ill. Portrait of a young girl, remarkable in treatment of figure and in technique.

Alice Freeman Palmer Memorial. Daniel Chester French; Wellesley College chapel, Wellesley, Mass. A marble relief representing a mature woman, the college, sending forth with her benediction a younger woman, the student. The student bears a lamp, lighted at the altar in the foreground.

All's Well. Winslow Homer; Museum of Fine Arts, Boston, Mass. A sailor, the lookout, stands beside the ship's bell, calling his signal.

Amicitia. Charles Keck; Rio de Janeiro, Brazil. A statue surmounting a monument; the entire memorial being a gift of the United States to the people of Brazil on the first centennial of Brazilian independence.

Anatomy Lesson, The. Rembrandt van Rijn; Royal Museum, The Hague. Dr. Tulp is explaining the action of muscles and tendons in the human arm. This picture, painted in 1632, brilliantly marks the close of the first of the three periods constituting the artist's career.

Anchor. In religious art, the anchor is employed as the symbol of hope.

Angel Heads. Sir Joshua Reynolds; National Gallery, London. A group of five lovely faces, studies of one little child, Frances Gordon.

Angels. In devotional art, angels are represented with the following characteristics: They are human in form, winged, always young, of the male sex, and generally draped in white. They are the messengers of God, the rulers of the stars and the elements, the guardians of the just, and the choristers of heaven. In this last function, they are frequently represented with various musical instruments.

Angelus, The. Jean François Millet; the Louvre, Paris. The peasant man and woman pause in their work in the field and stand with bowed heads, while a church bell rings in memory of the greeting of the Angel Gabriel to Mary, announcing the birth of the Savior. This picture has been criticized for its suggestion of sound.

Annunciation, The. A favorite subject in early Italian art, a widely known example of which is the mural painting by Fra Angelico (1387–1455), in the Museum San Marco, Florence. At the right of the picture kneels the Virgin and at the left stands the angel, facing her; both figures being set against the background of an arcade most interesting to the student of the history of architecture.

Antique (substantive and adjective). This term was originally applied to Greek and Roman works of art, such as statues, bas-reliefs, engraved gems, and medals. By extension of sense it now includes all objects of æsthetic value having the minimum age of a century.

Apollo Belvedere. A marble copy of a probable bronze original, now in the Museum of the Vatican, Rome. The statue bears the marks of the latest, or Hellenistic, period of Greek art. It was found in 1455, at Frascati, near Rome, among the ruins of an ancient villa. It is named from its present location in the *belvedere* (open-gallery, literally, "fair view") of the architect Bramante (1444–1514). It is the most famous of all Apollo statues and represents the god in successful conflict with a python or dragon. Reduced to a symbol, it signifies the sun triumphing over pestilence.

Appliqué (*ă'plē'kā'*). A general designation for ornament which is let into or fixed upon the surfaces of objects. For example, a wood panel may be thus treated with *appliqués* of bronze.

Apse (*ăps*). The semicircular or polygonal projection of the end of a church, behind the choir. In Roman Catholic architecture, when the long axis of the church extends from west to east, the apse is at the eastern end.

Arabesque (*ăr'ă-bĕsk'*). Ornament in which garlands of foliage and realistic or fantastic figures are combined in a capricious style, delicately interlaced and describing graceful curves. Arabesques are painted, inlaid, or carved in low relief.

Arch. Fundamentally, an arch is a structural device for spanning an opening and supporting an overlying wall by means of a number of wedge-shaped units arranged in a curve convex upward. The name is extended to any structure or ornament having the form and appearance of an arch.

Architrave (*ăr'kĭ-trāv*). In classical architecture, the architrave is the lowest of the three divisions of the entablature, that portion which rests directly upon the capitals of the columns. The name is applied also to the moldings around a doorway, especially if the opening is rectangular in form.

Ashlar (*ăsh'lĕr*). The name applied to stones hewn and squared for use in buildings, in distinction from rough, undressed stones.

At the Shrine of Venus. Alma-Tadema; Mendelssohn collection, Berlin. An excellent example of the artist's ability to paint marble, silk, and other beautiful materials.

Attic. That part of the entablature of a building above the cornice. Its purpose is to hide the roof and thus add dignity to the design.

Aureole (*ô'rê-ōl*). This word, derived from the Latin (*corolla*) *aureola*, "golden crown," refers to the luminous golden circles placed by painters about the heads or figures of deities in order to indicate their divinity. It was so used by Egyptian and Greek painters. Christian artists extended its use to indicate also the glory of angels and saints.

Aurora. Guido Reni; Rospigliosi Palace, Rome. Painted on the ceiling of the garden-house of the palace in 1609, this famous picture represents Aurora, goddess of dawn, preceding the advancing chariot of the sun god. The hours, as nymphs, accompany the chariot.

Autumn. Anton Mauve; Metropolitan Museum, New York City. A flock of sheep are being driven along a road over brown moors.

Autumn Oaks. George Inness; Metropolitan Museum, New York City. A group of oaks in red, brown, and yellow foliage; cattle in the foreground.

Avenue of Middelharnis. Meindert Hobbema; National Gallery, London. A roadway, bordered by tall trees, leading from the foreground into the distant background of flat country.

Aviator, The. Charles Keck; Charlottesville, Va. A sculptural work erected at the University of Virginia in 1919, the gift of Paul G. McIntyre.

Baby Stuart. Detail of the picture of the three children of Charles I of England by Antoon Van Dyck, in the Royal Gallery, Turin. The portrait here indicated is that of the child who became James II and was copied from the original by the Italian painter Canevari.

Bacchantes (*bă-kăn'tēz*). The female worshipers of Bacchus, the wine god, and equivalent to the mænads of Greek mythology. They were popular subjects in every branch of ancient art.

Background. The term applied in painting to the portion of space in a picture which is so rendered as to appear to be farther from the spectator than the principal object or group of objects in the composition.

Baldachin (*băl'dă-kĭn*). A structure in the form of a richly ornamented canopy, supported by columns, suspended from the roof, or projecting from the wall of a building,—for example, above an altar.

Bambino (*băm-bē'nō*). Italian word for "child." In art, this name is given to representations of the Infant Christ wrapped in swaddling clothes and bound by ligatures, according to the custom prevailing in southern Europe.

Baptistery (*băp'tĭs-tēr-ĭ*). A circular or polygonal building anciently placed near the basilica, or church, and used for the performance of the rite of baptism. Among separate buildings serving as baptisteries that at Florence must be placed first. It is celebrated for its bronze gates designed by Andrea Pisano and Ghiberti.

Baroque (*bă-rōk'*). A term applied in architecture to grotesque or whimsical ornamentation.

Basilica (*bă-sĭl'ĭ-kă*). The name, among the early Greeks, for a royal palace. Later it designated a court of law and place of assembly. It was a large oblong building with double colonnades and a semicircular apse at the end. Buildings of this type were frequently consecrated for religious uses by Christian emperors of Rome, so that Christian churches were often called basilicas.

Bas-Relief (*bä'rê-lēf'*; *bäs'rê-lēf'*). See *Low Relief*.

Bayeux (*bä'yû'*) **Tapestry.** A roll of canvas over 70 yards long and more than half a yard wide on which is embroidered a representation of the conquest of England by the Normans. It is in the public library of Bayeux, Normandy, France. Tradition ascribes it to Matilda, the queen of William the Conqueror. She is said to have presented it to the cathedral of Bayeux.

Beaching the Boat. Sorolla y Bastida; Metropolitan Museum, New York City. A group of brown oxen standing in the white surf. A sailboat in bright sunlight is in the background.

Bismarck. Franz von Lenbach. In the painter's studio, Munich. A famous portrait that reveals the very character of the "Iron Chancellor."

Black. In medieval art, black symbolized darkness, death, mourning, evil, falsehood, and despair. In heraldry, black is termed sable.

Black Hawk. Lorado Taft; near Oregon, Ill. A heroic statue of the famous Indian chief, Black Hawk.

Blue. In the symbolism of early Christian art, blue, as suggesting the sky, represents heaven and eternity, as well as piety and faith. It is commonly the color used by painters for the Virgin's mantle, her tunic or underrobe being red.

Blue Boy, The. Gainsborough; H. E. Huntington estate, Pasadena, Cal. This picture of a youth in blue satin is said to have been painted to disprove Reynolds' opinion that the predominance of blue in a picture is incompatible with good color effect. It was purchased from the duke of Westminster, London, in 1921, for about $650,000 by H. E. Huntington.

Bolivar. Sally James Farnham; New York City. A statue of the great South American liberator, a gift from the government and people of Venezuela.

Boston Public Library. Boston, Mass. Architects: McKim, Mead and White. A granite structure in the Italian Renaissance style, inspired by the Library of Sainte Geneviève, Paris, and built around a central court. The interior is richly decorated with colored marbles, with statues, and with mural paintings by Abbey, Sargent, Puvis de Chavannes, and John Elliott.

Boyhood of Lincoln, The. Eastman Johnson; University of Michigan, Ann Arbor, Mich. The boy Lincoln, seated on a rude stool, is reading by firelight.

Boyhood of Raleigh, The. Sir John E. Millais; Tate Gallery, London. Two lads, Raleigh and a companion, seated by the sea, listen with rapt attention to a sailor's story.

Breaking Wave, The. Winslow Homer; Worcester Art Museum, Worcester, Mass. An excellent example of this painter's power to interpret the moods of the sea.

Bringing Home the Calf. Jean François Millet; Art Institute, Chicago, Ill. Two men are entering a farm gate, carrying a newborn calf on a litter, followed closely by the mother.

Bronze. Antique bronzes are works of art of the highest value. Whatever be their form or their dimensions, they invariably give evidence of extraordinary science and widely extended practical knowledge. After them must be noted the bronzes of the 12th and 13th centuries, as well as those of Florentine artists of the 14th century, such as Ghiberti and Donatello, who produced absolute masterpieces. In the time of Louis XIV (1643–1715), immense vases, such as those in the garden at Versailles, were cast in bronze; while the best examples of the art during the last two centuries are equestrian statuettes and Chinese and Japanese bronzes, in which the arts of founding and chiseling the metal have reached their highest limit.

Buhl (*bōōl*). A kind of furniture which was invented and made by André Charles Boulle, or Buhl (1642–1732), cabinetmaker to the court of Louis XIV. It is richly inlaid with gold, copper, and tortoise shell, under the last named of which a crimson fabric is often placed.

Bunker Hill Monument. Charlestown, Mass. Memorial on the site where General Warren fell in the battle of Bunker Hill. It is a plain granite shaft, 220 feet high and 31 feet square at the base. The corner stone was laid by Lafayette in 1825, and the monument was completed in 1843.

By the River. Henri Lerolle; Museum of Fine Arts, Boston, Mass. A stream in the background; in the foreground, two women walking along a path.

Calvary. A cross of stone or iron, generally richly decorated and sometimes raised upon a platform which is reached by steps. Some calvaries, especially those of Brittany, are ambitious monuments supported by arcades and surmounted by numerous statues. The term is applied also to pictures representing the scenes of the Passion.

Cameo. A gem upon which a figure or an ornament is cut in relief.

Campanile (*kăm'pă-nē'lă*). A bell tower. As built in Italy, the campanile is usually placed near a church but not actually attached to it. The most famous example of this type is the campanile built by Giotto in Florence. The term is applied also to certain lofty towers which form parts of buildings. In America, conspicuous examples of the campanile are found in the new Old South Church, Boston, at Cornell university, at the Iowa State college, and at the University of California.

Capital. The head, or crown, placed at the summit of a column, pillar, or pilaster, and usually ornamented with various projecting moldings. As an architectural member, the capital immediately supports the entablature.

Capital, Composite. A combination of the acanthus ornament of the Corinthian capital with volutes or scroll-like patterns closely resembling those of the Ionic capital, with the difference that the four sides of the composite capital are absolutely symmetrical. The composite capital occurs in typical form on the Arch of Titus, Rome, erected toward the end of the 1st Christian century.

Capital, Corinthian. The characteristic of the Corinthian capital is the pattern of rows of acanthus leaves placed one upon the other, with volutes above them, one at each corner, supporting the projecting abacus. The Corinthian is the richest of the pure orders of architecture. The Greek type was produced in the 4th century B. C., and was later much simplified in the Tower of the Winds (100 B. C.), Athens. In this second form, it often appears in modern concrete buildings. The Roman type is of looser composition than the Greek. It reached its finest form in the Temples of Castor and of Mars Ultor erected in the Roman Forum during the 1st Christian century.

Capital, Doric. The Greek Doric capital is the simplest of the classical orders. It consists of an *abacus*, or block, an *echinus*, a swelling, bowl-shaped member, and *annulets*, or rings, just above the neck of the shaft.

Capital, Ionic. This capital is characterized by spiral volutes placed immediately underneath the abacus.

Capitol, The. Washington, D. C. An imposing building of mingled classic and Renaissance design. Fronting the east, it stands on an eminence, 97 feet above the Potomac

"THE ALBA MADONNA"

RAPHAEL (1483-1520)

National Gallery of Art
Washington, D. C.
(*Mellon Collection*)

"MUSIC AND LITERATURE"

WILLIAM M. HARNETT
(1848-1892)

Courtesy of Albright Art Gallery, Buffalo, N. Y.

River level. The entire length of the building is 751 feet, 4 inches; the width, 350 feet. The colossal statue of Freedom, surmounting the lantern which crowns the dome, rises 307½ feet above the ground level.

The central structure is of Virginia sandstone, painted white; the extensions are of Massachusetts marble. A hundred and twenty-four Corinthian columns, the shaft of each a monolith 30 feet high, adorn the porticoes of the fronts and ends of the building.

The corner stone of the central building was laid by President Washington, September 18, 1793. The wings, completed in 1811, were partially burned by the British in 1814. In 1827, the entire central building was completed, crowned by a low dome. The extensions were first occupied in 1857 and 1859. The present dome was completed in 1865.

The Capitol is occupied chiefly by the hall of Representatives and the Senate chamber. Many works of sculpture and painting adorn these halls as well as the splendid staircases and corridors of the building.

Caricature (*kăr'ĭ-kà-tûr*). A representation in which the peculiarities of a person or of an object are so far exaggerated as to produce a grotesque effect.

Caritas. Abbott H. Thayer; Museum of Fine Arts Boston, Mass. The painting of a gracious female figure standing with arms extended above two children who cling closely to her.

Carmencita. John S. Sargent; Luxembourg Gallery, Paris. A brilliant portrait of the famous Spanish dancer, contrasting with another of the same subject by William M. Chase.

Cartoons. A name given to the studies made by artists before they undertake the execution of pictures or frescoes. Since frescoes have to be executed on a fresh ground, retouching is impossible. Therefore, fresco painters are obliged to make full-sized designs which have only to be traced upon the ground. The paper used for this purpose was called in Italian *cartone*. Thence arose the application of the term cartoon to all preparatory sketches of pictures.

Caryatides (*kăr'ĭ-ăt'ĭdz*; L. *-ĭ-dēz*). Sculptured female figures which, in some classical and Renaissance buildings, serve as supports, taking the place of columns or pilasters. The most noted of such figures stand in the ruins of the Erechtheum, Athens, and in a hall of the Louvre, Paris, devoted to French art of the 16th century.

Catacombs (*kăt'à-kōmz*). Underground burial places. The most famous catacombs are those at Rome, in which the early Christians interred their dead, and in which they took refuge to celebrate their services. There Early Christian art took its rise. Catacombs exist also at Syracuse, at Palermo, and in Tuscany.

Cathedral. A cathedral is a church in which the *cathedral* or bishop's throne, is placed. Architecturally speaking, however, a cathedral need not differ in any respect from an, ordinary parish church.

Cathedral. City of Mexico. One of America's largest and richest churches. The edifice is 426 feet long and 203 feet wide. It was begun in 1573 and completed in the 19th century, at a cost of over $2,000,000. The interior, of Doric style, is richly ornamented.

Cathedral, Saint Patrick's. New York City. The Roman Catholic cathedral, located on Fifth avenue, between 50th and 51st streets, is one of the most noted structures in America. The corner stone was laid August 15, 1858, and the building was dedicated May 25, 1879. Its greatest length is 398 feet; its width, 174 feet; the towers are 330 feet high. The cathedral is built upon the plan of a Latin cross, in Gothic style. Its architect was Renwick, who gave also the design for Grace church, at Broadway and 11th street.

Cathedral of Saint John the Divine. New York City. The Protestant Episcopal cathedral on Morningside heights. The corner stone was laid December 27, 1892. In 1911, the choir and crossing were completed in Romanesque style. For the construction of the nave a modified Gothic style was later adopted. The plans called for a total length of not more than 520 feet, a width of 290 feet, and a height of 425 feet to the top of the spire. Its directing architect for years was Ralph Adams Cram, of Boston.

Cathedral of Saints Peter and Paul. Washington, D. C. Protestant Episcopal cathedral on Mount Saint Albans. The plans for this church present a Gothic structure, 500 feet in greatest length, with towers 262 feet high. Its elevated situation is said to be more beautiful than that of any other existing cathedral.

Cathedral of the Assumption. Moscow. One of the several notable structures in the Kremlin. It is built in the Lombardo-Byzantine style, although its cupolas are of Indian pattern. The interior is richly adorned with gems. The church was erected in the 15th century by the architect Aristotele Foraventi.

Cattle. Constant Troyon; Institute of Art, San Francisco, Cal. The group of cattle in pasture occupy the center of the picture; a splendid background of sky distinguishes this painting.

Charles I and His Horse. Antoon Van Dyck; the Louvre, Paris. A picture portrait, presenting a masterly treatment of the English king with his horse and attendants.

Chiaroscuro (*kyä'rô-skōō'rō*). Distribution of light and shade so effected in a picture that these elements are of mutual aid. This term is applied especially to the devices by which a figure or any object is made to appear as if enveloped in atmosphere. Among the masters of *chiaroscuro* must be mentioned Correggio (School of Parma, 1494–1534), regarded as its inventor, and Rembrandt, who developed it to its farthest limits.

Children of the Shell, The. Murillo; Prado Museum, Madrid. The Child Jesus is represented giving Saint John water from a shell.

Christ at Emmaus. Rembrandt van Rijn; the Louvre, Paris. The moment is that in which the two disciples recognized the risen Christ at the supper table.

Christ with the Doctors. Hofmann; Royal Gallery, Dresden. The youthful Christ, in the center of the picture, commands the attention of the learned men.

Church at Old Lyme. Childe Hassam; Albright Art Gallery, Buffalo, N. Y. A white New England church amid the lacelike shadows of slender trees.

Classical. This adjective in the strict sense is applied to the best periods of ancient Greek art, when great architects and sculptors united in their works ideality and imagination, close observation of nature, and the power to incorporate in clear terms their conceptions or impressions of grandeur and beauty. The term classical is also extended to later works of art whose excellence has caused them to be regarded as standards and models of special styles or schools. At the present time the same term is used to denote the character of any composition, either artistic or literary, in which the principal stress is laid upon structure and form.

Cloth Syndics. Rembrandt van Rijn; Royal Museum, Amsterdam. The group in the picture includes the five directors and the secretary of the Amsterdam cloth makers' guild. The canvas was painted in 1661 and is ranked as the masterpiece of the artist.

Colonel Thomas Cass. Richard E. Brooks; Boston, Mass. Bronze memorial in the Public Garden. A fine example of the "quiet, soldierly figure."

Colors, Primary. The colors which cannot be produced by mixture of others; they are three,—red, yellow, blue.

Colors, Secondary. Three colors, each produced by mixing two others: orange, a mixture of red and yellow; green, of blue and yellow; purple, of red and blue.

Columbus at the Court of Ferdinand and Isabella. Vacslav von Brozik; Metropolitan Museum, New York City. A room crowded with courtiers; the king and queen are about to sign the contract with Columbus, April 17, 1492.

Column. In architecture, a vertically placed support, consisting generally of three parts: the base, the shaft or cylindrical portion, and the capital.

Coming of the White Man, The. G. A. Reid; privately owned. A group of Indians amid trees watch the approach of Champlain's fleet.

Coming Storm, The. George Inness; Albright Art Gallery, Buffalo, N. Y. Level fields against a background of trees and threatening sky.

Communion of Saint Jerome, Last. Domenichino; the Vatican. Rome. The central figure is the aged Jerome, realistically portrayed. A symbolic lion reclines at the feet of the saint.

Composition. The harmonious combining of all the parts or elements in a work of art. The composition of a statue or that of a picture is good or bad in proportion as the lines are rhythmical in arrangement, the attitudes probable and the scene free and apparently unstudied. A view of a town, for example, *composes* well when the succession of buildings exhibits a graceful and picturesque outline. A landscape is well *composed* when the trees, the distances, and the foreground represent masses well balanced and pleasant to the eye.

Corcoran Gallery of Art. Washington, D. C. A white marble building in the Neo-Grecian style of architecture, which houses the art collections and the art school founded by William Wilson Corcoran.

Cornice. In classical architecture, the highest of the three parts of the entablature, so molded as to project beyond the frieze. The term is applied generally to the highest portion of a wall, when treated as a crown or finish.

Creation of Man. Michelangelo; Sistine Chapel, Rome. The recumbent human form awakens to life under the touch of the outstretched hand of God.

Cumæan Sibyl. Michelangelo; Sistine Chapel, Rome. The ancient sibyl, said to have prophesied the Nativity, is consulting her book.

Dance of the Nymphs. Corot; the Louvre, Paris. Background of trees and sky; in the foreground are groups of dancing maidens. Also called "Matinée." This is a famous picture in Corot's "first manner," or the period in which he introduced figures into his landscapes.

Dante. Ettore Ximenes; Washington, D. C. A memorial statue, the gift to the United States from the Italians of the country.

Dante, Portrait of. Giotto; National Museum of the Bargello, Florence. Perhaps painted from life. The picture formed part of a large fresco painted by Giotto early in the 14th century, long hidden by whitewash but recovered about 1840.

Dash for Timber, A. Frederic Remington; Museum of Fine Arts, Saint Louis, Mo. A group of horsemen, pursued by Indians, riding toward a clump of trees.

Deer in the Forest—Twilight. Rosa Bonheur; Metropolitan Museum, New York City. A sheltered nook in woodland. Glow of sunset is seen between blue-gray trees in the background.

Descent from the Cross. Rubens; Cathedral, Antwerp, Holland. A painting especially notable, technically, for the white light that bathes the dead body of the Christ as it is lowered on a stretch of linen.

Design. An outline or pattern, which serves as the basis of a composition and indicates the more important points in it. Specifically, the term means the preliminary sketch of a picture.

Diaper (*dī'ā-pĕr*). A term derived from a late Greek word meaning, probably, "pure white," and formerly applied to a fine linen cloth into which ornamental devices, such as geometric or conventional patterns and scroll or lattice work, were woven. From this system of ornament, the word diaper came to be used to denote an architectural decoration which consists in the continued repetition of a geometric pattern or a conventionalized floral design. It is applied to a flat surface, such as a panel or a wall, in color, gilding, or low relief.

Dignity and Impudence. Sir Edwin H. Landseer; National Gallery, London. A large, dignified dog and a little, saucy one in the door of a kennel.

Distemper. A method of coloring surfaces, such as walls or panels. The colors for the process are mixed with a solution of water and size, or, for small surfaces, of water and gum or the albuminous matter of eggs.

Dome. A roof formed by a series of arches springing from consecutive points on a circular or polygonal plane base and crossing one another at the summit. The solid figure thus formed may be roughly described as hemispherical. If, for example, the plane base were a true circle, and the arches true semicircles, the dome would then be a true hemisphere. During the Renaissance period, this structural device was made more or less pointed in section, following the precedent of Brunelleschi, the architect and engineer of the dome of the Cathedral of Florence.

Doric. An order of ancient architecture, characterized by simplicity of ornament. In Greece, this order combines strength and elegance, but the Roman Doric style appears heavy and inert. The Doric column has no base; toward the middle of the shaft it shows a swelling or entasis.

Dove. In Christian art, the dove is the symbol of the Holy Spirit, as well as the emblem of love, innocence, purity, and peace.

Dryness. The name applied to the quality of painting in which the outlines are hard and formal, the modeling stiff, and the color harsh.

Dry Point. A sharp steel needle with which an engraver draws directly upon a copper plate. In proportion to the pressure used, the dry point sinks more or less deeply into the metal. The name "dry point" is used also of the engraving made by this method and of a print from such an engraving.

Dying Gaul. The original figure in marble is in the Capitol, Rome. The name of the ancient sculptor of this work is unknown.

Earl of Clarendon, The Second. Sir Peter Lely; Institute of Art, Minneapolis, Minn. An attractive portrait of a little child with a dog as companion.

Echinus (*ĕ-kī'nŭs*). The convex member placed beneath the abacus of the Doric capital. The artistic function of the echinus is to afford a transition between the verticals of the columns and the horizontals of the entablature.

Elgin (*ĕl'gĭn*) **Marbles.** The collection of ancient sculptures brought together by the earl of Elgin about the beginning of the 19th century, and now preserved in the British Museum. It represents the finest work of ancient Greek sculptors, including the greater part of the surviving sculptured decorations of the Parthenon, together with fragments of the Erechtheum, Athens, and of the Mausoleum at Halicarnassus, Asia Minor.

Elizabethan. The style of architecture transitional between Gothic and Renaissance, which prevailed in England in the Elizabethan era. The best examples of this style are found in the great country houses built during that queen's reign. Characteristic features of these mansions are long galleries, large windows, and tall decorated chimneys.

Emancipation Group. Thomas Ball; Washington, D. C., and Boston, Mass. The work represents President Lincoln and a kneeling slave. The group in Boston, from the same model as that in Washington, was erected shortly after the latter had been completed.

End of the Trail. James E. Fraser; Golden Gate park, San Francisco. A statue depicting an Indian warrior bowed in deep dejection, seated on a weary pony, which crouches forward in dumb dismay. It typifies the American Indian driven to the wall by a stronger race.

Engraving. The art of representing objects by incised lines on wood, metal, or stone. Engraving, as it is understood today, dates probably from the 15th century, in the early part of which woodcuts are known to have been produced.

Entablature (*ĕn-tăb'là-tûr*). In classical architecture, the entablature is the portion of wall resting upon the columns and supporting, at the ends of the building, the pediment or, at the sides, the roof plate. It consists of an architrave, a frieze, and a cornice. Its height is from four to five times the diameter of the shaft of the column.

Entasis (*ĕn'tà-sĭs*). The swelling at the middle of the shaft of a column. Entasis is one of the characteristics of the Doric order; the swelling of the columns gives an effect of lightness to a structure.

Etching. A process of engraving, in which the incised lines are obtained, not laboriously by working directly upon metal with the graving tool, but by the action of acid. The metal plate to be etched is covered with an etching ground, such as a varnish, which resists the action of acid. Great care must be taken to lay this ground equally over the whole plate. The drawing or picture to be reproduced is then traced with an etching needle, which, wherever it is applied, removes the ground and so exposes the plate. The plate is then put into acid, which corrodes the exposed parts. The design is thus bitten into the metal. The prints in ink, also taken from this etched plate, are called etchings.

Evolution of the Book. John W. Alexander; a series of six mural paintings in the Library of Congress, Washington, D. C. The subjects are "The Cairn," "Oral Tradition," "Egyptian Hieroglyphics," "Picture Writing," "The Manuscript Book," "The Printing Press."

Façade (*fà-sädˊ*). A term applicable to any important face of a building. It designates usually, however, the principal front, which is the most exposed to view and is more richly decorated than the rest of the edifice. The chief entrance to a building is usually placed in this façade.

Fates, The. Pitti Gallery, Florence. Probably drawn by Michelangelo and painted by Rosso. The three figures are said to have been studied from a single model.

Feeding Her Birds. Jean François Millet; Museum, Lille, France. A woman is pictured seated on a stool, feeding from a long spoon three children ranged on the doorstep.

Feeding the Sheep. Charles Jacque; the Louvre, Paris. A flock of sheep grouped about a feeding rack and a tub of water.

Fighting Téméraire, The. J. M. W. Turner; National Gallery, London. The famous ship, about to be broken up, is being towed to a berth at Deptford.

Figure. A drawn, painted, or sculptured representation of a human being or of an animal.

Figurine. A small molded figure or statuette, generally in terra cotta or similar material less durable than marble. The term is applied especially to little figures, decorated in color or gilt, found in ancient tombs. The finest of these are the Tanagra figurines, from Tanagra, Greece.

First Burial, The. Louis Ernest Barrias; Palais des Beaux-Arts, Paris. A nude marble group, representing a man carrying a dead child, accompanied by a mourning woman. The figures of the group are usually identified as those of Adam, Eve, and the dead Abel.

Fish. An elliptical symbol frequently found on Early Christian monuments and tiles. It is the emblem of Christ, and the usual explanation of its use is that the letters in the Greek word ἰχθυς, meaning "fish," are the initials of the words, Ἰησοῦς Χριστὸς Θεοῦ Υἱὸς Σωτήρ, that is, "Jesus Christ, Son of God, Savior." Used without the inscription, the ellipse is an emblem of baptism.

Flying Buttress. In Gothic architecture the organ of the transmission of thrust. It is an arm of masonry rising from the buttress or exterior support of an aisle arch and springing over the aisle roof to meet the support of the loftier nave and add resistance to the greater disruptive force there active. The flying buttress is the only new principle introduced into the building art by the men of the middle ages. Its development is most interesting. It began in Normandy when the monkish builders of Caen threw a half barrel vault over the aisles to counteract the thrust of the nave. This device proving successful, it was in principle transferred to the exterior and isolated in space, as in the church of Saint Martin at Laon, France. In this edifice the flying buttress reached the limit of its functions, but in a later structure, the Cathedral of Reims, it was given two stories and a double flight.

Fog Warning, The. Winslow Homer; Museum of Fine Arts, Boston, Mass. A fog bank looms on the horizon. A fisherman in his boat pulls sturdily for his ship.

Foreground. That portion of a picture, and sometimes of a relief sculpture, on which the objects nearest to the spectator's eye are represented.

Foreshortening. The term applied to the apparent diminution in the length of an object in proportion as the direction of its length coincides with the observer's line of sight. The word is used also of the method of drawing by which objects in a picture are made to conform to this law of perspective.

Forge of Vulcan, The. Velasquez; Prado Museum, Madrid. Vulcan, at his forge, is listening to Hermes, who is delivering a message from the gods.

Forging the Shaft. John F. Weir; Metropolitan Museum, New York City. A foundry, where workmen are drawing a white-hot shaft from the furnace.

Fountain of Time, The. Lorado Taft; Chicago, Ill. An imposing sculptural work erected on the Midway, representing ninety colossal figures passing before the veiled figure of Time. The material used is a kind of concrete.

Fresco. In its strict sense, a fresco is a mural painting executed on a fresh, damp ground of plaster. The ground soon becomes unfit to paint on, and therefore retouching is impossible. This is the chief difficulty in the process. On the other hand, as the color combines with the lime in the ground, it is of great durability in pure, dry air. The term fresco is now used loosely to designate any manner of painting on plaster.

Frieze. The part of the entablature placed, in the ancient orders of architecture, between the architrave and the cornice. In the Doric order, the frieze is decorated with metopes and triglyphs; in the Ionic and Corinthian orders, it is ornamented with bas-reliefs which form a continuous design.

Galahad, Sir. George Frederick Watts; Eton college, England. The knight of the pure heart is represented standing by his horse, at the moment when he has caught the vision of the grail.

Garfield. Charles H. Niehaus; Cincinnati, Ohio. An excellent portrait statue of James A. Garfield. The president is represented as speaking, a manuscript in his right hand, his left hand raised in an impressive gesture.

Gargoyle (*gär'goil*). A term derived from a French word meaning throat, and applied to the spouts placed usually on the roof gutters of Gothic buildings for the purpose of carrying the rain water far from the walls. Gargoyles came into use about the end of the 12th century. From the 13th to the 16th century, they were commonly carved fancifully, terminating in grotesque shapes of animal or human heads.

Genre (*zhäN'r'*) **Painting.** This French term was formerly preceded by the word "*bas*"; the whole denoting the low or domestic as distinguished from the religious or the historical style. Under it are classed all those pictures in which subjects taken from everyday life are treated realistically.

Giralda Tower. Seville, Spain. A beautiful square tower, 330 feet in height, the upper 100 feet being a belfry. A statue of Faith crowning the structure moves in the wind like a vane, in Spanish *giralda*, whence the name.

Gleaners, The. Jean François Millet; the Louvre, Paris. Bent figures of three toiling women are represented in the foreground of a harvest field.

Golden Stairs, The. Sir Edward Burne-Jones; privately owned. A procession of tall, slender figures of women on a curving staircase. Called also "The King's Wedding" and "Music on the Stairs."

Gothic (*göth'ĭk*). Originally a term of reproach, synonymous with "barbarous," first used by the Italian artists of the Renaissance. The style of architecture, determined by the use of the pointed arch, which was developed in western Europe between the second quarter of the 12th and the end of the 15th century. The sculpture contemporary with this structural style was a subservient art. It followed the lines of the building, the figures being cramped between emphasized verticals and horizontals. But, as Gothic architecture approached its climax, figure sculpture attained great expressiveness, especially in the portrayals of the Christ and the Virgin. At the same time and to an equal degree this quality marked the grotesques surcharged with symbolism, which were set in a profusion sufficient to people the roofs and the tower-balconies of the Gothic church.

Grand Canal, Venice. J. M. W. Turner; Metropolitan Museum, New York City. A picture famous for its color effects. Painted about 1834.

Grant, Ulysses S. H. M. Shrady; Washington, D. C. A heroic equestrian statue, forming the chief feature of the imposing Grant memorial.

Great Lakes, Fountain of the. Lorado Taft; Chicago, Ill. Sculptured female figures, symbolical of the five lakes, form the principal part of this important work, placed at the south front of the Art Institute.

Greek Slave. Hiram Powers; Corcoran Gallery of Art, Washington, D. C. A nude marble figure, representing a girl captive taken by the Turks during the Greek revolution of 1821.

Grief. Also called "Death" or "Peace of God" or "Mourning." Memorial to Mrs. Henry Adams; Rock Creek cemetery, Washington, D. C. One of the masterpieces of Augustus Saint-Gaudens. Bearing no inscription, the countenance of the bronze figure, seated, with closed eyes as in a dream, is mysterious and awe-inspiring.

Groin. The edge, or arris, formed by the intersection of two barrel vaults.

Group. In art, this term implies two or more figures or objects so placed and related as to form a unit. The groups in a picture should present well balanced masses. In sculpture, a group is a collection of figures, each of which is necessary to the effect of the whole The outline and arrangement of such a group should present a harmonious effect.

Gulf Stream, The. Winslow Homer; Metropolitan Museum, New York City. A broken-masted sailboat lies in the trough of the waves; a Negro is prone on the deck. Sharks appear in the foreground; at the right, a waterspout; at the left, on the horizon, a sailing vessel. The sea is blue-green, under a copper sky.

Gypsy. Murillo; Crocker Art Gallery, Sacramento, Cal. A masterly character sketch of a gypsy woman, revealing Murillo's genius as a *genre* painter.

Hard. A term applied to pictures which exhibit stiffness of drawing and harshness of outline.

Harp of the Winds. Homer D. Martin; Metropolitan Museum, New York City. A view of the Seine; a row of tall poplars on a flat shore. In the distance is a town.

Harvest, The. Léon L'Hermitte; Museum of Fine Arts, Saint Louis, Mo. A realistic picture of peasants harvesting grain by hand.

Harvesters at Rest. Léon L'Hermitte; Wilstach collection, Philadelphia, Pa. A peasant woman is bringing a midday meal to two men who are seated on the ground. A similar group, by the same artist, under the title "Harvesters' Meal," is in the Institute of Arts and Sciences, Brooklyn, N. Y.

Hatchings. Lines, either parallel or crossed, by means of which the modeling of objects is indicated in engraving. By these lines, according to their size and closeness, the engraver is able to suggest tones, to render the effect of vibrating lights, and to mark distinctly the form and even the texture of an object.

Hay Wain, The. John Constable; National Gallery, London. A wagon is being driven through a shallow stream in the foreground; cottage and trees beyond.

Heart. In Christian symbolism the heart represents the greatest of the three Christian virtues, charity; the symbols of faith and hope are, respectively, the cross and the anchor.

"Herringbone and Dots." A very frequent *motif* found in Oriental rugs. It is a simplified representation of a reptile from which all features have been eliminated except the indication of the spine and the scales.

Hewer, The. George Grey Barnard. A heroic, kneeling figure in marble, representing a primitive man hewing wood with a stone hatchet. In conception and execution, this is one of the best productions of American sculpture.

High Light. In a picture, the high light is that spot which appears to the eye to be of the greatest brilliance. Since this high light is always a reflected light, it is found only on such surfaces as reflect and do not absorb the light. A high light, for instance, may appear upon a burnished metal plaque or in an eye, but it is never seen upon materials of dull, heavy texture.

High Relief. A piece of sculpture executed upon a flat or curved surface, from which it projects more than half

the apparent total thickness of the figures, or so far as to resemble a sculpture in the round.

Hille Bobbe. Frans Hals; Berlin Museum, Berlin. Portrait of a fishwife of Haarlem, with an owl perched on her shoulder. A work which well illustrates this artist's comic power. A similar portrait of this woman, the work of Hals or one of his pupils, is in the Metropolitan Museum, New York City.

Historic Painting. The painting of historic scenes, or of scenes in which historical personages are represented.

Holy Family. Murillo; the Louvre, Paris. The Virgin, robed in blue, seated in the center of the picture, holds the Infant on her knees before the adoring Saint Elizabeth and the child Saint John.

Holy Night. Correggio; Royal Gallery, Dresden. Bright light in the center of the picture radiates from the Christ Child lying upon a bed of straw. The morning is just breaking over the hills in the distance.

Hope. George Frederick Watts; Tate Gallery, London. A single figure, seated on a segment of a great globe, eyes blindfolded, all but one of the strings of her harp broken, is represented as clinging alone to a deserted world.

Horse Fair, The. Rosa Bonheur; Metropolitan Museum, New York City. Heavy white and sorrel Percheron horses are being led or ridden by men in blue blouses.

Horses of Achilles, The. Henri Regnault; Museum of Fine Arts, Boston, Mass. The horses, conscious of their master's approaching death, resist the charioteer's attempts to harness them.

Immaculate Conception. Murillo; the Louvre, Paris. This is accounted one of the greatest of Spanish paintings. A graceful figure in blue mantle, with the crescent moon beneath her feet, surrounded by throngs of cherubs, is gazing into heaven.

Impasto (*im-pàs'tō*). The application of very thick oil color to the surface of a canvas. The purpose of impasto is to give the effect of relief, force, and solidity to the objects represented.

Indian Hunter. John Q. A. Ward; Central park, New York City. A fine bronze group of an Indian and his dog, both in alert attitude.

Inlaying. A method of decorating objects, such as weapons or furniture. It consists in incising patterns on the surface of the object and filling the spaces thus formed with pieces of variously colored wood, ivory, metal, or mother-of-pearl.

In Pasture. Jules Dupré; City Art Museum, Saint Louis, Mo. A background of field and trees. In the foreground a cow is straining at the rope held by a peasant.

Interior of a Cottage. Josef Israëls; Corcoran Gallery of Art, Washington, D. C. Light from the cottage window bathes the figures of a sleeping child and a woman sewing.

January Day, A. W. Elmer Schofield; Museum, Cincinnati, Ohio. A canvas of tall gray trees, mingling with evergreens; on the ground, broken patches of snow, the sky blue and cloud flecked.

Joan of Arc. Anna V. Hyatt; Riverside drive, New York City. Replicas of this statue have been erected at Gloucester, Mass., and at Blois, France. It is a work worthy of comparison with the best of modern French sculpture.

Joan of Arc. Julien Bastien-Lepage; Metropolitan Museum, New York City. Joan stands in listening attitude by a tree. In the background, vague figures suggest her vision of Saint Michael, Saint Catherine, and Saint Margaret.

Joan of Arc at Domremy. Chapu; the Louvre, Paris. Marble statue. The maid is seated on the ground, hands clasped on her knees, spiritual exaltation expressed on her upturned face.

Keokuk, Chief. Nellie V. Walker; Keokuk, Iowa. A notable heroic bronze statue of the famous Indian, erected on a high bluff overlooking the Mississippi river.

King Lear. Edwin A. Abbey; Metropolitan Museum, New York City. Cordelia stands in the center with the king of France; Goneril and Regan at the left. At the right, Lear, with his dog, is being led away.

Lake, The. Jean Baptiste Corot; the Louvre, Paris. The shore of a lake, overshadowed by great trees. Three human figures in the foreground. This canvas is sometimes called "Spring."

Landscape. A picture which represents natural scenery, and in which the interpretation of nature is the predominant feature; figures of men or of animals being introduced only as accessories, to give a tone of reality to the scene or to furnish a scale of dimensions.

Landscape with Windmill. Jacob Ruysdael; Royal Museum, Amsterdam. The masterpiece of this artist; counted by many as the finest landscape painting of the 17th-century Dutch school.

La Source. Jean A. D. Ingres; the Louvre, Paris. A painting of a young girl standing by a rock, while a stream of water pours from a jar on her shoulder into a pool at her feet.

Last Day of the Condemned Man. Munkácsy; Wilstach collection, Memorial Hall, Philadelphia, Pa. The picture illustrates the old Hungarian custom of allowing visitors to visit a prisoner on the day before his execution. This painting first brought fame to the artist.

Last Judgment. Michelangelo; Sistine Chapel, Rome. First exhibited on Christmas Day, 1541. The great fresco, lacking in unity of design, is filled with clouds and human figures, and centers about the Christ, who sits in judgment. It is literary rather than artistic in character. It declares itself as the work of an aging and fatigued man and it lacks the inspiration of the ceiling pictures.

Last Supper. Andrea del Sarto; in the refectory of the monastery of San Salvi, Florence. A treatment of this subject, surpassed only by that of Da Vinci.

Last Supper. Leonardo da Vinci; Church of Santa Maria delle Grazie, Milan. This famous picture embodies a wonderful character study of the apostles. In order, from left to right, the faces are those of Bartholomew, James the Less, Andrew, Judas, Peter, John, the Christ, Thomas, James the Greater, Philip, Mathew, Thaddeus, Simon. The moment is that when Jesus said, "One of you shall betray Me."

Latona and Her Children. William H. Rinehart; Metropolitan Museum, New York City. A marble group representing the queen mother bending over her children.

Law, The. Edwin H. Blashfield; mural painting in the Federal building, Cleveland, Ohio. The central figure symbolizes law; at the sides are portraits of personages notable in legal history.

Leonardo Loredano, Portrait of. Giovanni Bellini; National Gallery, London. One of the greatest of painted portraits. The subject, who was doge of Venice 1501–21, is posed wearing his official robe and cap of cloth of gold.

Lewis and Clark. Charles Keck; Charlottesville, Va. A monumental group of sculpture erected at the University of Virginia in 1919, the gift of Paul G. McIntyre.

Library of Congress. Washington, D. C. A monumental building in the style of the Italian Renaissance, begun in 1887 and completed in 1897, at a cost of over $6,000,000. Other than being one of the best planned and equipped library buildings in the world, it contains valuable examples of painting, sculpture, and mosaic.

The building forms a rectangle 340 feet by 470, enclosing a cross; the exterior walls are of granite. Many artists have contributed to the ornamentation and the enrichment of the interior in the mediums of marble, bronze, and color.

Lincoln. Augustus Saint-Gaudens; Chicago, Ill. A bronze statue in Lincoln park. This work is called "the greatest portrait statue in the United States." President Lincoln is represented standing in front of a great chair, as if about to address a multitude.

Lincoln Memorial. Washington, D. C. An imposing building, in the form of a Greek temple, constructed of a Colorado marble of extraordinary whiteness. The edifice, which was 10 years in building, stands upon a platform 204 by 134 feet wide, and rises 122 feet above the level of the Potomac. The memorial contains a colossal seated figure of Lincoln, by Daniel Chester French, cut in Georgia marble. The mural decorations are by Jules Guérin.

Lincoln Monument. Springfield, Ill. A granite structure 120 feet high, surmounted by a bronze statue of Lincoln, and flanked by bronze groups representing arms of the government service. Erected in 1874, at a cost of $200,000.

Line of Beauty. A term applied, in accordance with certain artistic theories, to a graceful curved or undulating line, which is held to be absolutely beautiful in itself. Such a line is commonly represented as a double curve, resembling an elongated letter S.

Lithography. A branch of the art of engraving in which the drawing to be reproduced is traced upon a stone with oily ink or crayon. The surface of the stone is wetted, and the printer's ink, which contains oil, adheres only to those portions of the stone where the design is drawn. Prints are struck off in the usual manner.

Loggia (Italian, "balcony"). Development of the antique bema and the rostrum. In medieval Italian towns a structure of considerable dimensions, roofed, slightly elevated, and open on three sides, from which orators addressed the people on the conduct of the city-states. Of such structures the best existing example is the *Loggia dei Lanzi*, Florence, with its imposing round arches, forming one side of the great square, on which fronts also the Old Town Hall (Palazzo Vecchio), erected in the early years of the 14th century.

Long Pond. Henry W. Ranger; Museum of Fine Arts, Syracuse, N. Y. A quiet sheet of water seen through openings in a fringe of trees.

Lost Pleiad (*plē'yăd*; *plī'ăd*). Randolph Rogers; Art Institute, Chicago, Ill. A marble figure of a girl, posed as if intently gazing into the distance.

Lotus. The Egyptian and Asiatic water lily. The first plant-form to be used in decorative design. It was introduced by the Egyptians into the mural painting of their tombs and temples (Old Kingdom, about 3400–2400 B. C.), not by reason of its beauty, but because, as a perennial, it represented to them the principle of immortality. In their art it was colored blue, like the Nile lily (*Nymphæa cerulea*), but, when it passed into Buddhistic symbolism, it imitated the white variety (*Nymphæa alba*), indigenous to India. As is true of the acanthus, its course may be traced without break through the history of ornament. From it was developed the honeysuckle pattern (anthemion) of Greek architecture and Greek ceramics, while numerous other derivatives appear in modern wall-decoration and in textiles.

Low Relief. A piece of sculpture so executed, upon a flat or curved surface, that the figures project less than half their apparent total thickness.

Luke, Saint. Tradition says that Luke, the disciple and companion of Saint Paul, was a physician and also a painter. Portraits of the Virgin were ascribed to him in the early Christian centuries. He has, therefore, always been regarded as the patron saint of artists. In pictorial art he is often represented as an evangelist, holding the book of his gospel, and with an ox at his side. In pictures of the Byzantine school and the schools derived from it, he appears as a youthful painter, with a portrait of the Virgin in his hand.

Luxembourg, Palace of the. Paris. Now the meeting place of the French Senate. The structure was built in the Florentine style by Jacques Debrosse for Marie de' Medici, widow of King Henry IV. It was erected 1615–20 and occupied the site of the old palace of the dukes of Luxembourg, from which it takes its name.

Macabre (*mȧ-kä'b'r*). A term applied to subjects, either painted, sculptured, or engraved, in which a representation of Death figures. Death may be delineated under either the form of a skeleton or that of an *écorché*, that is, a figure representing a body from which the skin has been removed.

Madame Lebrun and Her Daughter. Madame Lebrun; the Louvre, Paris. A noted and charming portrayal of motherhood and childhood.

Madame Récamier. Jacques Louis David; the Louvre, Paris. A portrait distinguished by its purity and simplicity. The lady, in white gown, reclines on a couch of pale yellow.

Madeleine, Church of the. Paris. A structure in the form of a Roman temple; resembling the Maison Carrée at Nimes, France. It has no windows, the gorgeously decorated interior being lighted through three cupolas. The exterior is distinguished by a colonnade of 54 massive columns. It was erected in the early years of the 19th century, the last directing architect being Vignon.

Madonna, The (Our Lady). Since the 6th Christian century, the mother of the Christ, accompanied by the Divine Infant, has been one of the most frequent subjects of religious art. At the time of Francis of Assisi (1182–1226) this theme received a further impetus through the highly spiritual and gentle character of the saint. It was he who established the ringing of the Angelus, commemorative of the Angel Gabriel's salutation to Mary, and who showed a truly maternal love for all created things, as is manifest in his canticles to the various forces of nature.

For purposes of identification, a madonna may be named from its original or later location, as the "Sistine," painted for the monastery of San Sisto, or the "Cowper," long in Cowper house, England. Some accessory in the picture may give it a title, as the "Madonna of the Harpies," named from figures of harpies on the pedestal upon which the Madonna is standing.

The following are among the most famous Madonnas:

"Alba Madonna." Raphael; Mellon Collection, National Gallery of Art, Washington, D. C. It was in the Hermitage Gallery, Leningrad, from 1836 to 1931, when it was purchased by Andrew W. Mellon from the Soviet government for $1,166,400.

"Madonna of San Sisto" (Sistine Madonna). Raphael; Dresden Gallery, Dresden.

"Madonna of the Goldfinch." Raphael; Uffizi Gallery, Florence.

"Madonna of the Chair." Raphael; Pitti Gallery, Florence.

"Madonna of Burgomeister Meyer." Holbein; museum at Darmstadt (copy in Dresden Gallery).

"Madonna of Murillo." Murillo; Pitti Gallery, Florence.

"Madonna of the Sack." Andrea del Sarto; S S Annunziata, Florence.

"Madonna, *La Belle Jardinière*." Raphael; the Louvre, Paris.

"Virgin of the Rocks." Leonardo da Vinci; the Louvre.

"Madonna." Bodenhausen; Leipzig Museum.

"Virgin in the Carpenter Shop." Dagnan-Bouveret.

"Madonna of the Carpenter Shop." Edward Simmons.

"Madonna of Bruges," group in sculpture; Cathedral of Bruges, Belgium.

"Madonna of the Candelabra." Raphael and certain of his pupils; Walters Gallery, Baltimore, Md.

Maison Carrée (*mâ'zôN' kȧ'rȧ'*). Nimes, France. A beautiful Roman temple of the rectangular Greek model. The building is 45 feet wide by 85 feet long; 30 Corinthian columns are spaced along the sides of the cella and around the entrance porch. Dating probably from the early years of the Christian era, the structure was long used as a church. It now serves as a museum.

Man with the Glove. Titian; the Louvre, Paris. A famous and powerful portrait in the artist's "first manner."

Marriage. Gari Melchers; Institute of Art, Minneapolis, Minn. A bride and groom standing, as if at the marriage altar.

Marriage à la Mode. William Hogarth; National Gallery, London. A series of six paintings, illustrating the agitated, unhappy married life of a wealthy citizen's daughter, wedded to the dissipated son of a peer.

Marriage at Cana, The. Paul Veronese; the Louvre, Paris. Painted in 1563. A very large canvas in which several of the figures are portraits of 16th-century sovereigns, among which are those of the emperor Charles V, Francis I of France, and the sultan.

Marriage of Saint Catherine. Correggio; the Louvre, Paris. The Holy Child is placing the ring upon the saint's finger as a symbol of spiritual union. The attendants are Saints Catherine and Christopher.

Massasoit. Cyrus E. Dallin; Plymouth, Mass. A bronze statue of the famous Indian friend of the New England colonists.

Mater Dolorosa (*mā'tĕr dŏ'lô-rō'sȧ*). The Latin phrase means "mother of sorrows." It is applied to the Virgin, when she is represented as sorrowing for her crucified Son. In art, the Mater Dolorosa is generally represented alone, sometimes with one sword in her breast, sometimes with seven, in allusion to the seven sorrows which she endured.

Medicine Man, The. Cyrus E. Dallin; Fairmount park, Philadelphia. A bronze work representing an Indian medicine man on horseback in an attitude of authority. It is a companion piece to the admirable equestrian statue "The Appeal to the Great Spirit" by the same sculptor.

Meeting of Air and Water. Isadore Konti; New Orleans, La. A fountain of stone and bronze erected in Audubon park, 1919.

Member of the Humane Society, A Distinguished. Sir Edwin H. Landseer; National Gallery, London. The subject is a large dog lying on a pier by the waterside.

Metope (*mĕt'ô-pē*). The space between two triglyphs in the frieze of the Doric order. In the primitive wooden structure this space was left open. In the later stone temple the window so formed was blocked by a panel (Greek *meta*, upon; *opē*, aperture). Metopes were decorated with either paintings or bas-reliefs. The term is applied also to the bas-reliefs found on metopes.

Mezzanine (*mĕz'ȧ-nĭn*; *-nēn*). Synonym of the French *entresol*. A small story placed midway between two floors of a building. Generally a mezzanine is found between the first and second higher ones. The term is applied also to the small windows, generally of greater length than height, which light an intermediate story.

Michelangelo. Paul Wayland Bartlett; Library of Congress, Washington, D. C. An impressive bronze representation of the great sculptor, standing with chisel in hand, as if meditating upon some great conception.

Middle Distance. Terms used to designate that part of a picture lying between the background and the foreground.

Milton Dictating Paradise Lost. Munkácsy; Public Library, New York City. The blind poet, seated in an armchair, dictates to his daughter, who is writing at a table in the foreground.

Minuteman, The. Daniel Chester French; on the battlefield at Concord, Mass. This sculptor's first important work, modeled from a cast of the "Apollo Belvedere." It represents a young patriot standing, alert, one hand on his plow, the other grasping a musket, as if awaiting a summons.

Modeling. In the art of sculpture, the process which consists in constructing, in clay or wax, the model which is to be reproduced in plaster, terra cotta, bronze, marble, stone, or wood. The term has also another meaning. The modeling in a painted portrait is good, when the painter has successfully indicated the various planes of the figure.

Mona Lisa (*mō'nā lē'zā*). Leonardo da Vinci; the Louvre, Paris. The portrait of the wife of Francesco del Giocondo. The picture is remarkable for its firm, pyramidal structure and for the finest hands painted during the Italian Renaissance.

Monochrome. A painting, drawing, or print executed in one color.

Mormon Tabernacle. Salt Lake City, Utah. A remarkable elliptical building, 150 feet in extreme width by 250 feet in extreme length. The roof of the structure, shaped somewhat like a turtle's shell, is self-supporting. This construction uses one of the largest self-supporting arches in the world. The auditorium seats 8000 people.

Motive. In music the word "motive" is a synonym of "musical phrase." In architecture it applies to a subject or theme of ornament. So also in decorative design. In the vocabulary of sculpture and painting it is less significant and less frequently used.

My Mother. James A. McNeill Whistler; Luxembourg Gallery, Paris. Called by Whistler "The Mother—Arrangement in Grey and Black."

Napoleon, 1814. Jean L. E. Meissonier; the Louvre, Paris. Napoleon returning from the battle of Laon. Behind him, on lower ground, appears a group of officers.

National Museum. Washington, D. C. A massive white granite structure with a frontage of 561 feet, a lateral extension of 365 feet, and a height of 82 feet. It is designed as part of the new grouping of public buildings in Washington. The museum contains the government collections and laboratories of natural history.

Nebraska State Capitol. Lincoln, Nebr. Architect, Bertram Grosvenor Goodhue. A notable innovation in American state edifices. A broad, low main building, 400 feet square, is constructed around four courts. In the center rises an impressive square tower, 400 feet high. The façade, with its setback, suggests that of the Pitti Palace at Florence (1430); while the tower indicates modern German influence, recalling, at the same time, the turreted structure over the crossing in the older cathedral at Salamanca, Spain.

Neutral. A vague color which does not present any predominant tone is said to be neutral. The term denotes particularly a gray of bluish violet tint used in water colors. Neutral tints form excellent grounds for pictures, since they increase the value of striking colors and cause the latter to stand out with peculiar brilliance.

New Mexico Art Museum. Santa Fe, New Mexico. A unique adaptation of Spanish-Indian Pueblo architecture. With the co-operation of the artist colony at Santa Fe and Taos, the building and its furnishings have been made representative of the art and life of the Southwest.

Night Watch. Rembrandt van Rijn; Royal Museum, Amsterdam. Called also "The Civic Guard" and "The Day Watch." This picture marks the "second manner" of the painter and is remarkable for its treatment of light and shade.

November Morning. Dwight W. Tryon; John Herron Art Institute, Indianapolis, Ind. Landscape in rich brown tones, in which the summer's green is still felt.

Nydia. Randolph Rogers; Art Institute, Chicago, Ill. A graceful marble figure, representing the blind girl of Bulwer-Lytton's *Last Days of Pompeii*.

Old Woman Cutting Her Nails. Rembrandt van Rijn. Altmann collection, Metropolitan Museum, New York. This homely subject is painted with great luminosity and renders with wonderful vitality the pose and action of the figure. Its attribution to Rembrandt, until recently unquestioned, is now disputed by Professor John Van Dyke of Rutgers college, New Brunswick, New Jersey. This critic, who is not without authority, asserts that the picture is the work of Nicolaes Maes (1632–93), a younger contemporary of Rembrandt, who for years employed a single model. The same face, the writer further affirms, appears in the later artist's "Sleeping Woman," Brussels Museum; "Praying Woman," Royal Museum, Amsterdam; and finally in "A Dead Woman," Brussels Museum.

Order. The term applied to the three principal styles of Greek architecture. They are entitled *Doric*, *Ionic*, and *Corinthian*. A combination of the Ionic and Corinthian is known as the composite order. In Roman times another and simplified order, the Tuscan, was developed from the Greek Doric.

Original. A term used to designate a picture, a drawing, or a statue from which copies or reproductions have been made.

Ornament. The term applied to a painted or sculptured motive, enclosed by regular or irregular lines, which contributes to the richness and effect of a work of art.

Oxen Going to Labor. Constant Troyon; the Louvre, Paris. In the foreground of a broad expanse of land, oxen are walking sturdily and calmly.

Oxen on the Beach. Sorolla y Bastida; Memorial Art Gallery, Rochester, N. Y. A yoke of oxen in the foreground, ready to haul the boat at the right of the picture to the stretch of sand above.

Palette (*păl'ĕt*). The palette is one of the principal requirements of the painter. It consists of a thin oval or rectangular board or tablet, generally of walnut or pear wood. It is hollowed out at one end, and provided with a hole through which the thumb is passed, in order that the palette may be held conveniently. Upon the palette the artist lays and mixes his colors.

Pan-American Building. Washington, D. C. A beautiful marble structure, the headquarters of the Pan-American Union. This edifice, designed by Albert Kelsey and Paul Cret, was completed in 1910, at a cost of $1,000,000. Among its many artistic features are the typical Latin American *patio* and the hall of the Americas, the latter said to be the most beautiful room of its kind in the United States.

Panel Picture. A picture painted upon a wooden tablet or panel, rather than upon a canvas. Altar pictures were so painted by the earliest medieval artists, and many specimens are to be seen in modern galleries.

Pastel (*păs'tĕl*; *păs-tĕl'*). A process of drawing in color by the use of crayons. The drawing is made upon paper having a rough surface or upon a canvas covered with a kind of distemper. The colors are laid on with hard crayons, while the lights, masses, and planes are indicated with soft crayons, which can be crushed and spread with the finger or stump. Drawings in pastel are easily effaced, since the whole surface may be destroyed with one stroke of the brush. They should be set, therefore, with a special fixative, and carefully shielded from air or dampness.

Patriotism Guarding the Flag. Paul Wayland Bartlett; Duluth, Minn. A statue carved in red Minnesota granite and erected at the foot of a great flagstaff designed by Cass Gilbert, architect.

Pediment (*pĕd'ĭ-mĕnt*). In classical architecture, the triangular portion of wall, above the entablature, forming the gable at the end of a building. The term is applied also to rounded construction having similar position and use. The facades of ancient temples were always crowned by pediments, the two sides of which marked the slope of the roof.

Perseus with the Head of Medusa. Benvenuto Cellini; bronze statue in the Loggia dei Lanzi, Florence. The hero stands over the body of the Gorgon, with a sword in his right hand and the severed head in his left.

Perspective. The art of representing, upon a plane surface, objects as they appear to the eye of the spectator viewing them from one fixed point.

Philip II, Portrait of. Attributed to Titian; Museum, Cincinnati, Ohio.

Philip IV of Spain. Velasquez; Metropolitan Museum, New York City. A full-length, life-size figure of the artist's royal patron.

Photo-Engraving. The general name for a variety of processes in which advantage is taken of the action of light upon sensitized surfaces to produce plates from which facsimiles of drawings and photographs may be printed. Photo-engraving processes all depend upon the preparation of metal plates for etching. The etching ground is a coating of gelatin or similar substance sensitive to the action of light. Exposed to light through a properly prepared photographic negative, portions of the coating become insoluble. When the soluble portion has been removed by washing, the etching of the unprotected portions of the plate with acid produces the desired printing surface.

In the *half-tone process*, a plate, usually of zinc or copper, is so treated that a printing surface composed of fine dots *in relief* is secured. The *photogravure process* consists in producing upon a copper plate an *incised* or intaglio pattern from which the picture is printed. The recently developed *rotogravure* is an adaptation of the photogravure to the rapid processes of the rotary printing press.

Pietà (*pyā-tä'*). The Virgin Mother mourning for the dead Christ. The incident is represented as occurring at the foot of the cross. The most famous example of this frequently treated theme is the marble group by Michelangelo, in Saint Peter's, Rome. The technical excellence of this work resides in the study of the living body as contrasted with the cadaver.

Examples in painting are: by Titian, in the Academy, Venice; by Fra Angelico, in Museum San Marco, Florence; by Carlo Crivelli, in the Metropolitan Museum, New York City.

Pilgrim, The. John Q. A. Ward; New York City. A heroic bronze statue in Central park.

Pilgrims Going to Church. George H. Boughton; Public Library, New York City. A group of Puritans in a snow-covered forest clearing; the men of the party are armed and watchful. Called also "Puritans Going to Church."

Pioneer, The. A. Phimister Proctor; Eugene, Oregon. A bronze statue erected on the grounds of the University of Oregon, 1919.

Plein Air. The term "plein air" is applied to a school of modern French painters because of their practice of painting in the open air.

Polychrome. A term applied to art works in which several colors are used. Greek sculpture was polychrome, that is to say, gilded and painted in a variety of tones, principally blue, green, and red.

Ponte Vecchio di Firenze, Il (The Old Bridge at Florence). Title of a sonnet written in both Italian and English by the poet Longfellow. In these few lines the Bridge, imaginatively endowed with life and speech, relates the history of the city of Florence, whose two parts, separated by the river Arno, it has joined since the middle of the 14th century. Considered as a work of architecture, this bridge is interesting, since, supporting shops at either end of the central arcade, it shows the economy of space practiced in the medieval walled town. Bridges with houses, like the superposed stories of the roofs in buildings north of the Alps, were the modest ancestors of the American skyscraper.

Pot of Basil (*bŏz'ĭl*), **The.** John W. Alexander; Museum of Fine Arts, Boston, Mass. A picture inspired by the story told in the poem "Isabel" by Keats, which was itself derived from the Italian of Giovanni Boccaccio (1313–75).

Reading from Homer. Alma-Tadema; privately owned. The faces of the listeners reflect the enchantment of the tale from the ancient poet, read from a scroll by a youth seated on a dais at the right of the picture. The figure of the woman with luxuriant auburn hair is a portrait of the second wife of the painter.

Relief. The term relief as applied to painting designates the apparent projection of objects, an effect produced by modeling or by a gradation of tints. In sculpture, a relief is a work executed on a flat ground, from which the figure or series of figures projects in a greater or less degree. According to their degree of projection, the sculpture is said to be in high or low relief. In architecture, the moldings and systems of ornament which project from the surface of a wall are termed reliefs.

Republic, The. Daniel Chester French; Chicago, Ill. A heroic, ideal sculptured figure, erected in Jackson park.

Retreat from Moscow. Paul Gustave Doré; Metropolitan Museum, New York City. A group of Napoleonic soldiers seated in a cart are being followed by a squad of Russian cavalry.

Rising Storm, The. George Inness; Art Institute, Chicago, Ill. Clouds darkening a broad landscape; in the right foreground a man driving a horse and cart.

Rococo (*rō-kō'kō*). (French *rocaille*, "shell-work.") A decorative style popular in Europe in the 17th and 18th centuries. It was characterized by a profusion of riotous ornament, consisting of scrolls, foliage, and fantastic animal forms, intermingled and often confused.

Rood Screen (rood, or rod, signifying the Cross of the Crucified). A low wall of stone or an iron grill used to separate the clergy in the apse from the laymen in the nave. It sometimes supports a gallery from which portions of the service are read, and it is capped by a Crucifix with the attendant Virgin and Saint John the Evangelist.

Roosevelt, Theodore. A. Phimister Proctor. An equestrian statue erected in Portland, Oregon, 1922.

Saint Anthony and the Infant Christ. Murillo; Berlin Museum, Berlin. The saint is kneeling, and holds the Christ Child in his arms.

Saint Mark's Basilica. Venice. This structure is called the most splendid piece of polychromatic architecture in Europe. It is 250 feet long, and measures 170 feet from north to south at the transepts. Byzantine in style, its construction, alteration, and reconstruction date from successive periods between the 12th and the 16th century. The basilica is especially famous for its mosaics representing scenes from the Bible and ecclesiastical history.

Salon (*sȧ'lôN'*). The exhibition of the works of living artists held annually in Paris, by the Society of French Artists. The title *salon* comes from the *salle carrée* of the Louvre, in which exhibitions were formerly held.

Scarab (*skăr'ăb*). A stone carved in a conventionalized form of the scarabæus, or dung beetle, which was regarded by the ancient Egyptians as a symbol of resurrection and immortality. Scarabs were prized among the Egyptians as seals and amulets.

Scottish Rite Temple. Washington, D. C. A notable building modeled after the Mausoleum erected by Queen Artemisia at Halicarnassus, Asia Minor, in the 4th century B. C., and accounted one of the wonders of the ancient world.

Scumbling. The process of softening the colors of a picture by blending them with a neutral tint, applying this neutral tint over the colors with a nearly dry brush.

Shade. That part of a picture, a drawing, or an engraving representing objects which, not being struck by luminous rays, are relatively obscure. The term is used also to denote the result of the mixture of several colors, with special reference to the degrees of luminosity produced by mixing black or white with pure color.

Shadow, Cast. A shadow projected upon a surface by a body interposed between it and a source of light.

Shaft. The part of a column, of cylindrical form, between the base and the capital. The surface of the shaft is sometimes smooth, sometimes decorated with flutings or with foliage patterns arranged in spirals. Half the diameter of a shaft, measured at its base, is called a *module*, and serves as the scale, according to which the other parts of the column and the entablature are proportioned.

Shakspere. Frederick W. MacMonnies; portrait statue in the Library of Congress, Washington, D. C.

Shaw Memorial. Augustus Saint-Gaudens; Beacon street opposite the Statehouse, Boston, Mass. Bronze relief group representing the colored regiment commanded by Colonel Robert Gould Shaw in the Civil War. The marching men form a background for the figure of Colonel Shaw on horseback.

Siddons, Mrs. Gainsborough; National Gallery, London. The great actress wears a blue gown and the typical Gainsborough hat.

Siddons, Mrs., as the Tragic Muse. Sir Joshua Reynolds; Grosvenor house, London. The pose and action of the figure recall the Sibyls of Michelangelo in the Sistine Chapel, Rome.

Singing Tower. A delicately tapered tower, octagonal at the top, in an exquisite landscape setting at Mountain Lake sanctuary, near Lake Wales, Florida, the creation and burial place of Edward Bok. Built of pink Georgia marble and coquina rock, it rises 205 feet from a base 51 feet in diameter to a richly ornamented crown 37 feet across. It was dedicated on February 1, 1929, by President Coolidge as a gift of the builder to the American people. The tower was designed by M. B. Medary.

Slave Ship, The. J. M. W. Turner; Museum of Fine Arts, Boston, Mass. A storm-driven ship on a luridly lighted sea strewn with human bodies. This picture has occasioned much controversy.

Song of the Lark, The. Jules Breton; Art Institute, Chicago, Ill. A girl, on her way to work in the fields, pauses to listen with rapt attention to the song of a lark.

Sower, The. Jean François Millet; privately owned. Often said to be Millet's most successful picture. It represents a vigorous figure of a man, striding across a field, broadcasting the grain with his hand.

Spirit of '76. Archibald M. Willard; Town hall, Marblehead, Mass. Painted in 1876. The old man in this familiar picture is said to be a portrait of the artist's father.

Spring. Anton Mauve; Metropolitan Museum, New York City. In the foreground a shepherd with his dog facing a flock of sheep in green pasture; a row of young trees at right.

Spring. Botticelli; Academy, Florence. An allegorical picture founded upon a literary theme first treated by the Latin poet Lucretius and, during the Renaissance, by the Florentine Poliziano. It contains the figures of Flora, the Graces, and the god Mercury. It was produced as a wedding gift for Lucrezia Tornabuoni, daughter of a powerful family of Florence.

Statehouse, Massachusetts. Conspicuously located on Beacon Hill, Boston. The design of the original Georgian and central portion of the building is the work of Charles Bulfinch. The structure is distinguished by its large gilded dome.

Stele (*stē'lē*). An upright stone used by the Greeks as a monument commemorative of persons or historical events. Certain relief sculptures found on Athenian stelæ take high rank among the remains of Hellenic art.

Stenciling. A simple method of executing decorative paintings. A piece of stiff card in which the desired pattern has been cut is laid upon paper. Color is then applied, reaching the paper only where the card has been cut away.

Still Life. A term applied to pictures which have for their subjects fruit, flowers, vases, and such other inanimate objects as usually form the accessories rather than the main interest of pictures.

Stippling. The process of executing a painting, a drawing, or an engraving by a series of small touches, strokes, or dots, instead of long strokes or hatchings.

Strigil (*strĭj'ĭl*). An instrument of bronze or ivory, with which the ancients scraped their limbs after bathing, and which the ancient athletes employed to remove the oil after anointing their bodies.

Summit of the Sierras. William Keith; Institute of Art, San Francisco, Cal. A foreground of green slopes and storm-twisted trees; snowy summits rise in the distant background.

Sun Vow, The. Hermon A. MacNeil; privately owned. A bronze group, said to be the most perfect production of this artist. "An old Indian, seated, watches the effort of a boy who shoots an arrow toward the sun."

Swastika (from the Sanskrit, "fortunate"). A cross with equal arms, each having its end turned backwards at right angles to the arm. It is one of the most universal and widespread of art forms among primitive peoples, regarded among some as a symbol of polyandry or fertility and more generally as a promise of good luck. It was adopted as the emblem of the Nazi government of Germany.

Sycamore Hill. Edward W. Redfield; Carnegie Institute, Pittsburgh, Pa. An excellent example of this artist's power in painting winter landscapes. Promise of new life lurks in the stream and the trees.

Symbol. In art, a conventional representation of figures or objects, which serve as the signs of ideas.

Tanagra (*tăn'ä-grä*) **Figurines.** Small terra cotta figures made in classical antiquity, the most beautiful specimens having been found at Tanagra in Bœotia. Figurines from this place, either painted or gilded, are highly prized by collectors for delicacy of execution and their inexpressible charm. They represent divinities, ladies of fashion, or animals.

Technique (*tĕk'nēk'*). This term, in painting and sculpture, denotes manipulative skill, mastery of material, and all those qualities of hand and eye which contribute to the achievement of excellence in a work of art.

Tempera (*tĕm'pä-rä*). See *Distemper*.

Terra Cotta (*tĕr'ä kŏt'ä*). A baked clay, specifically that of a brownish red color, which has always been used by sculptors for their less important works. In the 15th century, when variously colored and glazed, it was used with great success by the Della Robbia family of Florence.

Texture. A term applied to the arrangement of neighboring tones, or of different shades of the same color in alternation or juxtaposition. The word texture is used also to denote the quality of the surface of textiles.

Thrust. The force exerted by an arch against a supporting pier.

Tone. A term applied to a variation of color or tint, produced by admixture of white or black. The same hue is retained, but it becomes lighter or darker when white or black is added. The word is applied also to the brilliance, the intensity of tint, or the dominant effect observable in the colors of a picture. In this sense, we speak of warm tones, cold tones, or energetic tones.

Tottenham Church. John Constable; Metropolitan Museum, New York City. An expanse of green lawn, beyond which the square church tower rises.

Transfiguration, The. Raphael; the Vatican, Rome. Two scenes, that on the mount and that in the valley, are presented with a very evident lack of unity.

Tribute Money, The. Titian; Dresden Gallery, Dresden. Jesus answering the questions of a Pharisee regarding the justice of paying tribute to Rome.

Triglyph (*trī'glĭf*). An ornamental element in the frieze of the Doric order. It consists of a block with two complete vertical grooves, or glyphs, incised in its face. The two beveled vertical edges each form half of the third groove. Hence the name, meaning three-grooved. The stone triglyph recalls the ends of the ceiling beams in the primitive wooden cabin.

Trinity Church, Boston, Mass. Noted church standing in Copley square. Designed by H. H. Richardson in French Romanesque style, with the tower inspired by that of the older cathedral of Salamanca, Spain. The interior wall decorations are by John La Farge, one of the first American mural painters. The stained-glass windows represent the best artists of the modern American, French, and English schools.

Tuscan. An order of architecture of the Etruscan style, called also the Rustic order. The Tuscan order is generally regarded as differing from the Doric only in being less refined in its proportions.

Two Natures, The. George Grey Barnard; Metropolitan Museum, New York City. A group of two figures; "a victor, half erect, half bending over a prostrate foe."

Valley Forge. Edwin A. Abbey; mural painting in the Pennsylvania State capitol, Harrisburg, Pa. Baron Steuben is drilling a squad of troops. Washington's headquarters can be seen in the background.

Values. The term applied to the relationships of light and dark parts and color intensities in a picture.

Vehicle. In the art of painting, the liquid with which pigments are diluted in order to render them of a usable consistency is termed the vehicle. In water color, the vehicle is water; in oil painting, oils of various kinds; while wax is the vehicle in encaustic painting.

Venus and Adonis. Correggio; Crocker Art Gallery, Sacramento, Cal. Venus admonishes the huntsman Adonis to avoid danger.

Venus of Melos. A Greek original statue discovered on the island of Melos in 1820 and now in the Louvre, Paris. It is a descendant of the nobler type of Aphrodite (Latin, Venus), created in the 4th century B. C., and dates most probably from approximately 100 B. C.

Vibrating. A term applied to a strongly marked, nervous, living effect of color in pictures.

Victory of Samothrace. Sculptor unknown; the Louvre, Paris. This statue of a female figure is said to be the most exquisite expression of movement left to us by antique art. It was executed to celebrate a naval victory of the Macedonian ruler Demetrius Poliorcetes over the Egyptian general Ptolemy in 306 B. C. The statue was discovered in Samothrace in 1863.

Washington. John Q. A. Ward. Bronze statue in front of United States Subtreasury building, New York City.

Washington. Thomas Ball; Boston, Mass. A bronze equestrian group which is a conspicuous feature in the Public Garden.

Washington Crossing the Delaware. Emanuel Leutze; Metropolitan Museum New York City. A large historical canvas, depicting Washington and his forces on their way to surprise the Hessian troops at Trenton, N. J., December 25, 1776.

Washington Monument, The. Washington, D. C. An imposing obelisk, interior of granite, exterior of white marble, erected as a national memorial to the first president of the United States. It is one of the loftiest masonry structures of the world, having a height of 555 feet, 5½ inches. The shaft alone is 500 feet, 5⅛ inches high, 55 feet square at the base, and 34 feet at the summit. The pyramid surmounting the shaft is 55 feet high, with a cap of aluminum.

The architect was Robert Mills. In 1848, the corner stone was laid, and during the next seven years the walls rose to a height of 152 feet, but, in 1855, work was suspended for lack of funds. The money, until this time, had been raised by popular subscription. In 1878, Congress having appropriated funds for the purpose, work was resumed, and the completed monument was dedicated in 1885. Robert C. Winthrop, who 37 years before had delivered the oration at the laying of the corner stone, was the orator at the dedication.

Washington, Portrait of. Gilbert Stuart; Metropolitan Museum, New York City. Painted in 1795. This picture represents a life-size figure, seen almost to the waist, and turned slightly to the right. It is known as the Gibbs-Channing-Avery portrait.

Willows, The. Corot; Cleveland Museum of Art, Cleveland, Ohio. A small canvas, with a cottage at the left, pollard willows at the right and in the background.

Windmill, The. Jules Dupré; Cleveland Museum of Art, Cleveland, Ohio. Landscape with windmill in center; background of cloudy sunset.

Woodcut. An engraving made upon wood; the term is applied also to the prints made from such an engraving.

Woodcutting. The art of woodcutting consists in drawing, or photographing, a design on the flat surface of a block of wood, generally boxwood, and in cutting away all that portion of the block upon which the design does not appear. The part of the block which is left in relief is covered with ink, and impressions of it are taken.

Wood-Gatherers, The. Corot; Corcoran Gallery of Art, Washington, D. C. A group of peasants at work on the edge of a forest. The picture was signed by Corot only a few days before his death.

Wood Sawyers. Horatio Walker; City Art Museum, Saint Louis, Mo. Two men in a farmyard are working with saw and sawbuck. Wood is piled against a fence behind the figures. The subject and the treatment have been described as those of an American Millet.

Young Bull, The. Paul Potter; National Museum, The Hague. A picture of powerful realism, held by many critics to be one of the greatest of animal paintings.

Young Woman with Water Jug. Jan Vermeer; Metropolitan Museum, New York City. An interior, lighted through a casement. On a table a brass basin, in which a young woman places a jug of the same metal.

TEST QUESTIONS

Point out the relation of the play-impulse to the rise of the fine arts 1503
How may the fine arts serve in furthering the development of democracy? 1503
Explain the advantage of the method used in this department in treating the history of painting. 1504
Characterize the four historic styles of architecture 1504
Discuss the method of treating in this department the history of sculpture 1504

MUSIC

Summarize the styles and development of music in its various stages of growth . . . 1505
Characterize the uses of music among the Egyptians 1505
Discuss the use of the musical scale in the East 1505
State a distinguishing characteristic of Hebrew music. What kind of musical scale did the Arabs develop? 1505
What was the chief musical instrument of ancient Egypt? How is this instrument referred to in the Bible? 1505
Name two of the chief musical stringed instruments used by the ancient Hebrews; four of the principal wind instruments . . . 1505–06
Characterize the typical ancient Greek lyre. Name several forms of this instrument . . 1506
What two wind instruments were important among the ancient Greeks? 1506
Indicate the esteem with which the Greeks regarded music 1506
Name one of the earliest treatises on polyphonic music 1506
What grouping of notes was the foundation of the Greek music system? 1506
Give the name of a famous composition of the early 13th century in England . . 1507, 1533
Outline the career and indicate the importance of Orlandus de Lassus 1507
What is meant by the secularization of Church music? Point out the bearing of this process upon the career of Palestrina. Indicate the character of his work 1507
Summarize the important work of Adrian Willaert in Venice 1508
Describe the origin of the opera in Florentine school 1509
Discuss the rise of troubadours and minstrels in Europe 1509
Indicate the importance of the strolling players in the development of music in medieval times 1509
Explain why J. S. Bach is called the "father of modern music." 1510
Compare the careers and powers of Handel and J. S. Bach 1510
What place does Gluck occupy in the history of modern opera? Give the titles of several of his operas. How many operas did he write? 1511
Name the two most famous oratorios by Haydn 1511
Indicate the variety of musical composition in which Mozart excelled 1511
Who was César Franck? 1512
Point out two distinguishing characteristics of Beethoven's music. Name one opera and one oratorio by this master 1512
Name two groups of Schubert's most popular compositions 1512
In what type of music is the work of Weber of greatest importance? What other composer was largely indebted to Weber for the style of his productions? 1512
Characterize the work of Mendelssohn-Bartholdy. Enumerate several of his most important works 1512
Define Schumann's position in musical history. In what kind of composition is his best work found? 1512
For what instrument chiefly did Chopin write? 1512
State the most important contribution of Berlioz to musical art. Enumerate several of his most successful compositions . . . 1512
Describe the type of piano playing and the musical form originated by Franz Liszt . . 1512
What is the notable characteristic of Rossini's most celebrated compositions? Enumerate the most famous operas by Donizetti. Account for the mastery of art shown by Verdi in "Aida" and "Otello." 1513
Indicate the relation of Brahms to romanticism and classicism in music 1513
Name three famous operas by Meyerbeer; two by Saint-Saëns 1513–14
Indicate the place in musical history assigned to Richard Wagner. Characterize Wagner's use of the orchestra. Point out the position of "The Flying Dutchman," "Tannhäuser," and "Lohengrin" in the growth of Wagner's art 1514
Around what fairy tale did Humperdinck write a famous opera? 1514
Characterize the compositions of Tchaikovsky 1515
Describe the program music of Richard Strauss. Name three of Strauss's more important works 1515
Name two modern composers whose work resembles that of Tchaikovsky 1515
Who was the pioneer of the Russian nationalistic school? Give the title of one of his operas 1515
For what is Mussorgsky most widely known? 1516
Give the names of two pupils of Rimski-Korsakov and describe the works of each . . 1516
Characterize the work of Shostakovich . . . 1516
How did oppression affect the music of Czechoslovakia? 1516
To what nation did Dvořák belong? Name two of his best works 1516, 1519
Describe the unusual characteristics introduced by Grieg into his shorter compositions 1516
Name a leading composer in each of the following: Brazil, Mexico, Argentina, Cuba . . . 1517
Describe some of the radical changes that have taken place in music in modern times . 1517
Characterize the work of Debussy. Indicate two of his greatest works 1517
What is atonalism and who is acknowledged to be its chief exponent? 1517
With what performances and with what date is American appreciation of serious secular music said to have begun? 1518
Who were the first three native composers of American music? 1518
How did the New England Puritans regard the pipe organ? 1518
Where and when was the earliest concert of record presented in America? 1518
What effect did the Revolutionary War have on the musical life of America? 1518
What type of music did Stephen Foster produce? Give the titles of three of his compositions 1518
Describe briefly the work of John Philip Sousa; Victor Herbert; Irving Berlin 1519
Who wrote "Showboat"? "Oklahoma"? . . 1519
What type of music did Paul Whiteman and Ferde Grofe develop? 1519
What influence has jazz exercised on the serious art-music both in America and Europe? 1519
Give the name of one of the oldest choral societies in the United States 1520
Outline the work of Theodore Thomas . . . 1520

How did George Eastman and Augustus D. Juilliard advance the study of music in the United States? 1520
What is folk music and how does it differ from primitive music? 1521
What important part did the folk songs of Italy play in developing their 19th century music? 1521
What is the oldest known English folk song? 1521
Tell something of the history of the music of Ireland and Scotland. How did the ancient Irish regard their minstrels? 1521
Discuss the music of the North American Indians 1521
What can be said of the origin of folk music in the United States? 1521
What is the origin of the melodies which the Negro adapted to his "spirituals"? 1522
Summarize the contributions of Helmholtz to the theory of music. What are overtones? 1522
Distinguish between musical tones and mere noise 1522
Define pitch, intensity, timbre 1522
Describe the manner in which the ear receives and records sounds 1523
Describe the origin of the neumes. In what respect were they found unsatisfactory? . 1524
Explain the way in which Guido of Arezzo used the neumes. Show how the musical staff developed from his device 1525
Indicate the origin of the word clef. What clefs are now in common use? 1525
Who is credited with having first assigned definite time values to the neumes? . . . 1525
Name the notes used in 12th century music . 1526
Enumerate the ecclesiastical modes 1526
What is a key signature? 1526
Distinguish between normal minor, harmonic minor, and melodic minor scales 1527
Of what are rhythmic groups in music composed? What is duple rhythm? triple rhythm? simple rhythm? 1527
Define syncopation. Point out the meaning of a time signature 1527
Distinguish between one part forms and two part forms. Describe the song form with trio 1528
Define musical form; motive; phrase. Describe a musical period 1528
What is a rondo? 1529
Describe the usual structure of a march . . 1529
Outline the structure of a musical suite . . . 1529
Into how many classes is the song divided? . 1529
Name three great composers of overtures. Describe the three types of overture that are recognized today 1530
Outline the structure of the modern sonata cycle 1530
From what form was the symphony developed? Name two composers who contributed most to its development 1530
What is a symphonic poem and who first made use of this term? 1531
Trace the origin of the concerto. For how many instruments is this form written today? . 1531
Describe the form of composition known as a mass 1531
Point out the services of Pope Gregory the Great 1531
Name the first oratorio. Describe its structure 1532
Of what parts does the present day cantata consist? 1532
Define the term aria 1532
Characterize the vocal manner called recitative 1532
What is the contrapuntal style? In what musical form did it originate? 1533
What was the *organum*? 1533
Describe the musical form known as canon. What is double counterpoint? Indicate the distinctive characteristic of the fugue. How are fugues classified? Who is the greatest master of the fugue? 1533–1534
Describe the equipment of a modern pipe organ 1534
Discuss the following keyboard instruments: Clavichord; harpsichord; spinet 1534
Name three classes of modern musical instruments 1535
Describe the modern pianoforte and tell how it ranks with other musical instruments . 1535
What two composers have made notable use of the pianoforte in orchestral compositions? 1535
Discuss some of the varied musical effects that may be produced on the violin. Indicate the characteristic timbre of the strings of the viola 1535
For what scenes and ideas is the music of the harp especially appropriate? Outline some of the tonal effects produced by various combinations of the stringed instruments of the orchestra 1535–1536
Characterize the tone qualities of the flute; of the oboe 1536
For what musical effects is the English horn appropriate? the bass clarinet? the bassoon? 1536
Indicate the musical capacity of the tenor trombone 1536
Describe the saxophone 1537
What kind of drumsticks are used with kettledrums. Characterize the emotional effects of the kettledrums 1537
Discuss the development of the modern orchestra 1537–1538
Name several composers who have developed the range and the capacities of the orchestra 1538
Discuss the manner in which modern composers write for the orchestra 1538
How are symphony orchestras in the United States supported? 1539
Outline the uses of the piccolo flute and the clarinets in the military band 1539
Discuss the uses and qualities of the following military band instruments: horn; trumpet; cornet; alto cornet; tenor horn in B flat 1540
Describe the Novochord; the Theremin . . . 1541

OPERAS

What famous historical character is the central figure in Meyerbeer's opera "L'Africaine"? Describe the conduct of the island queen, Selika 1549
How does "Aïda" rank in popularity among Verdi's operas? Where is the location of the story? Describe the final scene of the opera. 1549
Summarize the story of "Andrea Chénier". . 1549
Outline the plot of "The Barber of Seville" . 1550
Name the characters in "The Bartered Bride" 1550
In what setting is the story of "La Bohème" placed? 1550
Tell the story of "The Bohemian Girl" . . . 1550
How was "Carmen" first received by the public? Recount the story of this opera. . 1550
From what source is the plot of "Cavalleria Rusticana" derived? Upon what dramatist's work is the opera of "Le Cid" founded? 1550
By whom was the music of "The Daughter of the Regiment" composed? Summarize the plot of the story 1550–1551
Tell how fate overtakes Don Giovanni in the opera of that name 1551
What motive prompts the suicide of the hero Ernani? 1551
Who wrote the music of the opera "Faust"? What fact indicates the popularity of this opera? Recount the story of the opera . . 1551
Characterize the opera of "Fidelio" by Beethoven. Outline the story 1551
Whence is the plot of "Der Freischütz" derived? What character represents the supernatural element in the story? 1551–1552

In what country is the setting of "Lakmé" placed? 1552
Describe the leading scenes in "Lohengrin" 1552–1553
Who wrote the music for "Lucia di Lammermoor"? 1553
Name the leading characters in "Madame Butterfly." Summarize the plot of "Manon" 1553
Tell the story of "Martha" 1553
Upon what work is the plot of "Mignon" based? 1553–1554
Who were the authors of "The Mikado"? . 1554
Indicate the position of "Orpheus and Eurydice" among operas 1554
Recount the story of "Parsifal" 1554–1555
Who wrote the opera "H. M. S. Pinafore"? . 1555
Who is the prophet in Meyerbeer's opera of that name? What fate overtakes him? . . 1555
Name the operas included in "The Ring of the Nibelung." Tell the story of each . .1555–1556
Upon what play is Strauss's opera of "Salome" based? 1556
Outline the opera "Tales of Hoffman" .1556–1557
Recount the story of "Tannhäuser" 1557
Summarize the story of Athanael in the opera "Thaïs" 1557
Describe the final scene of "Tristan und Isolde" 1557–1558
What is the rank of "William Tell" among Rossini's operas? 1558
Characterize Mozart's opera, "Die Zauberflöte" 1558

PAINTING

Define the art of painting. Outline two plans for the historical study of this art 1559
Describe the use of color in the decorative system of the Egyptians. Compare the effects of atmospheric conditions upon Egyptian and Assyrian painting 1559
Estimate the character of the paintings of Zeuxis, Parrhasius, and Apelles in ancient Greece. Name two famous Greco-Roman copies of Greek paintings 1559
For what purpose were mosaics employed by Byzantine artists? In what period did this type of art flourish? 1560
In what Italian cities did the modern art of painting take its rise? 1560
Show that Duccio rather than Cimabue is the true father of modern painting. Who was the founder of the Florentine school? Where are the best examples of Giotto's work to be found? 1560
What reason prompted general acceptance of Giotto's murals in his own time? 1560
Estimate the influence of Giotto on modern painting. 1560–1561
To what three artists do we owe the laws of perspective? 1561
Estimate the service of Masaccio to the development of painting. What great advance did Piero della Francesca make? 1561
What influences favored the introduction of the nude into painting in the 15th century? 1561
Characterize the treatment of the adult nude by several painters just before the High Renaissance 1561–1562
What two commissions given by Pope Julius II signalize the High Renaissance? 1562
Describe the theme and style of Michelangelo's frescoes in the Sistine Chapel 1562
What themes did Raphael treat in the study of Pope Julius? Describe his method of presentation. 1562
Characterize the genius and the work of Leonardo da Vinci 1562–1563
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EDUCATION
KNOWLEDGE IS POWER

EDUCATION

INTRODUCTORY

An organized educational system, carried on by professional teachers and provided with suitable material equipment, such as special school buildings, textbooks, maps, and scientific apparatus, is a product of modern civilization. Primitive peoples and societies in the earlier states of civilization had no institution such as the school which we know today. They did, indeed, give their youth some preparation for the later activities of adult life, but this training was acquired through imitation of the older members of the family or tribe, and the process of education was in no wise separated from the general life of the group. The savage boy learned to use the implements of war and the hunt by being a part of the tribal group that engaged in these activities. Girls were trained in domestic duties by the older women. There was no special body of knowledge that required for its transmission an institution and a teacher.

Beginnings of Special Education. The first demand for a definite type of education, which appeared as civilization advanced and as the earlier unsystematic type of education became inadequate, was the demand for religious training. Primitive tribes frequently organized elaborate ceremonies at the time when the boy became a candidate for admission to adult society, and through these ceremonies initiated him into the secrets of tribal religion. Special education of the girls was never as fully organized as was the special education of boys. Indeed, even in modern times, the informal imitative type has more commonly prevailed in the training of girls than in the training of boys.

The special ceremonies which were developed in primitive tribes for the education of boys were usually reserved for the privileged classes. In those primitive societies where the distinction between the ruling class and the slaves was marked, it was only the upper class that enjoyed the advantages of initiation into tribal practices. The sons of the warriors who were to become the priests or the military leaders of the tribes were the ones who were given special education, and this instruction was usually imparted by the priests.

Development of Secular Education. From institutionalized education under the supervision of the church to public education under the control of the state is a step which can readily be understood. One has only to recognize the fact that, as civilization became more complex, special bodies of knowledge accumulated, which were not religious in character and were not susceptible of transmission through simple imitation. As soon as any nation began to develop a literary language which was more complex than the primitive language of the semi-barbarous tribe, it was natural that there should be set aside a certain group of individuals to cultivate and transmit the literary traditions of the nation.

Throughout the history of educational systems, the transmission of literary material has been one of the main functions of the school. The result is that the content of the course of study in schools of all grades is very largely literary. Training in industry and instruction in the ordinary practices of social life are, even in modern times, left very largely to the family or to the intimate social group in which the child grows up; but the family is not able to give to the child the amount of attention which is necessary to provide him with the full knowledge of language, history, literature, and other similar literary subjects.

Growth of Public Education. What originated as the practice of the nobility has gradually come to be the general practice of the community. Schools have been set up by all modern communities, and their children have been brought together under the supervision of teachers trained to handle large groups and thus relieve parents of the necessity of individual training or private tutoring of their own offspring. So significant has it become for modern society that children be properly introduced to the special bodies of knowledge necessary for successful living, that the state has finally taken over the whole matter and has even gone so far as to prescribe that every child must be in attendance at a public school. All modern nations have educational laws of more or less complete compass, and are prepared to enforce these laws in such a way as to provide, with a high degree of certainty, that no child shall escape training in the fundamentals necessary for social intercourse.

For example, it is intolerable in modern society that any considerable number of persons shall be unable to read. Reading is necessary in order that there may be ready communication between a government and its citizens.

What has been said with regard to reading can be repeated with reference to the ability to use numbers. Modern society cannot be carried on unless its members are able to count and to execute with accuracy some of the simpler calculations which are necessary for commerce and trade. Here, again, it is not possible to depend on the individual family to prepare its children in the use of numbers. Consequently, society has provided by law that every child shall attend the organized school long enough to acquire at least the rudiments of number.

Expansion of the Curriculum. One must be able to write, as well as to read and perform correctly simple calculations. A century ago these activities, commonly known as "the three R's," were all that society demanded as essential to an elementary or common education; but the commercial relations into which every one must now enter and the social activities which every citizen must share are gradually making it necessary that every citizen shall have knowledge that extends far beyond the rudimentary branches. One must know something about geography if he is to be an intelligent member of a community such as we have in the United States. One must know something about the history of one's country. For these and like reasons, we find that state legislatures have been prescribing in recent years a large number of subjects to be taught in the schools.

American and European Schools. A study of the schools of the United States will bring out characteristics which most Americans do not know to be unique. It is proper therefore at the outset to call attention to the important fact that the schools of this nation have characteristics which could appear only in a democratic educational system.

First European University. The European schools took on their present form during the late medieval period. As late as the 12th century there

were in Europe no educational institutions other than the monasteries within the Church, where the clergy received such training as was held to be necessary for their calling. During the 12th century the first great schools of Europe were organized. These were not schools for the common people nor for the training of youth for any of the common activities of life. Special institutions were not regarded as necessary for the training of ordinary children. The first schools were intended only to give that special type of education which would raise the individual to a position of unusual influence and power.

The first of these institutions was a law school at Bologna, Italy, chartered in 1158. One Irnerius had succeeded in translating the codes of law of the northern Italian cities. He lectured on these codes to students who came from all parts of Europe to prepare themselves to maintain their places as members of the governing classes of the nations to which they belonged. This was the beginning of the first of the great medieval universities.

It will be seen from this brief description that the institution was what we call in modern terms a higher professional institution. Other similar institutions were organized for instruction in medicine and theology.

Preparatory Schools. In connection with these great centers of learning, there grew up in the provinces preparatory schools, where boys who were going to attend the universities acquired a knowledge of the Latin language, which was necessary in order to understand the university lectures. These preparatory schools had to secure their teachers from the only educated class that was in existence at the time, namely, the clergy. The Church, therefore, exercised throughout the educational scheme a very large influence. Many of the clerical orders of the Roman Catholic Church were established for the purpose of organizing and conducting schools.

The preparatory schools, like the universities, received only boys from the upper classes of society. They were schools for the aristocracy, not for the common people. The courses of study which they offered were also determined by the special purpose for which they were organized. There was in these schools no disposition to deal with the common facts of ordinary life. Like the universities, they were highly restricted in spirit and in content of instruction.

Origin of Common Schools. Schools for the common people were not organized until much later than the universities and the preparatory schools. These schools grew up in part under the control of the Church. There were so-called cathedral schools, which were gradually organized at the great centers of population, within the cathedrals themselves, for the purpose of training the boys who were to serve in the choir. The boys who were to render such service were sons of the common families. They had to be trained in reading and music in order to take part in the Church services. Sometimes a charitable priest would extend instruction in these cathedral schools beyond reading and music, so as to give the boys some special help in preparation for their relatively simple lives. A little arithmetic was added to the other lines of teaching. The catechism also was taught in these schools. Indeed, the clergy frequently taught the catechism to the common people in direct connection with the Church services and in special classes. The catechism classes became the nuclei of schools for the boys and girls who were in no wise related to the higher schools.

These religious schools gradually were extended, and, at the time of the Reformation, the leaders of that movement saw the importance of giving religious instruction to all the common children. They therefore organized numerous schools in connection with the religious centers even in the smaller communities. The common school, which thus grew up, frequently had the support of some intelligent ruler who recognized the desirability of giving religious and general instruction to the common people in his province. Common schools were not intended, however, to raise the common people above the level of their ordinary lives. None of the common schools led into the universities or into the professions.

Dual European School System. From what has been said, it will be understood why Europe in the modern period has two distinct types of schools,—one for the aristocracy and one for the common people. Just as society in Europe is divided into distinct classes which are perpetuated by heredity, so the schools of that continent are divided. Indeed, the perpetuation of the class system is dependent on the continuation of a class school system. We see here a very striking illustration of the parallelism between general civilization and the schools which grow out of it. In England, which is the most democratic of the European countries, a slight modification of the general class system of education has been devised, which again reflects the special spirit of a nation's civilization. A system of examinations has been developed which allows bright pupils to pass into the higher schools from the common schools.

Early Division in American Educational System. American practice differs from that of Europe. Originally, the schools of the United States were so organized that there was a common school for the ordinary people and a higher school for the clergy. When Harvard college was first organized in Massachusetts, it was a school for the upper classes, that is, for the boys who were going to enter the ministry. A preparatory school in connection with Harvard was organized in the Boston Latin school, which, like the college, was not intended for the training of the ordinary boys and girls of Boston, but was an exclusively classical school preparatory to college.

The common school which grew up in Massachusetts and the other colonies was a semireligious institution with a much less pretentious curriculum than that of the Latin school. The reading matter used in the common school was the catechism and extracts from the Bible. Indeed, the common school was described in the early statutes of the Massachusetts colony as an institution set up for the purpose of training children in reading, so that they might come into direct contact with the Scriptures.

The dual school system thus inaugurated in early colonial days broke down in the course of time, because the small groups of migrating families who went westward to what then was the frontier were so democratic in spirit and organization that they could not maintain any of the distinctions which had been common in Europe between the upper classes and the common people. The small villages which grew up in Massachusetts and Connecticut could maintain only a single school. This situation was due in part to the expense of maintaining schools, but in a larger measure it was occasioned by the absence of distinctions between the different classes of people of these village communities.

After the single school system was started in the villages of the colonies, it was natural that its expansion should be along lines that would maintain the democratic character of the original organization. When the community grew rich enough to set up a higher school, this also was open to all classes of boys and girls. The result has been that in the United States the common school and the higher schools have been organized with a unit plan of education for all the people. The American high school is an institution which follows directly upon the common school and is open to all comers, without regard to social classification. In the same way the colleges and universities of this country, especially the state universities which have grown up in the Western commonwealths, are expressions of the democratic demand for a universal higher education. The spirit of class division is thus eliminated in the schools of the United States.

HISTORY OF EDUCATION

THE practices of modern schools can be understood only in the light of history. Enough has been said in the introductory section to make it clear that the administrative units of modern American and European schools are descended directly from earlier forms of organization which grew up in various nations in response to the needs of the special types of civilization cultivated by these nations. But we may go much further than was indicated in the introduction. The details of instruction, including the materials in the course of study and the methods of classroom instruction, are dependent in all educational systems on the traditions which have come down from earlier times. Striking examples of this fact can be seen in the high respect in which the classics are held in American higher schools. This pre-eminence of the classics can be understood only when reference is had to the educational traditions of Europe. Furthermore, the methods of teaching in American and European schools are alike while the methods of Oriental schools are of a wholly different order.

In treating the history of education, it becomes necessary to draw a distinction between the school as an institution and certain personal influences which from time to time have appeared and have operated to reform institutional practices. The school as an institution tends to be conservative. Once its practices are established, it is natural for each succeeding generation of teachers to follow the examples of those who trained them. Progress or change in methods of teaching and in the courses of study usually depends on the vigorous efforts of some reformer who sees the inappropriateness for a later period of the educational procedures which have been brought down from an earlier age.

Reformers are seldom able to overcome altogether the conservatism of established institutions. The history of education is accordingly the account of a series of compromises between new ideas of what ought to be done and traditional practices which are thoroughly established.

For the purposes of our treatment, it is legitimate to treat in separate subdivisions first the institutions which have appeared in various countries at different times, and second the reformers who have labored to improve these institutions.

EDUCATIONAL INSTITUTIONS

Ancient systems of education must be understood as parts of the religious and governmental organization of the nations to which they belonged. Numerous glimpses into the educational system of Egypt are given by passages in the Old Testament. It is recorded that Moses was trained in all of the wisdom of the Pharaohs. This means that Moses, as a member of the royal family, was given the benefit of such knowledge as the governmental officials and priests of the day were able to accumulate and transmit.

Egyptian Education. Moses was in this respect absolutely separated from the other Hebrews, who, as slaves, enjoyed no privileges of education whatsoever. Moses was a member of the ruling class. His associates were the priests and princes. The priests had a body of knowledge which the common people did not possess. A curious and striking illustration of this can be given in the fact that these priests apparently knew enough about the science of optics to project from concave reflectors images of people on the walls of their temples and on the columns of smoke which rose from their altars. The projected images appeared to the common people like apparitions of their gods. The priests who knew how to make these projections are not to be charged with insincerity. They, undoubtedly, regarded these scientific secrets as gifts from the Deity, given them for the purpose of maintaining their control over the common people. They transmitted their knowledge of optics and other sciences, such as astronomy and architecture, to the rulers of the nation and to the members of their own priestly class, the training of princes and of novices for the priesthood being an important part of the work of every clerical community.

The educational system of Egypt was thus strictly a religious and royal institution carried on through the priests. The records show that schools for the young noblemen were organized in the palaces. Here discipline was severe and flogging was common. Instruction dealt largely with good manners, with ethical and political principles, and with such sciences as the priests and other teachers could command. The measurement of land was one subject taught. This was especially important in view of the necessity of relocating property after the inundations of the Nile. The boys were also taught swimming and gymnastics.

Greek Education. Greek education was of a somewhat different type. There had been developed in the Greek states a form of government which called for participation on the part of all the members of the aristocracy. Public debates among the members of the aristocracy were the common form of procedure in arriving at public decisions. Anyone who wanted to be a leader in the state must accordingly be prepared to speak in public and to maintain himself in an argument with his contemporaries. Training in rhetoric was, therefore, essential to the youth of the Greek states, and we find that special teachers of this subject exercised great influence in public affairs. Socrates (469–399 B. C.) was charged with having corrupted the youth of the land by the special form of logic and debate which he inaugurated. He was a philosopher and a teacher. He gathered about him a group of the younger men, taught them morals, and prepared them for participation in public life. Following his example, Plato (429–347 B. C.) and Aristotle (384–322 B. C.) conducted training classes for the young men of the aristocracy. The records of the sayings and teachings of these philosophers constitute a major contribution to European intellectual life. Again we must recognize the fact that these teachers were not connected with any public institution, but were influential because they gave a special type of training which was needed by the upper classes to maintain their social and political positions.

There was another important aspect of Greek education; it consisted in physical training in preparation for participation in the great national Olympic games. The Greeks prized perfection of bodily development most highly. They celebrated this perfection in the plastic art which still remains the wonder of the world. The youth of Greece were trained to run and to participate in other forms of physical exercise, and thus to perfect their bodies. In this way they were prepared to become formidable soldiers when they grew to be men. The prizes awarded at the Olympic games were regarded as great civic honors and were eagerly contested for by the young men from all the Grecian states.

Although the institutions which grew up among the Greeks were not perpetuated in the later periods of European education, the writings and teachings of the Greek philosophers exercised an enormous influence, furnishing in no small measure the materials which were used in all the higher schools of medieval and modern Europe. Thus the writings of Aristotle were the basis of scholastic education. The system of logic laid down by him was perfected until it became the chief subject of attention on the part of scholars.

The University of Alexandria. A part of the Greek influence came into Europe indirectly through the University of Alexandria where many great scholars worked. It was here that Euclid formulated about 300 B. C. the system of geometry which set forth in the form of strict Aristotelian syllogisms the

principles of land measurement which had been developed in Egypt and Greece. The Euclidean geometry which is still taught in our modern schools is a combined product of Greek and Egyptian education.

In theology as well as in the mathematical sciences, the influence of the University of Alexandria and the Greek schools was strong. Plato as well as Aristotle was accepted by many of the medieval scholars as an authority on matters of government and philosophy. His theory of the state which included a definition of education has been cited even in modern times as a proper basis for social organization. Plato was one of the authorities much studied in Alexandria and his doctrines were there worked over into a system of religious dogma.

Chinese Education. If we go to the Orient and consider the development of education in China, we find something which is a cross between the type of education found in Egypt and that which appeared in Greece. The great philosopher and teacher of China, Confucius (551–478 B. C.), laid the foundation for the political system of the Chinese state. His writings came to be of the greatest importance to anyone who intended to share in the government of China. Hence, the educational system of China centered about the writings of Confucius, and the young men of the country sought to make themselves masters by a process of merely memorizing all the maxims laid down by the great teacher.

There was a peculiar difficulty in the transmission of the maxims of Confucius, because the written language of the Chinese is clumsy and requires the very highest degree of specialization in order that the student may learn to read. Chinese written symbols were never simplified into a single alphabet, as were the written symbols of the Greeks. Each Chinese word is represented by a separate symbol. The labor of learning to read is, therefore, very considerable. A Chinese student is obliged to spend a much longer time in acquiring this art than is the boy of any European nation. The result was the development in China of a scholastic system which very rapidly became highly formal because of the difficulties involved in learning to read.

Furthermore, the isolation of China from other nations seems to have prevented the development of any large body of sciences, such as geography and comparative politics, which in Europe played an important part in the building up of the courses of study in higher institutions. China has, therefore, for centuries been content to train its youth in the art of reading the maxims of Confucius and similar teachers. Its educational system became stagnant—stranded, so to speak, on the inherent difficulty which the learner encountered in securing a broad view of knowledge. The formal system of training was rendered even more sterile by the erection of an examination system under the control of the state, through which boys were selected for the civil service. This examination system dealt with the maxims of early writers and operated to discourage altogether the development of anything like a modern and progressive attitude toward intellectual matters.

In recent years the Chinese schools have undergone a radical change through the stimulus of European and American models. The old formal scholastic training in Confucianism has rapidly given way, but there are at the present time very few Chinese public schools, and the support of these schools is so meager that there is little prospect of China's developing in any reasonable length of time an educational system at all comparable with that which is to be found in European countries.

Education in India. The educational system of India is to be compared with that of China. Schools of the native type are very scantily equipped, and the teachers deal only with formal subjects largely of a religious type. England has in recent years introduced many schools modeled after the pattern of her own schools. These exist in addition to the native schools.

A curious contrast exists between the methods of instruction in the native schools of India and the methods of instruction common in European and American schools. The pupils in the schools of India prepare their lessons by reading aloud the text which they are supposed to learn. All of the members of the class read at the top of their voices, and there is endless confusion in one of these schools. By listening to the reading, the schoolmaster is able to tell which one of his pupils is doing his duty most earnestly. The best pupil in the class is the one who reads the most persistently and in the loudest tones. Notions with regard to classroom discipline and classroom order are, therefore, wholly different from those which we entertain and those which have been traditional in European schools.

Roman Schools. The Roman boy of the earliest period was educated by his father. After 300 B. C. he was generally educated by a Greek slave. When the Roman state came into ascendancy and conquered the European provinces, Greece was gradually breaking up, and in 146 B. C. she became a conquered state. Learned Greeks came to Rome, in many instances as slaves of rich families. These learned Greeks were able to read; they knew the ancient literature of their race, and had some equipment in scientific knowledge. The Roman aristocracy was made up chiefly of warriors. There was, at the outset, no Roman literature to compare with the perfection of the writings of Homer and the other Greeks. The Greek slave was, therefore, a great asset in the Roman home. He took the boy in hand and gave him a type of knowledge which the father did not possess. From time to time, groups of families united in employing some especially competent Greek to instruct their boys.

Apparently, from the records, the boys in the Roman state were not especially eager to take on the training which the learned Greeks were prepared to offer them. Like the boys of all generations—but it seems in an unusual degree—the Roman boys were unruly and disorderly. Furthermore, from the conditions that have been described, it will be seen that the course of study which could be offered by the Greek was hardly suited to the taste and the future activities of most of the Roman boys. We have here one of the first examples of an imported education. The conditions found in Rome are not unlike those which appeared in Europe when a classical education, borrowed from older civilizations, was imposed upon a people who in their common lives had very little contact with these older types of thinking and writing.

There were other forms of education in Rome, especially the military types of training. The boys were prepared for the army by strenuous physical exercises and by games, through which they were made vigorous in body and skillful in the use of all sorts of weapons. Physical education was, therefore, an important part of the training of the Roman youth. As contrasted with the Greek physical education, it aimed less at æsthetic development, and sought more to produce powers of resistance.

Charlemagne's Palace School. With the disintegration of the Roman state, Europe broke up into a number of half-civilized nations and tribes. As any one of the rulers in the early medieval period succeeded in enlarging his state and solidifying his government, he was compelled to set up some of the institutions of civilization. The most notable example of the establishment of a school in these early days is to be found in the Palace School of Charlemagne. Charlemagne had conquered a very large part of the western countries of Europe. He employed an English monk named Alcuin (735–804) to conduct a school which was attended by his sons and by the other princes of the royal group.

Alcuin prepared material for this school, and we have some curious examples of the textbooks which were used at that time. One of these is an arithmetic. The numbers were all expressed in Roman

numerals. It is not easy to carry on the more complex arithmetical operations if one uses Roman numerals. For example, if one tries to state a problem in multiplication in these numerals, one will readily see the difficulty that was encountered by Alcuin and his pupils. Take the problem, XXVII multiplied by XLIV; the multiplication thus expressed suggests no regularity of relations between the different numbers. As a matter of fact, Alcuin found it necessary to devise an elaborate system of addition which would give the results that the modern boy, who has the advantage of the Arabic numerals, can readily work out according to the modern multiplication tables. Alcuin gave the princes of Charlemagne's court, in spite of the difficulties which he encountered, the best training in arithmetic and in letters that his broad knowledge could command.

It is probably true also that at about this period some of the art and wisdom of the Arabs, who came into Europe by way of Spain, began to influence the intellectual life of the European nations. At all events, it is certainly true that, after the withdrawal of the Moors from Spain, literature and the sciences of mathematics and medicine developed more rapidly than they had in earlier years, and that schools of the higher type, referred to in the introduction as medieval universities, began to develop.

MEDIEVAL AND MODERN EUROPEAN SCHOOLS

The latter period of medieval education in Europe exhibits a number of different kinds of schools. There were the schools for knights, in which the younger members of the aristocracy learned to ride and hunt and to carry on the arts of war; there were medieval universities, which were schools of law, medicine, and theology. Later, various reform movements arose within and without the Church, yielding in many cases organized systems of education.

Jesuit Schools. Notable among the later systems of this type were the Jesuit colleges which flourished for centuries and are influential even in modern times, especially in Roman Catholic countries. These schools were maintained by the religious order established by Loyola, who was born in 1491. They were highly organized, with a carefully planned course of study designed not only for the training of novices who were to enter the religious order but also for the training of boys of the better families, who were to be governors and military leaders. The course of study always included liberal quantities of the Latin language, which was in universal use among the educated classes in the medieval period.

Latin. The Latin language had a unique place in medieval Europe, and the whole history of European education revolves around this subject. Not only was Latin taught because of its utility as a medium of communication, but it was the bearer to the medieval world of the older and vastly influential Roman civilization, which dominated the religious, legal, and military organization of every European state. The great cultural movement known as the Renaissance can be understood only when it is remembered that the nations of northern Europe were very dependent for their culture upon the art and literature of an earlier age.

The enthusiasm for the study of Greek and Latin during the 14th and 15th centuries reflects the dependence of the northern European nations upon the culture of the South. There are many indications that the intellectual awakening of the northern nations was accomplished by devoted study on the part of the clergy, as well as on the part of those who had literary tastes and who were not satisfied with the intellectual life provided by the Church. In a poem entitled "The Grammarian's Funeral," Browning has given a picture of the enthusiasm of the Renaissance for knowledge of Greek and Latin. The Grammarian is pictured as an old man who has devoted himself in his later years to the arduous studies necessary to master the Greek language. He had gathered about him a group of enthusiastic students, who, in the poem, are represented as following their master to his grave and celebrating in this ceremony their appreciation of the intellectual world which his studies had opened up to them.

The Classical Traditions. Classical and theological subjects were the chief studies in the higher schools of Europe. The establishment of the classical course was so complete that, throughout all of the later generations of European civilization, this course has been the characteristic feature of the higher schools. For example, in England it is only within recent years that the modern languages have had any adequate attention. In Germany, it required the personal influence of the former kaiser Wilhelm II to give standing in the higher schools to subjects other than the classical languages. The best higher schools of Europe today are still devoted to the classical traditions, and the classical languages have been brought over to the United States as important elements of the high school and college curriculum.

Secondary Education and the Classics. What is true of the universities is true of the schools which prepare students for the universities. Such schools are commonly called, following the French terminology, secondary schools. This term has come to have very general use. We speak of the American high school as a secondary school. In like fashion we speak of the French *lycée* and the German *Gymnasium* as secondary schools.

The development of secondary schools in Europe was first a succession of efforts to organize instruction in the classical languages, afterwards a slow growth of additional subjects, such as mathematics, and, at length, science and the modern languages. The various periods of this development are characterized by recurrences of enthusiasm for the content of Greek and Roman culture. The enthusiasm for the classics degenerated from time to time into mere attention to the grammatical and rhetorical forms of Latin authors. The periods of devotion to the content of classical culture are called periods of humanism.

There was a period, for example, during which the teachers of Latin were more interested in the use of a vocabulary and a style copied from Cicero than in the facts of Roman life or the facts of Greek culture. Formalism in expression dominated this period. It made very little difference what were the subjects of discourse so long as most of the phrases were of the Ciceronian type.

After each period of interest in form, there came a period of interest in the content of that which was read. For example, in Germany in the latter part of the 18th century the intellectual leaders of the nation, such as Goethe (1749–1832), Herder (1744–1803), and their contemporaries, rebelled against instruction in the mere forms of expression and inaugurated a reform which is known as "neo-humanism." This neo-humanism sought to find serenity and balance of life in a revival of Greek art and an imitation of Greek literature.

Similar alternations of interest in form and content have marked the whole history of the study of the classics. Even in modern times this same contrast appears. There are some teachers who defend Latin today on the ground that it is a perfected form of expression; while there are others who point out that a study of the classics is justified only in the degree in which it makes students acquainted with the experiences of earlier and highly developed nations.

New Secondary Subjects of Instruction. The later periods of secondary education have been complicated by the fact that many new subjects have been developed and are demanding a place in the scheme of education. The natural sciences developed rapidly after the 17th century, and it has

become increasingly important in modern times for every student who is going to be a leader in social and political life to know something of the natural sciences. Within the last century, the scope of scientific inquiry has vastly increased through the development of the biological as well as of the physical sciences. Commercial and industrial life have been modified and reorganized through the influence of these sciences, with the result that a higher education is altogether incomplete if it does not include a generous amount of training in natural science. Moreover, within the last two generations, the social sciences have been added to the natural sciences, and it has become apparent that in a complex society, such as that in which we live, it will be necessary, even in the lower schools, to give instruction in economics and the theory of government.

Among the purely literary subjects, also, there has been competition. Modern languages and the culture of modern nations, as well as the earlier civilizations of Rome and Greece, have come to be important for students. Secondary schools have accordingly adopted modern languages into their curriculum, and in some instances the effort has been made to substitute the modern for the ancient languages.

Slow Change in Traditions. Whatever have been the changes in the curriculum and in the organization of the secondary schools, these institutions have maintained their place in Europe as entirely separate from the schools for the common people. Thus, in England there are a number of famous and ancient endowed schools which still continue to train the aristocracy and still maintain the traditions of the medieval educational system. These schools are called "public schools." This name was adopted in the early history of such institutions as Rugby, Winchester, and Eton, because these schools differed from the tutorial system that was practiced in many of the homes of the aristocracy. Furthermore, it was common for the patrons who endowed these schools to give certain scholarships and to permit bright boys from among the common people to enjoy the advantages of a special education without cost to themselves. The institutions are not public in the sense in which free schools are public. Indeed, all European secondary schools charge a tuition. Furthermore, the so-called public schools of England continue to give a formal, classical course of study. It is the traditional theory of these English schools that, by studying Greek and Latin, boys can acquire the type of mental concentration and moral discipline necessary to make them competent officers in the army and satisfactory members of the civil service corps.

It has been the contention of many reformers, on the other hand, that the same ends could be much more advantageously attained if science and modern literature were substituted for the classics. Such a substitution, it is argued, would provide mental discipline and, at the same time, give the information necessary for intelligent participation in the activities of modern society. One writer whose essays have been a very large influence in promoting reform in English and American education in the direction of science and modern literature is the philosopher Herbert Spencer (1820–1903). His essays on education, published in 1861, were a vigorous attack upon the traditional classical system and a powerful plea in favor of science in secondary education.

The English municipalities have in recent years contributed to the reorganization of secondary education by establishing a new type of higher schools. These schools are known as municipal secondary schools. They are maintained by the industrial cities of England, such as Liverpool, Leeds, Birmingham, and Sheffield, and they give instruction in the sciences that are necessary for the maintenance of the industries in these various centers. They are open also, on a much more liberal scale than are the traditional schools, to the boys of the cities who are going into the industries and commercial life.

European Universities and Scholasticism. The European university has been from the first typically a professional school. At the outset, as was indicated in the introduction, each university center had its characteristic course. It was a school of theology or a school of medicine or a school of law. Later each institution set up a number of branches. The branches which were most common were those which have been mentioned, namely, theology, law, and medicine. There was also a general branch, known as the philosophy division of the university, in which a miscellaneous collection of literary and scientific subjects was provided. In this division of the university most of the new developments have taken place.

The universities of the medieval period were the homes of so-called "scholasticism." This word is often used as a term of reproach, from the point of view of modern educational thinking. It is commonly implied that scholasticism means mere formalism in thinking, as a substitute for productive originality.

There is ground for this notion that scholasticism was altogether formal. The common type of instruction was that which emphasized logical forms. The Aristotelian syllogism was the pattern which was adopted for all thinking. A science of logic was cultivated to the exclusion of interest in any real facts. The scholastics often debated purely artificial questions with a view to increasing their critical knowledge of the possible uses of the syllogism. Given certain premises for an argument, it made no difference to them whether the argument was practically productive or not. They merely wanted to make sure that the consequences of the premises assumed were carefully worked out. History tells of debates, between great leaders in this scholastic period, which continued day after day, and the debater who received the highest academic awards after one of these debates was the logician who was most competent in the use of syllogistic forms and in the exercise of criticism which attached to these forms.

While, however, there is ample ground for the statement that scholasticism was excessively formal, it should not be overlooked that this period devoted to the study of logic was of great significance in the development of the power to think in fine distinctions. The scholastics created, in the languages which they developed, an instrument for a later type of discriminating scientific thinking.

They also established the practice of research, that is, they set aside a group of people whom society was prepared to support for the purpose of developing an intellectual life which had no immediate practical bearings. There has always been some prejudice on the part of practical people against university organization, because it has been felt that the universities are in many instances remote from practical life; but the later history of higher institutions has shown that it is altogether to the advantage of society that science be cultivated for its own sake. The scholastics furnished the example which has been followed in later academic organization, and developed communities where intellectual life was pursued, first of all for its own sake and secondarily for the applications of science and letters to the needs of civilization.

Academic Freedom. One of the great struggles carried on in the universities of Europe was the contest for academic freedom. The patrons who supplied resources for the maintenance of universities tried from time to time to dominate the thinking of the teachers in these institutions. Great theological controversies sometimes arose in the universities. It will be remembered that Luther was in the University of Wittenberg when he first made his attack upon the theological doctrines which became the issues of the Reformation. Political issues also arose from time to time when some ruler objected to the teachings of those who were connected with the universities. But from the earliest

periods it was the contention of the universities that the teacher must be entirely free to follow the truth wherever he sees it, and the tradition has finally come to be thoroughly established that universities are to be free from any outside control.

English Academic Social Life. The English universities, in addition to the establishment of the right of the teacher to think freely, developed a social life of the most intense sort. One of the reasons why American students under the Rhodes scholarships find it advantageous to go to Oxford in England is that they are brought into close contact with a group of students who, during their university lives, are intimately associated in the dining halls and living quarters of the colleges of that university.

The English universities go so far in their emphasis on social life that they are hospitable to students who pursue their studies with such leisure that they are called mere "pass students." It is not uncommon for members of the wealthier classes to look upon the university life chiefly as a social opportunity. As distinguished from the "pass students" there are "honor students" who are looking forward to professional or academic careers which require rigorous scholarly preparation. It has been suggested by students of American higher institutions that a similar distinction to that made in English universities might advantageously be adopted in this country. It is asserted that there would then be a frank recognition of what is now in fact the true condition. It would relieve college authorities also of the necessity of living under the shadow of the pretense that all American students are hard-working scholars.

American Colleges. As compared with the European universities, the American college is a somewhat detached institution. It does not aim to give professional training, but is higher in its scholastic requirements than the secondary schools. We shall have occasion later to discuss more fully the development of this unique American institution, but it is to be noted here that the American college is in part borrowed from the English university. It is the social life of the American college which is frequently emphasized when one attempts to describe its relation to its students and its importance in our educational system.

Common Schools as Missionary Enterprises. The European school for the common people was in all of its earlier stages a missionary enterprise. As indicated in the introduction, the common school began as a result of the desire on the part of the Church authorities to train choir boys or to give general religious instruction to the common people. Luther and his colleagues in the Reformation recognized the importance of making the common people independent in their religious faith. Luther's translation of the Bible is a clear indication of his desire that they should have access to the means of religious independence. The training of the people to read the Bible was quite as important as the making of the translation. We find, therefore, that the leaders of the Reformation were in favor of schools and exercised their influence in the direction of the development of schools on a large scale for the common people.

What is true of the Reformation applies also to the efforts of later religious sects which developed in Europe and England, and it is true also in the Roman Catholic Church from which these various bodies separated. A few illustrations will serve to indicate the character of these movements for the establishment of mission schools for the common people. One of the most noted of these institutions was the school established at Halle by Francke (1663–1727). In 1695, Francke, who had had a broad academic and theological training, established in a suburb of the city in which he lived an evangelical organization which conducted as one of its major enterprises an orphan asylum and training school for teachers.

Francke was a member of the sect known as the Pietists. This religious group held to certain austere doctrines with regard to human nature, not unlike the doctrines held later by the Puritans. They believed that all children are born with an evil nature inherited from Adam and Eve and that it is necessary to change this nature by the most rigorous discipline, if the child is to be saved from eternal damnation. The rigor of Francke's discipline is illustrated in the following statement which he makes about children's play:

"Play must be forbidden in any and all of its forms. The children shall be instructed in this matter in such a way as to show them, through the presentation of religious principles, the wastefulness and folly of all play. They shall be led to see that play will distract their hearts and minds from God, the eternal Good, and will work nothing but harm to their spiritual lives. Their true joy and hearty devotion should be given to their blessed and holy Savior and not to earthly things, for the reward of those who seek earthly things is tears and sorrow."

In France, the common school was promoted by the activities of the religious order known as the Christian Brothers. This was an order of monks, founded in 1684 by Jean Baptiste de la Salle (1651–1719), which devoted itself to the betterment of the poor children of the country by giving training in the rudiments of knowledge to the boys and girls of the common people. The rule of the schools conducted by this order was that both pupils and teachers should keep silent throughout all of the day. Corporal punishment was common. The curriculum consisted in the rudiments of reading, writing, arithmetic, and religion.

In England, similar movements were carried forward, and led to the organization of schools which were, as will be seen by their very name, efforts on the part of philanthropic organizations to provide for the poorer people. The common schools of England were known as "pauper schools" or as "ragged schools." They were supported by various societies, such as the British and Foreign Missionary Society, and the Society for Bettering the Conditions and Increasing the Comforts of the Poor. A number of interesting experiments in the conduct of cheap schools were made under the auspices of these societies.

The so-called "monitorial" system was developed under the auspices of the society first mentioned above. In 1797, Dr. Andrew Bell (1753–1832) had suggested that the older boys in the orphan asylums could be used as instructors for the younger boys. At about the same time, Joseph Lancaster (1778–1838) organized a school in which a series of gradations was introduced, by which the teacher could come into direct contact with the older pupils, who in turn carried to the lower classes the instruction which they received from their teacher. Each child was provided with a knapsack in which he kept such books and material as he needed. A huge room was fitted with benches on which the children could sit, and in this way the teacher sometimes was able to take care of 1000 children.

The Lancastrian movement, as it is called, is of special interest because it was brought to New York and contributed to the early stages of development in American education. It provided one great advantage over schools which had preceded it. It compelled the grading of the children. The older groups, who were more mature and able to take instruction directly from the teacher, constituted the upper grades, and the younger children were organized in groups of different levels to receive instruction from these monitors.

Common Schools under Civil Patronage. A second type of development, acquaintance with which is of the greatest importance for an understanding of the history of common schools in Europe, is that which flourished first in Germany. Here, the rulers of political states very frequently united with the Church authorities in maintaining schools for

the training of the common people. The advantages of this combined action soon began to make themselves apparent in both the economic and the political life of the state. The taking over of the function of education by the political government was an innovation which ultimately exercised very great influence in the life of the nation.

In 1763, at the close of the Seven Years' war, Frederick the Great (1712–86) gave this general movement of state education a great impetus by issuing what is known as *The General School Regulation.* This order established for the first time the principle of compulsory attendance on the part of the children. It also provided that the teachers who conducted the schools should be specially trained for their duties and adequately compensated, and that the state would assume responsibility for this compensation. A policy of religious tolerance also was proclaimed in the *Regulation.* It is to be noted that religious instruction was not eliminated from the school curriculum by this proclamation of tolerance, but it was provided that families of different types of religious affiliation should be allowed to receive in public institutions the type of religious training which conformed to their beliefs.

The *Regulation* of Frederick drew the most violent opposition from the clergy and from many people who had come to think of the schools as strictly religious institutions, but it marked the beginning of a new era in educational matters. Because of their adequate support and strong organization, the Prussian schools have been the model for all other European school systems; and in many respects they furnish also the pattern for American schools.

The Influence of Prussian Schools. The direct influence of these Prussian schools on the other systems of Europe can be traced through a report which was prepared in 1833 by a French commissioner named Cousin (1792–1867). The French schools, as indicated in an earlier paragraph, were first maintained by religious orders, but at the time Cousin made his report there was great interest in the organization of public support for schools which should admit children of all classes. Cousin went to Prussia, and made an exhaustive report on the organization and course of study of the common schools. This report was widely distributed in France. It was translated into English, and had a large influence in England and the United States in bringing about a new type of organization of public schools.

The Prussian school for the common people had at this time come to be a school which took charge of the children from six to fourteen years of age. It is interesting to comment on the reason for the adoption of fourteen years of age as the upper limit for school attendance. The original practice in German schools was to leave to the pastors the decision as to when children were mature enough to leave the school and be confirmed in the Church. Pastors gradually found that the age of fourteen was approximately the age at which they could approve the conclusion of the training course in the schools and could admit children to the Church. Throughout the civilized world, compulsory education laws have been passed, following the example of these German pastors in setting the age of fourteen years as that at which common school training is regarded as completed. Many of the reforms which are being suggested at the present time in American school organization will be more clearly understood if it is remembered that the upper limit of the common school was thus determined through a European organization which is in fact wholly different in character from the common school of the United States.

The secular organization of education in Germany prepared the way for a modern development which has been of great importance. These schools were among the first to be supplemented by a system of industrial education. The secular ruler was naturally much interested in the economic welfare of his people. Accordingly, he was willing to provide for the training of children in the trades.

The tendency to provide practical education was further powerfully re-enforced by the writings of some of the educational reformers who will be discussed in another section.

EDUCATION IN AMERICA

The educational system of America, during the Colonial period, was in part an imitation of the European system. Three grades of schools were to be found in the American colonies. There was, first of all, the highest institution, or college. The three institutions of this type which have exercised the greatest influence in American education are Harvard (founded in 1636), Yale (founded in 1701), and Princeton (founded in 1746). These institutions were organized by the clergy for the purpose of training boys to become members of their own profession. Closely connected with the colleges were the Latin grammar schools. These were modeled on the European secondary schools which administered a classical course of study and accepted pupils of the better social grades from the families which could afford to pay tuition. Finally, there was a common school which in its organization was influenced from the beginning by the European people's school.

Local Control of American Schools. The American common school differed from the European school in that it was from the outset an expression of the desire on the part of the American colonies to develop a type of intellectual freedom not prevalent in Europe. There are two further characteristics of the American common school which have distinguished it from its European predecessors. In the first place, the school was, from the beginning, controlled by local authority. Communities were indeed compelled by early legislation in the colonies to maintain an educational institution of some kind for the young people, but the details of organization were left to the communities.

We find that there was the greatest variety in the method of controlling these schools. In New England the town meeting determined the policy of the school. It set the salary of the teacher, and very frequently went so far as to select the teacher, although it commonly delegated supervision of the school to a trustee or to a committee. This committee often included the pastor of the church and one or more of the leading citizens.

The southern colonies differed from the New England colonies in their attitude toward education. To these southern colonies, especially to Virginia, had come Englishmen who brought with them the traditions of the English aristocracy. They usually lived on plantations so large that their neighbors were far removed, and the demand for any community life was, accordingly, much reduced. Virginia, therefore, did not have any town meeting which could control the school, and, because of the great distances between families having children of the same social level, schools were not organized. The young people were sent from the Virginia plantations back to England for their education, or they were trained by tutors at home.

In New York, the Dutch company which had large concessions sometimes provided schools as part of the inducement to immigrants to settle its lands. In Pennsylvania, William Penn (1644–1718) saw the importance of providing education for the children as a part of the general scheme of social organization. In these cases, however, the schools were left to the control of the community to a degree unknown in the European countries.

American Schools, Reading Schools. A second distinguishing fact about American schools is that they were reading schools. Instruction in the European schools was given orally by a teacher who was professionally trained and authorized to instruct the children. The colonies, unprovided with skilled teachers and unable to equip these teachers

with any technical preparation for their work, were satisfied to conduct schools as best they could, employing anyone to teach who could be secured for the relatively small wage which the community was able to provide. But there was one ambition which prompted the organization of the schools, especially in the New England colonies. It is clearly expressed in the preamble of the school laws of these colonies. A quotation from the school law of Connecticut, adopted in 1650, and resembling very closely the early law of Massachusetts, adopted in 1647, will make clear the purpose of the colonies in establishing their first common schools.

"It being one chief project of that old deluder, Satan, to keep men from a knowledge of the Scriptures, as in former times, keeping them in an unknown tongue, so in these latter times, by persuading them from the use of tongues, so that at least, the true sense and meaning of the original might be clouded by false glosses of saint-seeming deceivers; and that learning may not be buried in the grave of our forefathers," (the court decreed that whenever a township increased to fifty householders they should employ some one) "to teach all such children as shall resort to him, to write and read."

The influence of this legislation has been of great importance in the American schools. Throughout our history, emphasis on reading has controlled the form of organization of all classroom instruction. Reading books have been provided, in contrast to the oral instruction which is typical of European schools. The method of instruction has included preparation of lessons at home out of books, and the recitation has been from the first the typical form of classroom exercise in these schools.

Industrial Training. There was one further ambition in the minds of the New England colonists as to the training of their young people. It is expressed in the statute adopted at about the same time as that quoted above. This second statute aimed to provide training in industry for all of the children. The statute is as follows:

"All parents and masters do breed and bring up their children and apprentices in some honest lawful labor, or employment, either in husbandry or some other trade profitable for themselves and the commonwealth, if they will not nor cannot train them up in learning, to fit them for higher employment, and if any of the selectmen, after admonition by them given to such masters of families, shall find them still negligent of their duty . . . the said selectmen, with the help of two magistrates, shall take such children or apprentices from them, and place them with some masters for years, boys until they come to be twenty-one, and girls to eighteen years of age complete."

This statute did not exercise any large influence, because it did not provide adequate administrative machinery for enforcement. It is not until a relatively late period in the history of American education that industrial training reappears as an important part of the system.

Early Methods of Paying for Schools. In the matter of support, there was great variety of practice in the different colonies and in the different grades of schools. In the main, it may be said that higher education was never free, and in many instances the elementary schools were supported in part by payments made by the pupils. There was practically no full community support of schools until long after the establishment of the present Federal government of the United States. Indeed, as late as 1873, the last of the Northern states to abandon pupil payment was still receiving some support for the teacher from so-called "rate bills" paid by the pupil. Even in colonial times, however, partial support of the school out of the community treasury had begun. Accordingly, common schools have been from the first, so far as the public could make them so, free schools.

Early Schools and Lack of Organization. By way of negative statement, it may be pointed out that the early colonial schools were not graded. They were one-teacher schools, and in the form of their organization were of the type known even in modern times as "the district school." The teacher organized such classes as he or she was able to conduct, and the pupils were distributed according to their various abilities in the different subjects. The school term was often very short. Sometimes, the school year was divided into a winter term and a summer term; the latter was attended by the younger children, and the former by the older children. The original school laws of the northern colonies very frequently prescribed 4 to 21 as the ages for attendance on school. Later the European model of closing the elementary schools to students at about 14 years of age came to be adopted, but the original plan of American school organization was at once loose and comprehensive.

Early Schools, Religious but Secular. The schools of the American colonies were secular; that is, they were set up by the law of the colonies and were governed by the community rather than by the church. They were at first, however, religious in the content of their teaching. The reading books were full of quotations from the Bible and the catechism. The religious content of instruction reflects the main interest of the community. Nevertheless, the control and organization were secular. The consequence of this has been that, in modern times, the separation of the public school and the Church has been complete, and religious teaching has gradually disappeared.

The development of parochial schools in this country reflects the desire on the part of certain religious bodies to control, more completely than is possible in the public schools, the religious and moral education of their children.

Schools in the Early National Period. Between the Colonial period and the present, there is a pronounced break in the history of American schools. The Revolutionary War left the colonies in many cases financially weak and detached from the sources of their earlier social life and traditions. The Constitutional Convention, which established the national government, did not include education as one of the matters to be dealt with by the new Federal government. There was in fact so much disagreement between the practices of the northern and the southern colonies in matters of school organization that it was deemed wiser to leave schools to local control. The tendencies toward decentralized organization which appeared in the colonies thus became a part of the national policy. It was not until the middle of the last century that the Federal government made any provision for the consideration of educational problems. In 1867 an office of education was established, first as an independent department and in 1868 as an office of the department of the interior. This office, however, has no authority of any kind whatsoever over the schools in the different states. It is merely an agency for collecting information. The fact that the Federal Constitution does not mention education leaves the control of public schools to the states.

Since, during the early years of American history, the states were busily engaged in developing the material resources necessary for the life of the people, education was carried on in a somewhat irregular fashion, in accordance with the plans which had been set up during the Colonial period; but it was very meager. The United States office of education has estimated that in 1800 the average American citizen was not receiving more than 82 days of schooling in his lifetime. Many communities had no schools, sometimes because families were so isolated, and sometimes because teachers could not be found. The educational situation during the first decades of American national life was wholly chaotic.

A Typical Report. A report prepared by the committee which visited the schools of Taunton, Massachusetts, in 1801 throws so much light on the general situation early in the last century that parts of it may be quoted as exhibiting the conditions common at that time:

"The committee chosen by the town to inspect the schools beg leave to report their situation and examination . . . " January 6th, 1801. Your committee visited a school kept in Rueben Richmond's house instructed by Mrs. Nabby Williams of 32 scholars. This school appeared in an uncultivated state the greater part of the scholars.

"On the 26 of Feb. visited Mrs. Nabby Williams' school the second time and found that the scholars had made great proficiency in reading, spelling, writing and some in the grammar of the English language.

"On Nov. 10th, the committee visited and examined two Schools just opened: one kept in a school house, near Baylies works, of the number of 40 scholars, instructed by Mr. Philip Lee. This School we found to have made but small proficiency in reading, spelling and writing, and to be kept only six or seven weeks; upon inquiry why it should be taught no longer, we were informed that the ratio of school money for this School was and had been usually expended in paying the Master both for his service and board, and in purchasing fire wood which is contrary to the usual custom of the town.

"The other School, visited the same day, was kept near John Reed's consisting of the number of between 30 and 40 Scholars instructed by Mr. William Reed; This School, being formed into regular classes, appeared to have made a good and pleasing proficiency in reading, spelling, writing, some in arithmetic and others in the Grammar of the English language. This School's share of school money is expended to pay the Master for his service only, so that the School will be continued three months.

. . . .

"Feby. 26th, visited Mr. Dean's School 2 time, the Scholars were crowded into a small room, the air was exceedingly noxcious. Many children were obliged to tarry at home for want of room and though the school was kept only a few weeks they were deprived of its advantages. A want of books was the complaint. The committee were anxiously desirous that this evil might have a remedy and were of opinion it may be easily done. The Scholars appeared to increase in knowledge & claim our approbation.

"March 5th, visited two schools, one kept at Mr. Aaron Pratt's of the number of 30 scholars, instructed by Mr. Philip Drown. This school appeared quite unimproved and uncultivated in reading and spelling, some of them did better in writing.

"This uncultivated state did not appear to be from a fault in the children but, as your committee were informed, from the disadvantage of having had masters illegally qualified for their instruction; of which class is their present master unauthorized by law."

Beginnings of State Supervision. Shortly after the appearance of Cousin's report, the English translation of which was distributed in this country in 1835, a movement was started in Massachusetts and the other New England states and in Ohio—the first state to be organized out of the Northwest Territory—for a better organization of common schools. In 1837, the state of Massachusetts organized a state board of education and appointed as secretary of this board Horace Mann (1796–1859). In the meantime, Connecticut was moving in the same direction, and in 1838 appointed Henry Barnard (1811–1900) secretary of the state board of education. Ohio, under the influence of a group of organized educators in the city of Cincinnati, appointed a state superintendent of schools in 1837.

These were the beginnings of state supervision of public education. The local districts had found it impossible to give proper training to teachers, and even the selection of teachers, when left to local authorities, was carried on in a fashion that frequently led to complete failure in school organization. The state now began to assert its rights to insure good schools by establishing normal training classes and by compelling the various communities to employ teachers who had the approval of the state department and to submit to supervision by a central state authority.

Beginnings of Compulsion of Pupils. After the organization of state boards of education, came the movement to control attendance through the exercise of central state authority. In 1852, Massachusetts passed a compulsory educational law which differed from the earlier laws adopted in this country, in that it not only compelled communities to provide schools but also compelled pupils to attend school. The other states in rapid succession followed the example of Massachusetts,—the District of Columbia in 1864, Vermont in 1871, and other states later. It was not, however, until the '80's that even the most advanced compulsory educational laws began to be enforced. Since that time, compulsory education has been the accepted practice in the Northern states. The Southern states have been much slower in adopting compulsory education. Indeed, until after the Civil War the South had practically no public school system. It was not until very recently that the last Southern state adopted compulsory education, and in many cases the laws which are now in force are relatively weak.

The situation in the South is seriously complicated because this section of the country, in its effort to deal with this matter, maintained two school systems—one for the whites and one for the Negroes. The Southern states are handicapped also because of lack of resources, with the result that most of the developments in common school education have been slower in the Southern than in the older Northern states of the country.

Segregation. On May 17, 1954, the Supreme Court of the United States handed down its historic decision that public school segregation laws are unconstitutional because they violate the Fourteenth Amendment, which guarantees equal protection of the laws to all American citizens.

The decision, which was unanimous, overruled the case of Plessy *vs.* Ferguson, decided in 1896, which held that the states could provide "separate but equal" schools for white and Negro children. On this point Chief Justice Earl Warren said:

"We conclude that in the field of public education the doctrine of 'separate but equal' has no place. Separate educational facilities are inherently unequal. . . Today, education is perhaps the most important function of state and local governments."

Some 21 states in the North and South with segregation laws are affected by the decision, but the court left open for later determination the question of how and when the ban should be enforced.

Grading and Better Organization. As soon as the state boards of education began to deal with the problems of school organization, there appeared a tendency to grade the pupils better and to provide more definite courses of study for the common school. There was great interest during the decades between 1830 and 1850 in the example of Prussia. Many of the leading educators of this country visited the Prussian schools. Calvin Stowe (1802–86) of Cincinnati was compensated by the state legislature of Ohio for preparing a report highly favorable to the Prussian common school. Mann and Barnard also visited Germany and reported vigorously in their state documents on the virtues which they had observed in those schools.

There was also going forward in Europe a series of reforms, which will be referred to in later sections, under the stimulation of the writings of Pestalozzi (1746–1827) and Rousseau (1712–78). These reform movements in Europe were brought to America during the early years of the century, and encouraged the better arrangement of the course of study and the improved organization of the pupils.

Furthermore, there were growing up during the middle of the last century a number of municipalities which could afford to maintain better schools than those which had been possible in the rural districts prior to 1840. All these influences were operative at about the time that state departments were organized. The result in point of organization was that the common school of the United States took on its present form as an eight-year graded school during the decade between 1840 and 1850. The graded school has not yet entirely superseded in all parts of the country the native district school; but, in the main, the district school has disappeared, and the eight-year elementary school is the typical form.

In the South, where resources were meager, a seven-year school was adopted after the Civil War,

as the typical organization of the elementary grades. In New England, there are some exceptional school systems which conduct a nine-year elementary school. These departures from the rule, however, merely go to emphasize the importance of the general movement which resulted in the eight-year organization of elementary education.

Academies and Union Schools. Parallel with the development of common schools and of state control in these schools, was the development of secondary education. The early years of the 19th century saw the establishment of numerous private academies. There had grown up also in some of the larger communities in Massachusetts and in the other states so-called union schools, which offered a higher grade of education than did the common district school. There emerged slowly out of this development of secondary education an institution which did not begin to appear in any large numbers until after the Civil War, but which is one of the unique creations of the American educational system, namely, the public high school.

Characteristics of the Public High School. The public high school differs from the secondary schools of Europe in that it follows the elementary school. As has been shown in earlier paragraphs, the common school of Europe is separate from the secondary school. In this country, the high school takes the graduates of the eighth grade and continues their training through a period of four years. Furthermore, the American high school is free, the cost of maintenance being paid by the community in the same way in which the community pays for the maintenance of elementary education.

The high school began to flourish after 1870, and its history from that date has been one of phenomenal growth. Statistics in regard to this development will be presented in a later section. The curriculum in these schools began as a classical course modeled closely after that of the secondary schools of Europe, but in this respect also there has been a tremendous expansion in the years since 1870. The modern American high school offers a very wide range of courses and makes numerous adjustments to the students who enter the institution.

In 1893, a committee of the National Education Association, known as "The Committee of Ten," rendered a report on the organization of the high school curriculum, which defined the practice in these schools in a way which has been of the greatest influence in determining the development of the institution. Since that date, the high schools of the United States have followed a fairly uniform path. There is in recent years some indication that the standard pattern will undergo a modification in the direction of an expansion of its lower and upper grades; but the high school, as a typical institution in American life and altogether different in its organization and character from any secondary institution to be found in Europe, may be said to have been finally established in the early '90's.

City Superintendencies. One other line of development in American public educational systems may be commented on briefly. The cities of the United States have gradually developed a complex organization for the control and supervision of schools. In 1837, the cities of Buffalo, New York, and Louisville, Kentucky, each appointed a school officer known as a superintendent of schools. In 1839, Saint Louis, Missouri, and Providence, Rhode Island, did the same. Since that time it has become altogether common for the larger and even the smaller cities to support such a supervisory officer. Today, cities commonly organize their school systems under separate charters granted them by the state, and these independent school districts confer on their chief educational executive various powers and duties which differ greatly from city to city and are still in most cases in process of complete definition. The main fact for us to notice at this time is that a group of technical officers has been created for the management of the larger school systems of the country. In some instances these officers have had jurisdiction over both the elementary and the high schools. In other cases their jurisdiction has been limited to the elementary schools.

With the appearance of the graded elementary school, the high school, and the modern system of organization presided over by a superintendent, the modern American school system may be said to be launched.

Normal Schools. Standing somewhat apart from the elementary and high schools of the country are the institutions which provide the teachers for the elementary schools, namely, the normal schools. During the early periods of American education no special provision was made for the training of teachers. It was assumed that anyone who was educated was competent to take care of little children and to give them appropriate instruction. Indeed, during the Colonial period and the Early National period, it was altogether common to assume that very little training was necessary for any adult to qualify as a school-teacher. Accordingly, the public esteem for the pedagogue was relatively slight, and the social and literary traditions of our people have reflected the attitude that the teacher is an individual who cannot succeed in the competition of the business or professional world and is therefore assigned to the trivial task of caring for little children.

A different tradition grew up in Europe, especially after the development of a group of followers who attempted to put into practice the principles of some of the educational reformers. The school established by Francke in Halle became a center for the training of teachers, and the old castle at Yverdun, where Pestalozzi gathered about him a group of followers, became a center for educational reform in a new and important sense. These schools devoted much attention to the training of teachers, and set the example which in Europe and America has led to the organization of special institutions for this purpose.

The first moves in the United States for the training of teachers were in New England and New York. In 1823, the Reverend Samuel R. Hall conducted classes for the training of teachers in Concord, Vermont, and afterwards in Andover, Massachusetts. In 1827, James Carter opened at Lancaster, Massachusetts, a normal institution which he conducted privately. At about this same time Governor Clinton recommended to the legislature of New York state the establishment of a seminary for the education of teachers. Governor Clinton was especially interested in developing through such an institution the monitorial system which had been imported to this country with the Lancastrian schools. It was, however, the European influence which ultimately led to the development of normal schools as public institutions. The publication of Cousin's report in 1835, together with the enthusiasm of Mann and Barnard and Charles Brooks for German education, led to the acceptance in 1839 by the legislature of Massachusetts of a gift of $10,000 to be devoted to the establishment of a normal school. This school was opened at Lexington, Massachusetts, in the town hall, with one teacher and three pupils. From this date, normal schools were established in the various Northern states, as follows:

1839 Massachusetts (1st)	1854 Massachusetts (4th)
1839 Massachusetts (2d)	1854 Rhode Island
1840 Massachusetts (3d)	1855 New Jersey
1844 New York	1857 Illinois
1849 Connecticut	1859 Pennsylvania
1849 Michigan	1860 Minnesota

The normal schools thus established were supported by the states. In later years some of the large city systems have found it necessary to supplement the state normal schools by city training schools for teachers. Conspicuous examples of such institutions are to be found in New York City, Philadelphia, Saint Louis, and Cleveland. In some cases the state normal school is located in a city, and serves the double purpose of a state normal school

and a city training school. Examples of this type are to be found in Montclair, New Jersey; in New Britain, Connecticut; and in Milwaukee, Wisconsin.

The curriculum of the normal school ordinarily consists of a review of the subjects taught in the elementary school, such as arithmetic and spelling. This review is intended to prepare teachers to give instruction in these subjects. There are also courses entitled "methods," which deal with the best modes of presenting the various school subjects. Finally, there are certain general professional subjects, such as psychology and history of education. These strictly professional subjects are treated in a great variety of ways. Sometimes the psychology is of a general type, corresponding closely to the ordinary academic treatment of this subject. In some cases the effort is made to apply psychology directly to the study of the school subjects. The history of education has been very largely a history of the theory of education, and has been not infrequently replaced in recent years by more practical studies of classroom management and of the school laws of the state in which the student is preparing to teach.

Teachers' Colleges. The normal school has usually been a highly independent institution, its character being determined by its president and faculty. In some instances the normal school has taken on the character of a people's college. This is especially true in the Western states where no other institution of higher learning is easily accessible from the section of the state in which the normal school is located. In recent years, normal schools have been transforming themselves into teachers' colleges and have extended their curriculum from two years, which has traditionally been the length of the normal school training, to four years.

Most of the Western normal schools are permitted by their charters to give degrees, and many of them have taken advantage of this provision. More than one hundred normal schools of the country are at the present time classified as teachers' colleges. The curriculum ordinarily covers four years, the first two years being devoted to the typical normal professional training, but including a liberal amount of general training; the last two years being in many cases given largely to general training like that provided in the ordinary college.

Colleges. American colleges were originally established, as was pointed out in an earlier paragraph, for the purpose of training the clergy. The first of these institutions was Harvard which was founded in 1636. This institution was an imitation of Emmanuel college in Cambridge, England. William and Mary followed in 1693. Yale was established by a group of Congregational ministers in 1701. The charter granted to Yale, like that granted to Harvard, indicates a desire to uphold and propagate the Christian Protestant religion. Both charters express also the wish that the youth of the country may be instructed in the arts and sciences and may through the blessing of God be fitted for employment in both church and state.

The University of Pennsylvania claims 1740 as the date of its origin. This institution has special significance because it grew out of a somewhat more secular motive than the earlier institutions. About 1740 Benjamin Franklin published a pamphlet entitled *Proposals Relating to the Education of Youth in Pennsylvania*. Soon after its appearance 24 public-spirited citizens of Philadelphia took over the charter and property of a charity school established in 1740, and organized an academy largely, though not wholly, on the lines suggested by Franklin. The University of Pennsylvania, chartered in 1755 as the "College, Academy and Charitable School of Philadelphia," was built on this foundation. Its curriculum, including history and civil and international law, went beyond the original curriculum of most American colleges. In 1746 Princeton was founded; in 1754 King's college in New York, afterwards known as Columbia university.

These institutions were followed in later years by a group of public foundations. Perhaps the most famous—and certainly one of the most influential—of these, was the University of Virginia, which was established in 1817, when Thomas Jefferson was elected rector of the board of an institution which had been in existence as an academy since 1803. The board authorized in 1817 the purchase of a farm of 200 acres near Charlottesville, Virginia. The corner stone of the building of the so-called Central college was laid in October of the same year. Jefferson was very eager to have this institution adopted by the legislature as the state university. The example thus set has been of great influence in determining the practices of communities which in later years have developed, especially throughout the Central and Western states of the country, state-supported institutions.

The early colleges were by no means large institutions. As late as 1815, Harvard graduated a class of 66; Yale, of 69; Princeton, of 40; Williams, of 40; Pennsylvania, of 15; and the University of South Carolina, of 37. It was not until after 1820 that the rapid development of American colleges began.

Denominational Colleges. During the decade between 1820 and 1830 a large number of institutions were established, especially by the independent religious denominations, which began to feel the necessity of providing themselves with trained ministers to carry on the work of their churches. So vigorous has been the energy of churches in setting up these institutions of higher learning, that they may be said to have dominated the development of American higher education, in spite of the efforts of Jefferson and of later organizers to bring higher institutions under the control of the state. The statement has been made that, of the 750 institutions of higher learning in the United States and Canada nominally termed colleges, at least two-thirds were originally under the control of religious denominations.

College Graduates and the Professions. The purposes of colleges can be clearly defined in terms of the professions taken up by their graduates. For many years after the founding of Harvard the largest percentage of its graduates went into the ministry. During the early years, more than 70 per cent of all the graduates entered this profession. Later the profession of law became important, and, finally, medicine, engineering, and the modern profession of business took their places, both in society in general and in the colleges, along with the ministry.

A bulletin published in 1912 by the United States bureau of education has canvassed the gradual change in the character of professional choices by college graduates, and summarizes the whole matter as follows. Between 1642 and 1780 the ministry was the chief profession for which the colleges prepared. Up to 1720, the percentage of graduates entering this profession was somewhat more than fifty. After this time a rapid decline is shown in the number of graduates entering the ministry, and in 1780 the percentage fell to about twenty. The percentage of graduates entering that profession during the last period of the 19th century was only five and nine-tenths. Though surpassed by law between 1780 and 1820 in the number of college graduates entering, the ministry again led between 1820 and 1840. It is significant of the final decline of the interest among college students in preaching, that at the close of the 19th century the ministry is overtopped by teaching, commercial pursuits, law, and medicine.

During the first century of higher education in this country, training for law received scant attention, inasmuch as the governing class came directly from England, where they received their legal training. Between 1745 and the period of the Revolutionary War there was a slight increase. This increase was greatly accelerated immediately after the Revolution by reason of the change in government, which removed the English-trained lawyers

and created a demand for lawyers trained in American institutions. Law, accordingly, was in the ascendancy in the colleges during the early part of the 19th century, and once more between 1840 and 1885, perhaps because of litigations growing out of the Civil War. For a hundred years after the Revolution the law attracted a greater percentage of graduates than any other profession except the ministry. At the close of the century, however, it is surpassed by teaching and commercial pursuits.

Before 1705 medicine was an extremely variable profession. After 1705 the profession has a much more constant tendency, and thence to 1745 the percentage of college students entering medicine is approximately seven, rising to about twelve per cent from 1745 to 1780. While the profession of law was attracting many college graduates after the Revolutionary War, medicine fell off slightly, with an average percentage between the years 1781 and 1805 of about nine. Since 1850 this average has been further reduced by the growth of teaching and the commercial pursuits, with the result that this profession closed the century with an average of only six and six-tenths per cent of the graduates of colleges, a lower percentage than that of any other five-year period since 1735. Medicine has been the most constant of all the professions.

Recent Changes in Professions. Within one hundred years the profession of teaching has grown from about one-twentieth to about one-third of the graduates of colleges. Previously to 1835 it was outnumbered by the ministry, law, and medicine, but after this date the curve for medicine is lower. Since 1880 the line for teaching has crossed that of the ministry, and since 1890 that of law. Thus, at the present time it is the dominant profession into which college graduates go with business as its closest competitor.

The general trend of the curve for college graduates entering commercial pursuits since 1825 has been upward. At present, the commercial group takes one-fifth of the graduates, and is exceeded only by the group of teachers. The general rise of this curve is one of the most striking facts brought out by a study of the colleges, and one to which too little attention has been given.

The profession of engineering scarcely appears until after 1825. Its rise from that time until the present time has been steady; in fact, it has been rapid following World Wars I and II. At present, the profession has attained a percentage of about fifteen. A larger proportion of the graduates of the collegiate departments of institutions maintaining special engineering schools enter this profession, but the aggregate percentage is kept down by the small colleges, only a very small percentage of whose graduates, as a rule, pursue this vocation.

In spite of the comparatively large number of agricultural courses, farming does not attract and never has attracted a very large number of college graduates; the present percentage is about five. The rapid development of the land-grant colleges, however, has greatly stimulated enrollments. Although the number of graduates entering agricultural pursuits is increasing, it is not increasing so rapidly as the number entering other professions.

Prior to 1830, the profession of letters did not take more than one per cent of the graduates. Between 1830 and 1855 the percentage rose from one to two per cent, and by 1885 it had touched its maximum of three and three-tenths per cent. It must be remembered, however, that many men do not adopt the pen as a means of livelihood until comparatively late in life, and the result is that this series of records stops before the date at which a number of the more recent college graduates can have qualified for inclusion in this group.

Degrees granted by institutions of higher learning in 1950–51 indicate the tendency in major fields of study:

Field of Study	Men	Women
Agriculture	8,924	118
Architecture	2,556	88
Biology	6,725	2,072
Business and commerce	52,320	5,917
Chemistry	7,036	1,222
Dentistry, D.D.S. only	2,768	35
Economics	9,579	905
Education	18,898	32,633
Engineering	41,386	87
English	6,829	8,676
Fine Arts	2,487	3,119
History	9,000	3,321
Home Economics	55	7,848
Journalism	2,684	1,019
Language, Modern	1,597	2,671
Law	13,926	412
Mathematics	4,311	1,442
Medicine, M.D. only	5,563	451
Music	3,740	3,983
Pharmacy	4,622	411
Philosophy	2,333	321
Physical Education	7,654	2,459
Physics	2,671	117
Political Science	4,698	884
Psychology	4,836	2,983
Social Science*	4,722	2,339
Sociology	3,395	3,925
Speech and Dramatic Arts	2,254	2,030
Theology	3,329	135
Total†	279,343	105,009

*Not classified elsewhere.
†Includes studies not listed.

Growth of Colleges. The development of colleges during recent years has been extremely rapid. The following summary from a bulletin of the United States office of education shows that development during the last five decades:

During the 50-year period 1889–90 to 1939–40 the total number of administrative and instructional staff members at institutions of higher education increased more than eightfold, from 15,809 to 131,552. In 1941–42 the number stood at 134,137, which was 8.48 times the 1889–90 figure. The number of women members of staffs increased more than twelvefold, from an estimated 3,105 in 1889–90, to 37,886 in 1941-42. In 1889–90, women constituted 19.6 per cent of college and university faculties; in 1939–40, 28.1 per cent; and in 1941–42, 28.2 per cent.

Since 1890, and possibly an earlier date, enrollment of students in higher education has been steadily on the increase, not only in absolute numbers, but also in proportion to the total population of the country, and in proportion to the total number of persons of college age (18-21 inclusive). In 1889–90, the enrollment of 156,756 was 0.25 per cent of the total population and 3.04 per cent of the population 18-21 years of age. The enrollment increased steadily until the economic depression period of the thirties, when it suffered a temporary setback. It quickly rallied from this loss, and increased to about 1939–40. The outbreak of the war in Europe soon started another decrease.

In 1941–42, the nonmilitary resident college enrollment was 1,398,981, which was 1.07 per cent of the estimated population of the nation, and 15.66 per cent of the nonmilitary population 18-21 years of age.

Expenditures increased from $377,903,377 in 1929–30 to $572,465,437 in 1941–42.

Since the close of hostilities of World War II in 1945, college enrollment has increased by leaps and bounds. Approximately 2,000,000 students were enrolled during 1946–47, and an additional 475,000 students were turned away because of lack of college facilities.

American Universities. The distinction between the terms college and university has never been strictly observed in America. A university is a higher institution of learning including such professional schools as law, medicine, engineering, agriculture, journalism, and so on, and including also the graduate schools of letters and sciences.

Special reference is usually made when speaking of universities to the advanced work of a research type leading to the degree of doctor of philosophy. This kind of work was first emphasized at Johns Hopkins university incorporated in 1867. The first president of this institution, Daniel Coit Gilman, is usually regarded as the founder of graduate work in this country.

HISTORY OF EDUCATIONAL REFORMERS

Along with the development of educational institutions, there have appeared from time to time educational theorists and writers who have exercised an influence upon the course of subsequent school organization, through their criticisms of existing practices and their suggestions of new types of organization which should be set up. In general, it may be said that these educational reformers reflect the thinking of their times only indirectly. Usually they are significant in the history of the world because they recommend radical departures from tradition and from ordinary views about education. In many instances they have been teachers who have seen from their experience the fallacy of existing methods and have, therefore, thought out new modes of school organization. Very frequently their suggestions are so far removed from the possibilities of realization that the reform suggested is nothing but a theory. Even in such instances, however, the extreme theory has often operated to modify existing methods, and, while the plan proposed by the reformer has never been fully achieved, the modifications which have been attained have been sufficiently radical to justify his efforts.

In a few instances the writings of the educational reformer have led to the organization of a group of disciples who have carried his ideas into effect. Sometimes, indeed usually, the disciples have not followed exactly in the steps of their masters. For example, when Froebel developed the philosophical plan for the training of little children, which led to the organization of the kindergarten, he set in operation a movement which, especially in recent times, has developed in directions other than those implied in his suggestions. The kindergarten has had an independent history reaching far beyond the writings and immediate teachings of its founder. At the same time there can be no doubt that Froebel's writings were the source and original inspiration of the whole movement. The question has arisen within the kindergarten group from time to time whether Froebelian doctrines should be adhered to closely, or should be accepted as mere suggestions of a general type of thinking to be worked out by practical teachers who have to deal with the training of little children. In the course of this discussion, kindergartners have separated into conservative and radical groups.

Similarly, various groups of modern educators have attempted to interpret the general ideas which were laid down by Herbart. In many instances, these interpreters have been in disagreement with each other, but have expressed full acknowledgment of their dependence upon the original teachings of Herbart.

In considering, therefore, the life and writings of any reformer, it is necessary, first, to refer briefly to the conditions under which he did his work. It is then essential to summarize his views on education. Finally, it is important to estimate, as far as possible, the type of influence which he exerted on subsequent periods.

Socrates (469–399 B. C.). One of the earliest educational reformers was Socrates, the Greek philosopher who lived in the 5th century B. C. He was a teacher of morals, logic, and political philosophy; and he attempted to lead the young men of Athens to a clearer conception of their duty to the state, to their parents, and to their associates. His fundamental belief was that knowledge leads to virtue.

His system of teaching consisted in a series of questions which, step by step, followed up any assertion made with regard to any fundamental matter of conduct. The so-called Socratic method consists in drawing out from the individual the necessary consequences of any statement made by him. The teacher is not supposed to contribute directly any information; his business is to stimulate the student to think for himself and to be thoroughly critical of every conclusion at which he arrives.

Socrates did his teaching in a small state in which the young men to whom he appealed were members of the aristocracy which governed the state. The effect of his teaching was to spread broadcast among these young aristocrats skepticism in regard to contemporary practices and forms of social thinking and organization. So influential was this skepticism that in many instances the followers of Socrates became political radicals who sought, not only to criticize existing governmental policies, but to modify them in actual legislation and in the interpretation given to the laws of the state and to the customs of their times.

At length, aroused by the radical tendencies of Socrates' followers, the conservative party in Athens brought about his execution as a false teacher.

Socrates never wrote out any of his own views with regard to the state. It was his followers who gave expression to his doctrines. The writings of Plato and Aristotle, therefore, have been among the chief vehicles through which the influence of Socrates has been brought to the modern world.

Plato (429–347 B. C.). Plato wrote on philosophy, on social subjects, and on government, developing ultimately a general theory of the state. This theory distinguishes between the different classes of society, and defends the general position, which he borrowed from Socrates, that knowledge and clear thinking are the only possible bases of good conduct. Practical writers have sometimes criticized Plato by pointing out that knowledge is not always immediately expressed in action. A man may think clearly on social matters and yet not be just in his social behavior. Plato, on the other hand, emphasized very explicitly the relation between knowledge and action, and devoted his writings and teachings to the development of this theory.

Plato's doctrine of the state distinguishes between the slaves who are to carry on the ordinary activities necessary to provide society with the necessities of life, the warriors who are to defend the state, and the philosophers who through meditation develop a system of laws and practices which shall embody all of the principles of justice.

His influence was very great over a large group of followers, whom he taught in the school which he founded and called the Academy. Here he taught not only his system of philosophy but the higher branches of mathematics, which he deemed an important part of the mental equipment of youth.

Plato's writings and teachings were accepted in the later medieval period as the chief authority on educational organization.

He divides higher education into four main branches—arithmetic, geometry, astronomy, and music. This subdivision of the subjects of instruction, known in the medieval period as the quadrivium, was long the basis of study of the school curriculum. Plato's discussion emphasizes, not only the importance of these particular subjects, but also the necessity of developing a unity and symmetry of thought which can be arrived at only by mastering the full round of the curriculum.

Plato was an idealist—an ardent advocate of the æsthetic and the moral in education. He was especially congenial to the religious leaders of the medieval period and to the later thinkers who, in the Renaissance, sought to restore Greek culture with all its artistic accompaniments.

Aristotle (384–322 B. C.). Aristotle was a much more practical and scientific teacher than was Plato. He was the instructor of Alexander the Great, and in later life he received from his royal pupil many additions to his materials of knowledge. It is said that Alexander sent to Aristotle, from all parts of the world into which he carried his expeditions, samples of the things which he found. He sent, for example, actual specimens of strange animals, with the result that the science of zoology de-

veloped in Aristotle's hands. In like fashion, other natural sciences were opened up by Aristotle because of the breadth of material which he found available.

Aristotle organized the Lyceum as a place where he trained the young legislators and statesmen of Athens. It became a center of research in biology, history, and the science of government. Aristotle developed numerous systems of knowledge which were of great influence during the medieval period, and his discussions on the nature of the mind were the bases of the psychology and of much of the theology of this time. He formulated the principles of logic, which were taken over to the great school at Alexandria and were later utilized by Euclid in the formulation of geometry. Through geometry the Aristotelian logic was carried into the medieval schools and became the most important subject of higher education in Europe, both in the medieval and in the early modern period. The disputes of the scholastics are based upon the principles of this logic.

Aristotle advocates the beginning of education when the child is seven years of age. He mentions and evaluates the various subjects to be taught, namely, reading and writing, gymnastics, music and drawing. He lays great stress on physical training and on reading and music.

Aristotle's theories about education were much less completely formulated than were those of Plato. He contributed new content for education rather than new methods of giving instruction.

Quintilian (35–100? A. D.). Quintilian was a teacher of rhetoric in Rome. He formulated a theory of education for the orator, which became the classic of subsequent organization of training in language and letters during the medieval and modern periods. Quintilian may be regarded as the father of classical education. In his day classical education meant, of course, the transfer of Greek learning to Roman soil. He pointed out quite explicitly that the study of Greek is not so important in its content as in the training which it gives to the young orator.

Quintilian wrote his educational works late in life, after a period of successful experience as a teacher of Roman boys. It was his theory that the proper training of the orator must begin with infancy. He therefore devotes much of his writing to the theory of training the child from infancy up. He wrote a series of books entitled *De Institutione Oratoria*, in which he gave in great detail the methods of literary training. For example, he discussed the teaching of writing, and advocated teaching the forms of letters by requiring the child to trace letters which had been written for him. He afterwards discussed in equally great detail the method of teaching Greek grammar and the methods of teaching literary style. Quintilian favored also, as had Plato, the teaching of geometry and music as parts of a liberal education. He discussed the matter of corporal punishment, and advocated an abandonment of frequent floggings, on the grounds that the child's individuality must be respected.

Quintilian's influence in formulating the modern classical curriculum is perhaps greater than that of any other single writer.

Alcuin (735–804). Alcuin has been mentioned in the earlier paragraphs. He was educated in the Cathedral of York in England, and came to the continent as educational adviser of Charlemagne. In this capacity he exercised a great influence, not only over the princes who were his pupils, but in the political matters with which his master was always engaged. His influence was felt in the more vigorous and systematic organization of education and of the intellectual side of civilization wherever his pupils went.

Anselm (1033–1109). Anselm has been called the father of scholasticism. He was archbishop of Canterbury in England. For a time he did his work in the monastery of Bec, which he made the chief center of learning in western Europe. His teachings were chiefly upon religious doctrines. His fundamental principle was that Christianity can be founded on stable grounds only if reason guides. He trained his followers, therefore, to cultivate methods of correct and vigorous thinking. From Bec there issued, as a result, the most vigorous disputants of the age.

Peter Abelard (1079–1142) was the most famous teacher of the 12th century. Like all teachers of that day he was trained for theology, and his fame rests in large part upon his ability as a disputant on theological topics. He was an opponent of William of Champeaux, whom he seriously worsted in theological debate. He became a hermit in Champagne but hundreds of students flocked to him and were influenced by his liberal and spirited teachings. He is one of the important forerunners of the school of theology which afterwards became the great University of Paris. Much of the teaching which he did in his early years was at Notre Dame in Paris.

Saint Thomas Aquinas (1225–1274). Aquinas was undoubtedly the greatest and most influential philosopher of the middle ages. He adopted the method of teaching which later came to be universal in European universities, namely, the so-called commentary. He read Aristotle's works to his students and followed the reading by critical comments. This method is reflected in the lecture method of instruction which is common today in all higher institutions of learning in Europe and America.

Aquinas was a voluminous writer on theological and philosophical topics. His writings, like his oral methods of teaching, have exercised a lasting influence. No single authority has contributed more to the fixed teachings of the Roman Catholic Church and its schools than Aquinas.

Erasmus (1466–1536) was one of the leaders in the Northern Renaissance. He was educated in the schools of the Brethren of the Common Life in France and later was himself a teacher of the classics in various parts of Europe, and the author of many of the textbooks used in the teaching of Latin. He was the author of several treatises on education. In these he points out the importance of beginning education early and developing the powers of the child in the natural order. He also maintains that it is the business of the Church and state to see that there is an adequate number of properly qualified teachers. He himself exemplified throughout his life devotion to the profession which he thus aimed to promote in these writings. He was at home in all parts of Europe because of his command of the classical languages and is said to have been known in all of the schools of his time and during the century following his life.

Martin Luther (1483–1546). Luther was the father of the Reformation in Germany. The essentials of Luther's teaching were independence of religious belief and reliance on individual faith. Luther championed the cause of the common people and by his writings strove to improve the intellectual condition of his fellow citizens. He and his followers, like many of his lay and clerical contemporaries, were friendly to the classics, but he advocated the establishment of vernacular schools for the common people. He combated vigorously the pseudo-science of astrology.

The main subject of Luther's interest was religious teaching, and he is regarded as the pioneer of Protestant household instruction. His influence has undoubtedly been of prime importance in keeping in the curriculum of the common schools of Germany, even though they are under secular control, instruction in religion.

Ignatius Loyola (1491–1556). Loyola was a Spanish youth brought up in the court of Ferdinand and Isabella. He was wounded while engaged in military operations against the French. During the period of his convalescence he read certain religious treatises and resolved to give his life to the Church.

He became the leader in a movement for reform within the clergy. With a number of his followers, he founded, under a charter granted by Pope Paul III, the Order of Jesus, which has been throughout its history a teaching and missionary order.

The object of the order is described as "The progress of souls in good life and knowledge of religion, the propagation of faith by public preaching, spiritual exercises, and works of charity, and particularly the instruction of youth and ignorant persons in the Christian religion."

In the accomplishment of this purpose, the order established schools and colleges, and developed the so-called *Ratio Studiorum*, or plan of studies, which prescribed a rigid training in the classics and in religion. Latin and Greek were the backbone of the curriculum, but science and mathematics were also included. Where the order undertook missionary enterprises, the scope of the curriculum was enlarged to include instruction in the vernacular and in rudimentary subjects. The characteristic of all the teaching was its systematic and carefully planned organization.

Ignatius Loyola was not a reformer in the sense that he revolted against earlier ideals; he aimed rather at realizing ideals for which the Church already stood. His companion Peter Canisius strove to check the progress of Luther's social and religious teaching in Germany. Loyola's labors gave to the Catholic Church the order which has continued to exert the greatest influence over its educational activities. See *Jesuits*, page 2051.

Johannes Sturm (1507–1589) was a German educator of the extreme classical type. He was educated in the school of the Brethren of the Common Life at Liege. His chief work was carried on in the Gymnasium at Strasbourg. He was a rigid disciplinarian and a devoted classicist. He was an organizer of large ability and, by virtue of the fact that he wrote extensively on methods of education and organization of secondary education, his influence spread to other cities and to other countries. The modern organization of the German Gymnasium is to be attributed in very large measure to the influence of the school which he conducted in Strasbourg.

Roger Ascham (1515–1568) wrote in 1570 an educational work entitled *The School Master*. It is one of the most representative Renaissance writings in England. It is full of a liberal spirit and exhibits a large interest in physical education as well as intellectual training. In this book Ascham describes the method of teaching Latin which is known as the method of double translation. The Latin author is to be translated first into English and afterwards to be translated back again into Latin. Ascham's book on school teaching is interesting, not merely because of the liberal reforms he suggested in teaching, but also because of its literary style and because of the insight which it gives into the social and political life of the day in which he wrote.

Francis Bacon (1561–1626) was an English philosopher, statesman, and man of letters. He was one of the brilliant group who gathered around Queen Elizabeth. He advocated the development of science through observation and direct contact with objects as distinguished from the acceptance of statements made by writers of books.

His educational influence is general rather than specific. He inaugurated the period of sense-realism. His methods of scientific investigation were indeed much less productive than those of some of his contemporaries, but his writings were of such an impressive character as to attract the attention of readers and to give prestige to his theory that education should be based on direct observation.

John Amos Comenius (1592–1670). Comenius, or Komensky if the Bohemian form of his name is used, ushered in the change in attitude which came naturally after the long period of formal classical education. He was interested in making knowledge concrete and definite. He criticized the schools in the most severe terms, pointing out that they dealt in words rather than in useful forms of knowledge. He characterized the schools as "the slaughterhouses of the mind where ten or more years are spent in learning what might be acquired in one." "They are," he said, "places where minds are fed on words." These criticisms he made because of his experiences in the gymnasium in Prerau and his observation of the attitude of his fellow pupils in that and other schools which he attended.

He began his work as an educational reformer by preparing new materials for the teaching of Latin. He selected the names of common objects and arranged this selected vocabulary in simple sentences which the pupils could understand. Later he added to the concreteness of his teaching by preparing a pictorial encyclopedia called *Orbis Pictus*, in which lists of words are given. Each word is defined and accompanied by an illustration.

In order to change the practices of the schools, he organized a school at Sarospatak near Tokay. Here he made education thoroughly interesting to his pupils by instruction that was concrete rather than abstract.

He is to be described as the father of realism in modern education. He ushered in a period in which education was to cease being austere and remote and was to become sympathetic and helpful to the pupil, interesting and congenial to the child's native tendencies.

John Locke (1632–1704). Locke was one of a group of essayists who wrote on education though their chief interests were in other matters. He was an English philosopher who spent his time and energy chiefly in discussing the issues of philosophy. His great work is his *Essay concerning Human Understanding*. This, together with his political writings, gave him an influential position among the serious readers of his day.

His book entitled *Thoughts on Education* is a protest against too close devotion to books and bookish knowledge. He would have the young English gentleman, on whom his "thoughts" are concentrated, travel and become acquainted with things rather than merely learn languages.

Locke was a modern realist in every sense of the word. He belonged to a period when natural science was flourishing in England. His philosophical system was realistic in its interests, and he was thus one of the early advocates of a new type of education which breaks away from the severely classical traditions of an earlier period.

Jean Jacques Rousseau (1712–1778). Rousseau wrote at a time when education was dominated by the idea that the younger members of the court of France must be trained in the social arts which would make them acceptable in court life. The strictly court type of training which had been evolved was not primarily a system for the training of the intellects of the pupils. It was a course in manners. The breach between the common people, who had to work, and the aristocracy, who idled about the court and cultivated artificial manners, was daily growing wider; and Rousseau, as he wrote on education, was writing also on political issues.

Indeed, his two great works deal, one with political theory, the other with the theory of the training of the individual. We may, perhaps, gain a better view of his educational theory by referring first to his chief political essay, entitled the *Social Contract*. Rousseau held, in this essay, that the rights of the sovereign arise from the consent of society. In a primitive state men are at war with one another; but seeing that war is destructive they come together and form a group, agreeing each in his turn to surrender some of his individual rights to the group as a whole. The social contract thus formed is held to be the basis of civilized government. Rousseau's doctrine of the social contract was a

powerful influence in the French Revolution. It has been said that this book helped more than anything else to precipitate the Revolution.

On the side of individual training, Rousseau held that all of the false institutions which have grown up in modern society must first be eliminated if the individual is to come to the full development of his powers and personality. He wrote a book entitled *Émile*, in which he expressed his educational doctrines in the form of a life history of a boy who is supposed to have been properly educated. This book begins with the famous statement that all things are good as they come from the hand of the Creator. It is man who has destroyed the natural goodness of everything. Rousseau advocates, therefore, a return to nature. The boy who is to be properly educated must be taken away from association with society. He must never see a book until he is sufficiently mature to escape all the evil consequences which result from the use of books. Freed, in this way, from contact with society and books, the child must wander in the woods and open country and gather up knowledge which will satisfy his natural curiosity. In order that this boy may have the advantage of such knowledge as the race has accumulated, he is to be accompanied by a sympathetic tutor whose business it is merely to help him answer the spontaneous questions which arise in his mind. After the child has reached a certain stage of maturity, he should be led to see the importance of cultivating some type of skill which, in case of necessity, will provide him in later life with the means of livelihood. Still later, he may be brought back into the society from which he has been separated during the earlier period, and may now be introduced to books and men. He will be able to adjust himself to the social conditions which he thus encounters, because of the intelligence and the strength of physique which he has cultivated through his early training.

Rousseau's *Émile* was so fascinatingly written that it was accepted by Europe as a philosophy of life as well as a scheme of education. His teachings have also been of influence in subsequent generations where the general principle of the return to nature has seemed most attractive to those who are critical of modern society and the modes of life which modern education has developed. There are constant references to Rousseau's doctrine of education in such modern theories as that developed by Madame Montessori.

In many quarters of Europe, immediately following the appearance of his book, the education of children was organized on the free plan suggested by Rousseau. Not only were children taken out into the open fields and woods, but mature individuals attempted to give themselves a freedom of life and a detachment from the difficult problems of modern society by accepting Rousseau's doctrine as a philosophy of life.

From the nature of the case, Rousseau's teachings did not lead to the organization of a school system or a group of teachers. His writings tended, however, to modify the practice of existing schools in the direction of greater freedom and the recognition of natural impulses of children.

Johann Basedow (1723–1790). Basedow is the educational reformer of the post-Reformation period who is to be compared in general character with Comenius of the pre-Reformation era. Basedow, like Comenius, conceived of education as an appeal to the natural interests of children. He sought to promote nature study and contact with objects.

He devoted himself assiduously to the preparation of suitable textbooks for use in schools. In order to secure the funds for the preparation and publication of these books, he made an appeal to men of property for a public subscription and received a generous response. His movement was termed from this time on Philanthropinism.

The influence of Rousseau is very marked in the writings of Basedow. His motto was, "everything according to nature." A description of the new type of school which he established is given by Herr Schummelas as follows:

"I have just come from a visit with my father to the Philanthropin, where I saw Herr Basedow, Herr Wolke, Herr Simon, Herr Schweighauser, and the little Philanthropinists. I am delighted with all that I have seen, and hardly know where to begin my description of it. There are two large white houses, and near them a field with trees. A pupil—not one of the regular scholars, but of those they call Famulants (a poorer class, who were servitors)—received us at the door, and asked if we wished to see Herr Basedow. We said 'Yes,' and he took us into the other house, where we found Herr Basedow in a dressing gown, writing at a desk. We came at an inconvenient time, and Herr Basedow said he was very busy. He was very friendly, however, and promised to visit us in the evening. We then went into the other house, and inquired for Herr Wolke."

By him they were taken to the scholars. "They have," says Fred, "their hair cut very short, and no wigmaker is employed. Their throats are quite open, and their shirt-collar falls back over their coats." Further on he describes the examination. "The little ones have gone through the oddest performances. They play at 'word-of-command.' Eight or ten stand in a line like soldiers, and Herr Wolke is officer. He gives the word in Latin, and they must do whatever he says. For instance, when he says *claudite oculos*, they all shut their eyes; when he says *circumspicite*, they look about them; *imitamini sartorem*, they all sew like tailors; *imitanini sutorem*, they draw the waxed thread like the cobblers. Herr Wolke gives a thousand different commands in the drollest fashion.

"Another game, 'the hiding game,' I will also teach you. Some one writes a name, and hides it from the children—the name of some part of the body, or of a plant, or animal, or metal—and the children guess what it is. Whoever guesses right gets an apple or piece of cake. One of the visitors wrote *intestina*, and told the children it was a part of the body. Then the guessing began. One guessed *caput*, another *nasus*, another *os*, another *manus*, *pes*, *digiti*, *pectus*, and so forth, for a long time; but one of them hit it at last. Next, Herr Wolke wrote the name of a beast, a quadruped. Then came the guesses: *leo*, *ursus*, *camelus*, *elephas*, and so on, till one guessed right—it was *mus*. Then a town was written, and they guessed Lisbon, Madrid, Paris, London, till a child won with St. Petersburg. They had another game, which was this: Herr Wolke gave the command in Latin, and they imitated the noises of different animals, and made us laugh till we were tired. They roared like lions, crowed like cocks, mewed like cats, just as they were bid."

Johann Heinrich Pestalozzi (1746–1827). Pestalozzi is one of the world's greatest educational reformers. He was born in Zurich, Switzerland, and did his work in the little Alpine republic, but his influence has spread to every civilized country on the globe.

He was in temperament and behavior erratic and unsystematic. He failed to hold together the schools which he founded, and so far as his personal affairs were concerned he was always unfortunate. But in his insight into the needs of the common people, in his sympathy for children, and in his genius for devising methods of teaching, he is one of the foremost leaders of modern times.

After drifting from one enterprise to another, Pestalozzi wrote and published in 1781 the work on which his fame chiefly rests, a book entitled *Leonard and Gertrude*. In this book the author gives first a picture of the deplorable condition of a poor family in a Swiss village. The picture shows how the family lacked all the comforts of life and all prospects of securing even the barest living necessities. In the midst of these squalid conditions, the brave mother, Gertrude, takes up the task of teaching her children. Gertrude turns out to be such a genius in getting her children to carry on the simple industrial and domestic activities to which she directs their attention that, through their co-operation, she relieves the condition of the family and ultimately the poverty of the whole village.

Gertrude's method is that of organizing the children's activities and at the same time instructing them in the intelligent comprehension of all that is about them. She reads to them as they work. The language of her school concerns itself with the commonplace facts of everyday life, and yet it raises these facts to the level of understood and clearly

explained matters. The moral tone of the home and of the village is raised through this intellectual clarification of the facts of life. Skill which is cultivated at the same time that minds are trained makes it possible for the children to develop comfortable and wholesome surroundings.

Pestalozzi's message came as a great inspiration to an age which was impoverished by wars and by the lack of trained workers in industry. All over Europe the effort was put forth by rulers and religious leaders to bring the common people up to the level described in *Leonard and Gertrude*.

His teachings were brought to America and were eagerly accepted, especially at the normal school at Oswego, N. Y. Under the leadership of its principal, Edward Austin Sheldon (1823–97), this school became a great center for the dissemination of the doctrine of sense training, observation, and the cultivation of practical knowledge.

Charles Maurice Talleyrand-Périgord (1754–1838) was a French statesman. To his influence may be attributed the compact organization of the educational system of France. Napoleon adopted the suggestions which he made with regard to the organization of the educational system, and made it in this way a part of the public policy of France. To Talleyrand himself the organization of the educational system was a mere side issue. He was engaged in important diplomatic and political missions at different times during his life and seems not to have been seriously interested in carrying out the reforms which he had suggested in his writings. His personal influence, therefore, is relatively slight, although his statesmanship appears in the organization which he suggested and which was adopted by the French state.

Johann Friedrich Herbart (1776–1841). Herbart was a German philosopher and teacher. He was the first educational reformer to enunciate clearly the idea that education must be organized on the basis of carefully ascertained scientific principles. There are two sciences, he pointed out, on which education must be based—psychology and ethics. The first supplies an analytical account of the nature of the human mind which is to be educated; the second works out the social goals toward which educational systems must direct their efforts.

Herbart had experience as a tutor of boys in the home of the governor of Interlaken, and he was thoroughly acquainted with the sciences on which he proposed to base education. Indeed, his occupation was that of professor of philosophy in various German universities.

The system of psychology of which he was author stimulated the empirical studies of the last century which resulted in the establishment of laboratories for the development of an experimental and physiological science. The system was not in itself especially productive for education. The pedagogical writings of Herbart seem to have grown more out of his practical experience than out of his system of psychology.

Herbart laid great stress on the importance of arousing the pupils' interests and then extending these interests in many directions, until there should result what he calls many-sidedness of interest.

Herbart's doctrine of apperception is another of his leading contributions to educational theory. All experiences, in order to be clear, must be introduced into the learner's experience in such a way as to be fully assimilated.

In order that ideas may be apperceived, teachers must have a regular method of getting ideas into the pupil's mind. The method involves five steps, which are known as formal steps because they can be adopted as the proper form for any content whatsoever. These steps are preparation, presentation, assimilation, generalization, and application. Put in other words, the experience of the pupil must be so marshaled that the mind is ready to take in the new idea. This must then be presented in clear form. The mind must have time to receive the idea and put it into its proper relations. The mind must then contemplate it until the general nature of the new idea is recognized. Finally, the mind must carry over what it has absorbed into all productive new relations or applications.

Herbart's influence has been very great in America. Through the school at the University of Jena in Germany, over which Professor Wilhelm Rein (1847–1929) for many years presided, a great many Americans, notably Charles DeGarmo and Frank and Charles McMurry, were introduced to Herbartianism. They have been prolific writers on educational methods.

Friedrich Froebel (1782–1852). Froebel was the founder of the kindergarten. He was powerfully influenced on the one side by Pestalozzi, whose school at Yverdun he visited for a period, and on the other side by the idealistic philosophy of Schelling and Fichte.

Unlike Pestalozzi, he was not especially interested in the practical aspects of human training, but he was absorbed in the attempt to bring into complete harmony the inner experience of the child and the natural world in which the child lived. Prompted by his idealistic philosophy, he sought to bring about this harmonizing of the inner and outer worlds by finding the universal principles in nature and exposing the child to these at the earliest possible age.

There is much mysticism in Froebel's thinking and writing. This fact has led to confusion in the development of the institution which he founded. Indeed, it has permitted a certain sentimentalism to come into the kindergarten, which has tended to inhibit the careful study of children and their needs.

Froebel's Principles.—A number of extracts from Froebel's writings will serve to bring out the leading principles of his educational philosophy:

"A life of more than thirty years with nature, often, it is true, falling back and clouded for great intervals, has taught me to know this, especially the plant and tree world, as a mirror, I might say, an emblem of man's life in its highest spiritual relations; so that I look upon it as one of the greatest and deepest conceptions of human life and spirit when in Holy Scripture the comparison of good and evil is drawn from a tree. Nature, as a whole, even the realms of crystals and stones, teaches us to discriminate good from evil; but, for me, not so powerfully, quietly, clearly, and openly as the plant and flower kingdom.

"The child . . . perceives in the ball the general expression of each object as well as of itself (the child) as a self-dependent whole and unity . . . so the child likes to employ himself with the ball, even early in life, in order to cultivate and fashion himself, though unconsciously, through and by it, as that which is his opposite and yet resembles him.

"The cube is to the child the representative of each continually developing manifold body. The child has an intimation in it of the unity which lies at the foundation of all manifoldness and from which the latter proceeds.

"The pleasure with which the children play these games and others of a similar kind may therefore have its ground in a presentiment of what is symbolic and significant in them. May not their delight in these encircling movements, for example, spring from the longing and the effort to get an all-round or all-sided grasp of an object? . . . I am convinced that the exalted and often ecstatic delight of children in their simple movement plays is by no means to be explained through the exertion of mere physical force—merely bodily activity. The true source of their joy is the dim premonition which stirs their sensitive hearts that in their play there is hidden a deep significance; that it is, in fact, the husk within which is concealed the kernel of a living spiritual truth.

"Experience and history, too, teach that men truly and effectively promote human welfare much more by what they put forth from themselves than by what they may have acquired. Every one knows that those who truly teach, gain steadily in knowledge and insight . . . Again, to learn a thing in life and through doing is much more developing, cultivating and strengthening than to learn it merely through verbal communication of ideas. Similarly, plastic material representation in life and through doing, united with thought and speech, is by far more developing and cultivating than the merely verbal representation of ideas.

"The young growing human being should, therefore, be trained early for outer work, for creative and productive activity . . . play, building, modeling are the first tender

Above Chapel at Duke University in Durham, North Carolina. The university was founded in 1838. Today, more than 4,000 undergraduates attend the university.

Below Hoover Tower at Stanford University, California. This building, named for former president Herbert Hoover, a Stanford alumnus, contains the Hoover Institute and the Library on War, Revolution, and Peace. The university was founded in 1885 and at present is attended by over 7,000 undergraduates.

Above Timothy Dwight College, Yale University, New Haven, Connecticut. One of the numerous colleges on the campus which serve as dormitories for more than 8,000 male students.

Right Taylor Gate at Vassar College, Poughkeepsie, New York. An institution for women, Vassar was founded in 1861.

Left above The William Oxley Thompson Memorial Library at Ohio State University, Columbus, Ohio. This library was expanded in a $2,500,000 project in 1951 and was named for the fifth president of Ohio State University. The university, which is coeducational, was established in 1870.

NOTABLE COLLEGES

Below Dunster House of Harvard University in Cambridge, Massachusetts. This house is one of the seven dormitories for the students. Harvard is one of the country's oldest educational institutions and was founded in 1636. Today, more than 10,000 students attend the university.

The Nieuwland Science Hall at the University of Notre Dame which houses the departments of chemistry, physics, and mathematics of the College of Science. Completed in 1952, the structure cost $2,500,000 and is named for the late Rev. Julius A. Nieuwland, C. S. C.

Above The Institute for advanced study at Princeton, New Jersey. The Institute is a part of the famous Princeton University Graduate School which is located on adjoining property.

Left The W. Harrison Hightower Textile Engineering Building on the campus of the Georgia Institute of Technology in Atlanta, Georgia, which was founded in 1885. It is coeducational.

Lower left Tomlinson Hall, the Student Union Building at Case Institute of Technology in Cleveland, Ohio. This school was founded in 1880.

Below A campus scene of Rice Institute as seen from Lovett Hall. Rice is located in Houston, Texas, and was founded in 1912.

TECHNICAL INSTITUTIONS

blossoms of youth . . . Every child, boy and youth, whatever his condition or position in life, should devote daily at least one or two hours to some serious activity in the production of some definite external piece of work. It would be a most wholesome arrangement in schools to establish actual working hours similar to the existing study hours; and it will surely come to this.

"A universal and comprehensive plan of human education must, therefore, necessarily consider at an early period singing, drawing, painting, and modeling; it will not leave them to an arbitrary, frivolous whimsicalness, but treat them as serious objects of the school. Its intention will not be to make each pupil an artist in some one or all of the arts, but to secure to each human being full and all-sided development, to enable him to see man in the universality and all-sided energy of his nature, and, particularly, to enable him to understand and appreciate the products of true art.

"This school (he said) will be based on the interdependence of doing and thinking, representation and knowledge, art, and science . . . on the student's personal efforts in work and expression, making these again the foundation of all genuine knowledge and culture. Joined with thoughtfulness, these efforts become a direct medium of culture; joined with reasoning, they become a direct means of instruction, and thus make of work a true subject of instruction."

Thomas Arnold (1795–1842) was head master of Rugby for 14 years, from 1828 to 1841. During this period he exercised on the organization of secondary education in England an influence which was of the greatest importance. He assumed in an intimate way the social and intellectual leadership of Rugby. He contributed very largely to the establishment of the type of discipline which has come to be regarded as characteristic of the English so-called public schools. He was in favor of classical studies but he also provided, in the curriculum of his school, for modern history and modern languages and mathematics. In all these subjects he maintained the highest standards of scholarly exactness. The integrity of his character and the great influence which he exercised over the boys who attended Rugby is reflected in Thomas Hughes's *Tom Brown's School Days*. The influence of his methods of administration spread to the other schools of England.

Horace Mann (1796–1859). Mann was the first secretary of the state board of education in Massachusetts. In this position he exercised an enormous influence during the critical period of reconstruction which brought into being the American graded elementary school as a substitute for the older district school.

Mann was an indefatigable worker and a prolific writer. His annual reports deal with all kinds of problems, such as illiteracy, school buildings and sanitation, the training and employment of teachers, methods of teaching, methods of local school control, and public financing of education.

He was greatly impressed by the organization of German schools, and advocated the conservative importation of some of the practices which he observed there. He pointed out fearlessly the faults which he found in existing schools and suggested many reforms.

His criticisms aroused much animosity among the schoolmasters, especially those in the Boston schools, and brought him into sharp controversies. However, he was able to secure the establishment of the first normal school to have a continuous existence in his country. He modified the district school; he greatly improved public respect for education; and he fundamentally changed the methods of teaching in the schools.

Henry Barnard (1811–1900). Barnard was successively the head of the school systems of Connecticut and Rhode Island. He was also the editor of the *American Journal of Education*, which during the period of its publication in the middle of the last century was one of the leading factors in bringing about far-reaching reforms in American education. With Mann, Stowe (1802–86), and others, Barnard labored for the more definite organization of instruction, especially in elementary schools. He visited the schools of Europe, helped to acquaint American educators with the teachings of Pestalozzi, and contributed through his administrative activities to the improvement of elementary education.

Herbert Spencer (1820–1903). Herbert Spencer conceived early in his career the idea of preparing a comprehensive statement of the philosophy of the world. In order to develop this complete system of philosophy he began with an investigation of biological science, and from this point progressed through a study of society and its nature and of the individual and his nature to a treatment of the problems of ethics, or human conduct. Spencer laid the foundation for sociology and the modern studies of society. In the course of his inquiry he naturally came upon the problems of educational organization.

He found the English higher schools devoted to classical training, which had been traditional throughout the medieval and modern periods, on the theory that, through this type of training, the discipline of the mind can be secured more effectively than by any other means. Against this classical scheme of education Spencer rebelled. His interest in the sciences was so keen that he defended scientific training as superior to classical training for all purposes, even for the discipline of the mind. His discussion of education was embodied in four essays which were published in 1861 and have been widely read. They were perhaps more effective in the United States than in England, because in this country the classical tradition was less firmly established.

The first of Spencer's educational essays was entitled *What Knowledge is of Most Worth?* His answer to the question is that scientific knowledge is much more significant than any training in mere letters. In the course of his discussion he mercilessly criticized existing schools as utter failures in preparing children for the practical duties of life. Especially he points out that in such important matters as preparation for parenthood the school curriculum is silent. Science, he contends also, is even more useful than the classics for the discipline of the mind.

The second essay lays down the proper principles of *Intellectual Education*, such as progression from the simple to the complex and from the concrete to the abstract. The third of his essays is on moral training, and expresses the general view that punishment is justified only when it follows the pattern of nature and gives the child the training which will improve his adaptation to the world about him. The fourth essay advocates a better physical training for pupils.

Spencer's essays have done much to promote the development of the modern scientific curriculum in American high schools and colleges. His influence has also been large in the development in higher institutions of the social studies, such as sociology and political science.

William Torrey Harris (1835–1909). Harris contributed to educational reform through his work in the city of Saint Louis, where he was for years superintendent of schools, and in the Federal bureau of education where, during the later years of his life, he was commissioner.

In Saint Louis he introduced the kindergarten, reorganized the elementary schools and their curriculum, set up an eight-year graded system in the elementary schools, and promoted secondary education.

In the bureau of education, he elaborated the reports and laid the foundation for the most complete system of school statistics published by any government.

In his contributions to education, Harris labored to accomplish three great purposes. The first was to psychologize education. Along with other leaders in the school world, he showed the futility of the old-time psychology, with its so-called "faculties of the mind," and demonstrated the worth of the new. His second purpose was to establish faith in the school as an institution having sociological functions and value. In the *Report of the Committee of Fifteen*

he discussed four bases for the correlation of studies: (1) the logical order of topics and studies; (2) the symmetrical whole of studies in the world of human learning; (3) psychological symmetry; (4) the pupil's natural and spiritual environment. His final purpose was to place education upon an enduring foundation. He subjected the whole field to critical analysis, interpreting and justifying the school and assigning to it its proper place in the scheme of institutional life.

Alfred Binet (1857–1911). Binet was a French psychologist and director of the laboratory of physiological psychology at the Sorbonne. Prior to 1905, he had made numerous investigations of the deficiencies exhibited by children in the course of their development. At this date he was asked by the school authorities of Paris to undertake the study of children in the public school systems, for the purpose of detecting the various forms of mental deficiency which interfered with school work. He devised a series of tests, with the co-operation of Thomas Simon. These tests have been very widely used in Europe and in the United States as a means of determining the intellectual possibilities of children. The characteristic of these tests is that they are arranged in such a way as to determine the intellectual age of the child. By a series of trials, Binet assembled those tests which should be passed by a child three years of age if he is entirely normal in his mental development. Other series were developed for other ages, so that it is possible by means of this scale to compare any given child with other children of his chronological age. Various revisions of the Binet scale have been made by Terman and others who have taken up the work, especially in the United States.

Granville Stanley Hall (1846–1924). Hall was an American psychologist and writer on education. In 1881 he established at Johns Hopkins university one of the earliest psychological laboratories in the United States. He was the chief leader in the child study movement. In 1888 he became president of a university established in Worcester, Massachusetts, and named after its chief patron, Clark university. This institution was devoted entirely to graduate work, and, during the first two decades after its establishment, developed chiefly research in education under Hall's personal leadership. Hall was a severe critic of formalism in the schools. He advocated the abandonment of the ordinary types of teaching in the primary grades and a substitution, for the academic training in those grades, of physical education and observation of natural objects.

For the higher schools, he advocated a complete reorganization of the curriculum on the basis of studies he made of the adolescent period. His most influential work is a treatise on *Adolescence*, in which he describes this period as a distinct phase in the child's development, analogous to the periods of evolution which have led from time to time to the production of new species in the animal kingdom. The great emphasis which Hall laid upon the fundamental change which comes with the adolescent period in human life made him one of the chief exponents of the doctrine of periodicity in education.

During the later years of his presidency at Clark university, Hall's influence distinctly diminished, because of the lack of scientific methods in his work and the development in other quarters of more productive lines of educational research.

Charles William Eliot (1834–1926). Eliot became president of Harvard college in 1869. He found a conservative institution devoted chiefly to classical instruction. He reconstructed the college and transformed it into a great university.

Among his most notable educational reforms is the development of an elective system. Through this system, which has now become universal in American colleges and high schools, a student can so select subjects of study as to give himself the specific training which he needs for the calling in life which he intends to take up.

Eliot also labored for the enlargement of the college curriculum. He brought about the introduction of a great variety of subjects. The result is that a college is no longer the home of a small group of selected students who are intending to enter the learned professions,—it is the resort of all classes.

As the chairman of the Committee of Ten of the National Education Association, Eliot contributed to the organization of the American high school.

He retired at seventy years of age from the active presidency of Harvard, universally recognized as the Nestor of American education.

John Dewey (1859–1952). Dewey is first of all a teacher of philosophy. His contributions in the fields of logic and ethics have been of major importance in determining the trend of current thinking. His philosophical system is characterized by its devotion to the accomplishment of practical ends. Thus, in his theory of logic he points out that it is the solution of problems which in all cases stimulates human intellectual effort. In the field of ethics he has shown himself to be interested in practical social reforms of all types. Especially has he emphasized the influence of industrial and economic life on human conduct.

In the field of education he has been an untiring critic of formalism of every type. He began by objecting to the type of reading matter which is taken up in the schools, where very frequently words are substituted for fruitful ideas. Teachers, he points out, have been content to carry children through many series of exercises which have no meaning to the children themselves. Education ought to deal with the living interests of children and ought to use books only when children, of their own initiative, see the importance of going to this source of information.

In order to make concrete his educational doctrines, Dewey established a school which was entirely unconventional in its form of organization and in its practice. In this school the ordinary forms of discipline were abandoned, and the children were allowed freedom to ask questions as they occurred to them and to move about without restraint in seeking materials with which to answer these questions. For example, the children were given opportunity to cook their own meals, in order that they might come into contact with practical problems of social institutions. They were, for the same reasons, given training in the woodworking shop and in the garden.

Charles Hubbard Judd (1873–1946). Through energetic use of his outstanding abilities as teacher, orator, writer, and college administrator, Judd became one of the most influential leaders in American education. He was trained to be a psychologist, and during the early years of his professional career he taught psychology and completed many renowned researches in that subject. During his later years his interest shifted to education. He believed that the problems of education could be attacked scientifically, and he became the nation's greatest protagonist of the scientific movement in education. In his classroom instruction he insisted that his students buttress their opinions with objective data and that they meet the highest standards of scholarship in every other manner.

Most of his professional career was spent at the University of Chicago where he was professor and head of the department of education from 1909 until he retired in 1938. He served at least one term as president of several nationally prominent educational organizations. He was a remarkably effective platform orator and was more frequently than any other educator of his generation called upon to address professional and lay groups in all sections of the United States. He was the author of numerous books and of many other works on psychology and education.

RECENT EXPANSION IN AMERICAN EDUCATION

Since 1870, American education has expanded so rapidly that a special section may with propriety be devoted to the discussion of this period. Furthermore, it is possible to make very exact statements with regard to this development because, for the past 80 years, the United States office of education has kept careful statistical records of the various phases of educational activity in the country. Our knowledge of educational institutions prior to 1870 is based largely on the facts which are known with regard to certain typical educational institutions. Subsequently to this date a full body of statistics is available.

INCREASE IN AVERAGE SCHOOLING

One of the most striking of the tables that have been prepared by the office of education sets forth the average number of days of schooling of the ordinary American citizen. This table is as follows:

AVERAGE NUMBER OF DAYS OF SCHOOL ATTENDANCE OF AMERICANS AT DIFFERENT PERIODS

Year	Days	Year	Days
1800	82	1900	934
1840	208	1910	1080
1860	434	1920	1212
1870	582	1940	1820
1880	690	1946	2010 (est.)
1890	770		

The significance of these figures may be pointed out in the following terms. As late as 1840 the American school taught the ordinary pupil practically nothing but "the three R's." The school term was very short, and attendance was very irregular. The result was that the ordinary man got his preparation for adult life chiefly through the domestic activities which he encountered as a child in the home and in which he participated to a

SCHOOL ENROLLMENT, 1953 AND 1954

Source: Department of Commerce, Bureau of the Census.

Year and age	Male			Female			Total		
	Population*	Enrollment		Population*	Enrollment		Population*	Enrollment	
		Number	Per cent		Number	Per cent		Number	Per cent
OCTOBER, 1953									
5 years old	1,799,000	1,037,000	57.6	1,721,000	1,019,000	59.2	3,521,000	2,056,000	58.4
6 years old	1,903,000	1,846,000	97.0	1,819,000	1,790,000	98.4	3,723,000	3,636,000	97.7
7 to 9 years old	4,311,000	4,281,000	99.3	4,147,000	4,126,000	99.5	8,457,000	8,407,000	99.4
10 to 13 years old	5,173,000	5,124,000	99.1	5,011,000	4,994,000	99.7	10,184,000	10,118,000	99.4
14 to 17 years old	4,429,000	3,844,000	86.8	4,347,000	3,695,000	85.0	8,775,000	7,538,000	85.9
18 and 19 years old	1,705,000	642,000	37.7	2,081,000	538,000	25.9	3,785,000	1,180,000	31.2
20 to 24 years old	3,430,000	636,000	18.5	5,440,000	346,000	6.4	8,870,000	981,000	11.1
25 to 29 years old	5,479,000	301,000	5.5	6,003,000	33,000	0.5	11,482,000	334,000	2.9
Total	28,228,000	17,709,000	62.7	30,569,000	16,541,000	54.1	58,797,000	34,250,000	58.3
OCTOBER, 1954									
5 years old	1,799,000	1,013,000	56.3	1,723,000	1,019,000	59.1	3,522,000	2,032,000	57.7
6 years old	1,799,000	1,733,000	96.3	1,723,000	1,678,000	97.4	3,522,000	3,411,000	96.8
7 to 9 years old	4,827,000	4,777,000	99.0	4,626,000	4,602,000	99.5	9,453,000	9,379,000	99.2
10 to 13 years old	5,396,000	5,361,000	99.4	5,226,000	5,211,000	99.7	10,621,000	10,573,000	99.5
14 to 17 years old	4,510,000	4,002,000	88.7	4,426,000	3,782,000	85.4	8,936,000	7,784,000	87.1
18 and 19 years old	1,800,000	730,000	40.6	2,118,000	538,000	25.4	3,918,000	1,268,000	32.4
20 to 24 years old	3,538,000	677,000	19.1	5,357,000	322,000	6.0	8,895,000	999,000	11.2
25 to 29 years old	5,340,000	356,000	6.7	5,971,000	103,000	1.7	11,312,000	459,000	4.1
Total	29,010,000	18,650,000	64.3	31,169,000	17,256,000	55.4	60,179,000	35,906,000	59.7

*Civilian population, excluding relatively small number in institutions.

PUBLIC SCHOOL ATTENDANCE, TEACHERS, EXPENDITURES

Source: Office of Education, U. S. Department of Health, Education, and Welfare.

School Year Ended in	Pop. 5 to 17 Yrs.	Pupils		Teachers			Total Expend.
		Enrolled	Av. Attend.	Male	Female	Total	
1900	21,404,322	15,503,110	10,632,772	126,588	296,474	423,062	$214,964,618
1905	23,410,800	16,468,300	11,481,531	110,532	349,737	460,269	291,616,660
1910	24,239,948	17,813,852	12,827,307	110,481	412,729	523,210	426,250,434
1915	26,425,100	19,693,007	14,964,886	118,449	485,852	604,301	605,460,785
1920	27,728,788	21,578,316	16,150,035	95,654	583,648	679,302	1,036,151,209
1925	29,705,264	24,650,291	19,838,384	131,164	646,781	777,945	1,946,096,912
1930	31,571,322	25,678,015	21,264,886	141,771	712,492	854,263	2,316,790,384
1940	29,805,259	25,433,542	22,042,151	194,725	680,752	875,477	2,344,048,927
1945	.....	23,225,784	19,671,398	127,102	699,271	826,373	2,638,665,908
1946	28,943,947	23,299,941	19,848,507	138,209	692,817	831,026	2,906,886,441
1947	29,317,000	23,659,158	20,448,656	153,297	680,215	833,512	3,419,993,597
1948	30,171,000	23,945,000	20,910,000	161,913	698,765	860,678	4,311,176,011
1949	.....	24,476,658	21,495,819	172,720	706,084	878,804	4,992,185,000
1950	30,788,000	25,111,427	22,283,845	194,968	718,703	913,671	5,837,643,000
1951	30,725,000	25,706,000	22,747,000	214,966	729,000	944,036	6,528,300,000
1952	31,379,000	26,563,000	23,257,000	234,727	727,000	962,684	7,344,237,000

greater or less extent. Since that date the average schooling demanded for intelligent participation in the commercial and industrial activities of ordinary life has been increasing more rapidly than in any other period in the world's history. The use of machinery in all phases of life and the rapid expansion of transportation are the important economic causes which have developed this situation. The school may be said to have contributed in some measure to this general change in the character of public life; in some degree it has merely followed the development of civilization in its effort to prepare young people for participation in the activities of commerce and industry.

For the first time in history, the 1940 census of the United States obtained statistics on the amount of schooling completed by the adult population of each state. These data are extremely significant. They show the cumulative effect of mass education in recent years by the median of 11.2 years of school completed by the population 20 to 24 years of age as compared with only 8.4 years for the population 25 years of age and over. Of course, the amount of schooling of the people varies from state to state as will be seen from an examination of the accompanying table from the U. S. Bureau of the Census.

Reading. Whatever is assigned as the cause of the development of the school, it is altogether clear from an examination of the facts that instruction has come to be in recent years a very much more important part of the individual's life than it was in the middle of the last century. A concrete illustration of this is to be found in the changes which have taken place in respect to the ability of the common man to read and write.

Since the invention and the development of printing, reading has become the greatest intellectualizing agency in the world, and, thanks to the schools, the people of the United States have become the most avid readers in the world. According to N. W. Ayer's *American Newspaper Annual and Directory*, more than 25,000 different newspapers and magazines are now published in the United States. This number far excels that of any other country; in fact, it approximates one-third of the periodical publications of the whole world. There are few homes in the United States that do not subscribe for at least one newspaper and for at least one magazine.

Some of the more important reasons for the tremendous development in periodical publication and circulation in the United States are stated as follows by the author of a special census report on newspapers and magazines:

"This sketch of the rise and development of the American newspaper has now reached the period of time which marks the commencement of the third and present era in its history. It is not possible to assign the beginning of this era to any particular year or event, its coming being due to a variety of causes, which may be enumerated in the following order: First, the establishment of the penny press; second, the development of railroads as a means for the distribution of newspapers, the transmission of news reports, and the reduction of heavy postage rates; third, the discovery of telegraphy, and its immediate application to the purposes of journalism; and fourth, but not less important than other causes, the improvements of the printing press, which have rendered it possible to print large editions of newspapers in a short time."

Writing. Before commenting on the significance of these facts for education, it will be well to include in our discussion certain statistics which show that the more general use of reading has been accompanied by an equal demand for the mastery of the second of "the three R's," namely, writing.

A very definite knowledge of the extent to which writing has gained ground as a common art in the last three-quarters of a century can be obtained from an examination of the statistics of the post office. If we take all of the money paid for letter postage in 1843 and assume that it was spent for the cheapest letter that could be forwarded through the mails, it will be found that the average letter writing of each inhabitant of the United States during the full year amounted to less than four letters of one sheet each. This estimate is altogether extravagant, because the lowest letter postage of that date, namely, 6 cents, would carry only one sheet of paper within a radius of 30 miles. If letters went more than 30 miles, or were made up of more than one sheet, the cost was greater, reaching a maximum at 400 miles or more, when each sheet cost 25 cents. Letters sent at rates of postage higher than the minimum would reduce the average computed. It is fair to assume, therefore, that letter writing in 1843 was not a common practice.

Other facts of the same import are as follows: In 1840 the revenue of the post office for all classes of mail was 27 cents a year for each inhabitant of the United States. This amount had not doubled in 1870, when it was 49 cents. It rose to the point where in 1890 it was $0.97; in 1900, $1.34; in 1910, $2.43, and in 1946 more than $5. Not all of this was for letters, but the figures show that reading and writing are much more commonly used today than a generation ago. This conclusion is overwhelming when account is taken of the steady reduction in rates which has characterized the history of the post office.

Overcoming Illiteracy. Such statistics emphasize the fact that our modern life is utterly dependent on means of communication. This social fact is not merely an external material fact; it has to do with human habits and human education. It has to do with the common expectations of life. Not very far back in the history of this nation writing was not thought of as essential to the practical equipment of a man. Indeed, if we consider only the most highly authentic figures on this matter, we find that, in 1880, 17 per cent of our population could not write or read. Back of this date, the statistics are largely matters of speculation, but it is certain that the percentage increases rapidly. We find, for example, in a message of Governor Campbell to the legislature of Virginia in 1839, the statement that "almost one-quarter part of the men applying for marriage licenses were unable to write their names." If we go a little farther back, the fraction of illiterates undoubtedly puts in the majority those who did not command the art of writing.

The attitude of modern society is such that a percentage of illiteracy even as high as that of 1880 is wholly intolerable. Today no man willingly admits that he cannot read or write. The expectation of the nation is that all its members are to go to school long enough to be part of a common social whole which is held together by written and printed means of communication.

With regard to reading, modern expectations are even more far-reaching than are those with regard to writing. Public signs are used on every hand, on the assumption that all who make use of the streets will be able to follow written directions. The man who cannot read can hardly take care of himself in a crowded city.

Inadequacies of Early Schools. If one stops to translate these various expectations into definite terms regarding education, one begins to realize that the modern school has a task which the old-fashioned school with its simple expectations never faced. The school of 1840, with its brief period of contact with the pupils, with its untrained teachers, with its meager supply of books, and with its inadequate schoolrooms, was not in most cases a place where the type of fluent reading and writing demanded by modern society could be imparted.

Such statements about the schools of the last century can be abundantly verified by reference to contemporary literature. Thus, in 1838 Horace Mann, in his second report to the Massachusetts board of education, wrote:

"I have devoted especial pains to learn, with some degree of numerical accuracy, how far the reading, in our schools, is an exercise of the mind in thinking and feeling, and how far it is a barren action of the organs of speech upon the atmosphere. My information is derived, principally, from

the written statements of the school committees of the respective towns,—gentlemen who are certainly exempt from all temptation to disparage the schools they superintend. The result is, that more than eleven-twelfths of all the children in the reading-classes, in our schools, do not understand the meaning of the words they read; that they do not master the sense of the reading-lessons; and that the ideas and feelings intended by the author to be conveyed to, and excited in, the reader's mind, still rest in the author's intention, never having yet reached the place of their destination."

The major part of the report from which the foregoing passage is taken is devoted to a discussion of the reasons for this deficiency in reading ability. Mann finds that one important reason for the failure of pupils of that day is to be found in the emphasis laid on formal spelling and mere pronunciation. A quotation from a later part of the report reveals the practices of that time and also one important reason why instruction in reading was ineffective. The quotation is as follows:

"Another device to fill vacuity by pouring in vacuity, is this:—a book is prepared, in which the spelling and reading lessons alternate. First come a few columns of words, and then a page of apothegms and synopses of universal truths, not occupying, perhaps, more than a line each; some one word in the spelling columns being incorporated into each of these short sentences. The force of the reasons against the preceding mode is but little abated when applied to this. This motley company of sentences repels all interest on the part of the learner. Topics, more alien from each other, and more bewildering to the mind, could not be found, if one were to stick a pin through all the leaves of a book, and then to read continuously all the sentences through which the puncture was made. As many-colored and diverse-shaped objects, flitting swiftly before the eye, will make no stable impression upon the retina; so a multitude of incongruous ideas and feelings, trooping hurriedly before the mental vision, can leave no enduring traces of outline, aspect or quality upon the mind. A rapid succession of discordant images will inflict distraction upon the mind of an adult;—how much more certain are they to do it upon that of a child! The power of passing abruptly from one subject of thought to another, without mental disturbance, requires long habit and familiarity with the matters presented. Children can have neither.

"Another reason is to be found in the inappropriate character of the reading exercises offered to children.

"And yet, in many of the reading-books now in use in the schools, the most pithy sayings of learned men; the aphorisms in which moralists have deposited a life of observation and experience; the maxims of philosophers, embodying the highest forms of intellectual truth, are set down as First Lessons for children;—as though, because a child was born after Bacon and Franklin, he could understand them of course. . . . Using incomprehensible reading-books draws after it the inevitable consequence of bad reading."

Demand for Reading Ability. Other passages might be quoted from this significant report, but perhaps enough has been repeated to indicate the fact that in the middle of the last century the pupils who went out from the schools were not fluent, intelligent readers. The expectations of society with regard to the attainments of the individual were slight, and the use of the art of reading in after life was correspondingly meager.

It would, of course, be out of keeping with the facts to assert that defects of the kind described by Horace Mann made no serious difference in the lives of men and women in 1840. But such a statement is much more nearly true of that time than would be a statement that today we can look with complacency on the crudities of our treatment of reading in the schools. In 1840 the average citizen was called on very little to read. His political affiliations were fairly direct; he usually voted for representatives whom he knew. His correspondence was very light; and the contacts of his daily life were simple. It is not unqualifiedly true that it made no difference at all whether he could read or not, but it is true that he was required to use the art very little in his ordinary routine.

In contrast with all these facts, are the expectations of modern society. Today one must read if he is to share in the life of his times. Correspondingly, there has been an enormous increase in the amount of attention given to the education of the common man.

GENERAL EXPANSION

From 1870 to 1920, the number of schoolhouses more than doubled. Since 1920, the number has constantly decreased, due primarily to the merging of one-room schools with other schools. From 1870 to 1944, the value of schoolhouses increased 61 times. The number of days the schools were in session increased from 132.2 to 175.9. The average number of days attended by each pupil enrolled increased from 78.4 to 147.9. The percentage of children enrolled attending school each day increased from 59.3 to 84.3.

During the years of economic depression in the 1930's, school attendance showed a decline owing to the falling birth rate. But the increase in the birth rate immediately before and during World War II shattered all previous enrollment records. The number of children from 7 to 13 years of age going to school in the fall of 1954 reached almost 20 million, an increase of over 5 million since 1945; and a further sharp increase is expected by 1965.

The result of this increase has been a teacher shortage and a school building shortage. The number of teachers being graduated from teacher training institutions rose from 25,000 in 1948 to 35,000 in 1950, but this was no more than enough to fill the normal number of vacancies caused by death, retirement, marriage, and change of occupation.

In the fall of 1955, according to the U. S. Office of Education, full-time public elementary and secondary day schools—

1. Enrolled 30,532,166 pupils—22,059,688 in elementary schools and 8,472,478 in secondary schools. The increase in total enrollment was 1,122,000, or 3.8 per cent more than the total enrollment in 1954.

2. Employed 1,135,093 classroom teachers, a gain of 69,000, or 6.5 per cent over the number reported in the fall of 1954.

3. Employed 77,554 teachers who did not meet the lowest standards for certification. This number represented 6.8 per cent of all teachers, a somewhat smaller proportion than the preceding year.

4. Enrolled 2.3 million pupils in excess of the normal capacity of the accessible publicly-owned school plants in use. This represents a drop of 74,000 from 1954. Three-fourths of the pupils in excess of normal capacity were in elementary schools.

5. Scheduled for completion during the 1956 fiscal year 67,098 instruction rooms, an increase of 7,093 over the previous fiscal year.

School Plant Needs. The school building shortage is due, not only to the great increase in enrollments, but also to the postponement of new construction during the war years, when the lack of building material and manpower made it difficult to build or even to maintain school buildings properly. During most of the 1930 decade school plant maintenance and building upkeep were neglected because of lack of funds. Consequently, from about 1931 through 1945, there was not much new construction, maintenance was neglected, and depreciation continued at an increasing rate. Some buildings became so dilapidated and obsolete that remodeling was impracticable. Then, before the postwar programs got under way, the schools were overwhelmed with increased enrollments and the Korean War resulted in shortages of building material. School facilities are still far behind the rising demand.

The percentage of school revenue provided by the state has gradually increased, while the percentage provided by the local school districts has gradually decreased. In 1952, the percentage provided by the state was about 43, while the local districts furnished about 55 per cent.

NUMBER OF SCHOOLS OF SPECIFIED TYPES BY STATES—1952

Source: Office of Education, U. S. Department of Health, Education, and Welfare.

Division and state	Public schools (excluding kindergartens)		Nonpublic schools (excluding kindergartens)[1]		Institutions of higher education[2]		Residential schools for exceptional children		Schools of nursing[3]
	Elementary	Secondary	Elementary	Secondary	Public[4]	Private	Public	Private	
Continental U. S.	123,763	23,746	10,666	3,322	641	1,191	307	137	984
New England:	5,277	1,007	930	434	39	119	28	16	104
Maine	1,311	192	94	61	6	10	4	.....	10
New Hampshire	474	104	66	39	3	6	2	.....	12
Vermont	[5]801	81	31	25	4	9	2	1	6
Massachusetts	[6]1,688	441	441	200	18	61	11	11	55
Rhode Island	[5]304	61	95	30	2	10	4	1	5
Connecticut	699	128	203	79	6	23	5	3	16
Middle Atlantic:	13,233	2,301	2,447	710	57	220	28	60	240
New York	5,355	950	1,107	338	32	99	11	31	93
New Jersey	1,516	263	397	127	10	26	9	6	39
Pennsylvania	[7]6,362	1,088	943	245	15	95	8	23	108
East North Central:	18,409	4,013	2,871	640	89	230	38	17	197
Ohio	2,939	1,154	627	155	9	60	11	1	52
Indiana	[12]200	799	319	41	6	32	7	1	23
Illinois	[5]3,470	861	877	192	20	80	5	5	80
Michigan	[13]800	703	483	167	19	28	9	6	21
Wisconsin	[16]000	496	565	85	35	30	6	4	21
West North Central:	32,393	4,079	1,664	417	100	140	46	8	113
Minnesota	4,650	563	361	71	15	27	11	3	19
Iowa	5,830	948	344	135	18	29	6	2	21
Missouri	[16]300	702	410	88	18	36	11	3	23
North Dakota	2,812	392	52	21	11	2	4	.....	10
South Dakota	3,419	280	54	22	7	8	4	.....	6
Nebraska	6,002	524	219	47	10	14	5	.....	10
Kansas	3,380	670	224	33	21	24	5	.....	24
South Atlantic:	16,655	3,776	599	301	87	196	61	13	154
Delaware	148	50	31	11	2	3	4	.....	7
Maryland	818	208	170	60	14	20	6	9	18
District of Columbia	122	36	51	24	2	20	5	2	6
Virginia	2,639	510	71	53	12	32	10	1	31
West Virginia	3,719	370	53	15	11	11	9	.....	19
North Carolina	2,483	931	56	32	15	40	9	.....	34
South Carolina	2,836	529	37	19	7	25	6	.....	13
Georgia	2,617	683	46	30	18	33	7	1	12
Florida	1,273	459	84	57	6	12	5	.....	14
East South Central:	14,838	2,430	444	225	46	103	24	3	51
Kentucky	4,462	528	216	95	9	30	5	1	9
Tennessee	3,832	495	77	42	7	39	7	1	12
Alabama	2,972	755	100	45	9	17	8	1	12
Mississippi	3,572	652	51	43	21	17	4	.....	18
West South Central:	11,766	3,765	743	240	92	77	30	6	47
Arkansas	1,633	568	58	19	12	11	4	.....	7
Louisiana	1,759	538	244	94	9	11	7	2	22
Oklahoma	2,653	867	87	37	23	8	8	2	8
Texas	[5]5,721	1,792	354	90	48	47	11	2	10
Mountain:	5,278	1,146	285	103	45	19	31	1	28
Montana	1,210	199	45	16	8	3	5	.....	4
Idaho	561	158	24	7	4	3	4	.....	.....
Wyoming	593	103	11	1	2	.....	3	.....	.....
Colorado	1,303	282	78	30	13	7	6	1	5
New Mexico	620	144	71	26	7	2	5	.....	1
Arizona	445	85	43	18	5	1	3	.....	4
Utah	368	138	9	4	5	3	4	.....	6
Nevada	178	37	4	1	1	.....	1	.....	8
Pacific:	5,914	1,229	683	252	86	87	21	13	50
Washington	1,113	347	108	49	14	12	8	.....	14
Oregon	1,093	260	78	26	7	15	5	1	4
California	3,708	622	497	177	65	60	8	12	32
Alaska	102	31	13	2	4	1	.....	.....	.....
Canal Zone	17	22	.....	.....	1	.....	.....	.....	.....
Guam	21	2	.....	.....	.....	.....	.....	.....	.....
Hawaii	139	54	.....	.....	1	.....	4	.....	3
Puerto Rico	1,718	332	92	60	1	1	3	1	9
Virgin Islands	21	3	.....	.....	.....	.....	.....	.....	.....

[1]Estimated. [2]Includes universities, colleges, professional schools, teachers colleges, normal schools, and junior colleges. [3]January 1, 1952, not affiliated with colleges and universities. [4]Includes 5 U. S. Service Academies. [5]1950. [6]Number of School buildings. [7]1951.

TYPE OF SCHOOL ATTENDED BY THE ENROLLED POPULATION 5 TO 29 YEARS OF AGE

Source: Department of Commerce, Bureau of the Census.

Year, age, and sex	Total enrolled	Type of School					
		Elementary		High school		College or professional school	
		Number	Per cent of total enrolled	Number	Per cent of total enrolled	Number	Per cent of total enrolled
OCTOBER 1950							
Total, 5 to 29 years	30,176,000	21,401,000	70.9	6,643,000	22.0	2,130,000	7.1
5 to 13 years	20,714,000	20,338,000	98.2	376,000	1.8	.....	.....
14 to 17 years	6,953,000	1,049,000	15.1	5,725,000	82.3	180,000	2.6
18 and 19 years	1,190,000	10,000	0.8	451,000	37.9	728,000	61.2
20 to 24 years	959,000	2,000	0.2	58,000	6.0	899,000	93.7
25 to 29 years	358,000	2,000	0.6	33,000	9.2	323,000	90.2
Male, 5 to 29 years	15,755,000	10,998,000	69.8	3,328,000	21.1	1,428,000	9.1
5 to 13 years	10,522,000	10,361,000	98.5	161,000	1.5	.....	.....
14 to 17 years	3,541,000	629,000	17.8	2,838,000	80.1	74,000	2.1
18 and 19 years	667,000	8,000	1.2	271,000	40.6	388,000	58.2
20 to 24 years	692,000	.....	.....	39,000	5.6	653,000	94.4
25 to 29 years	332,000	.....	.....	19,000	5.7	313,000	94.3
Female, 5 to 29 years	14,421,000	10,403,000	72.1	3,315,000	23.0	702,000	4.9
5 to 13 years	10,192,000	9,977,000	97.9	215,000	2.1	.....	.....
14 to 17 years	3,412,000	420,000	12.3	2,887,000	84.6	106,000	3.1
18 and 19 years	523,000	2,000	0.4	180,000	34.4	340,000	65.0
20 to 24 years	267,000	2,000	0.7	19,000	7.1	246,000	92.1
25 to 29 years	26,000	2,000	.....	14,000	.....	10,000	.....
OCTOBER 1954							
Total, 5 to 29 years	35,906,000	25,936,000	72.2	7,712,000	21.5	2,258,000	6.3
5 to 13 years	25,396,000	24,918,000	98.1	478,000	1.9	.....	.....
14 to 17 years	7,784,000	999,000	12.8	6,634,000	85.2	151,000	1.9
18 and 19 years	1,268,000	4,000	0.3	506,000	39.9	758,000	59.8
20 to 24 years	999,000	13,000	1.3	63,000	6.3	924,000	92.5
25 to 29 years	459,000	2,000	0.4	31,000	6.8	425,000	92.6
Male, 5 to 29 years	18,650,000	13,293,000	71.3	3,880,000	20.8	1,480,000	7.9
5 to 13 years	12,885,000	12,679,000	98.4	206,000	1.6	.....	.....
14 to 17 years	4,002,000	605,000	15.1	3,324,000	83.1	74,000	1.8
18 and 19 years	730,000	4,000	0.5	294,000	40.3	433,000	59.3
20 to 24 years	677,000	5,000	0.7	41,000	6.1	632,000	93.4
25 to 29 years	356,000	.....	.....	15,000	4.2	341,000	95.8
Female, 5 to 29 years	17,256,000	12,644,000	73.3	3,833,000	22.2	779,000	4.5
5 to 13 years	12,511,000	12,239,000	97.8	272,000	2.2	.....	.....
14 to 17 years	3,782,000	394,000	10.4	3,310,000	87.5	77,000	2.0
18 and 19 years	538,000	.....	.....	212,000	39.4	326,000	60.6
20 to 24 years	322,000	8,000	2.5	22,000	6.8	292,000	90.7
25 to 29 years	103,000	2,000	.....	17,000	.....	84,000	.....

KINDERGARTEN, SCHOOL, AND COLLEGE ENROLLMENT 5 TO 29 YEARS OF AGE: 1954

Source: Department of Commerce, Bureau of the Census.

Type	Number enrolled				Per cent enrolled			
	Kindergarten	Elementary school	High school	College or professional school	Kindergarten	Elementary school	High school	College or professional school
Total	1,509,000	24,427,000	7,733,000	2,414,000	100.0	100.0	100.0	100.0
Public	1,235,000	21,416,000	7,053,000	1,441,000	81.8	87.7	91.2	59.7
Private	274,000	3,011,000	679,000	973,000	18.2	12.3	8.8	40.3

An examination of the expenditure for education shows, for a few years following 1930, the effects of the economic depression which began in 1929 and continued until about 1934. By 1940, recovery was complete as measured by total expenditures. Since 1940, expenditures have increased at a very rapid rate, reaching a total of almost $2,500,000,000 in 1944 and by 1953 they had more than doubled.

Growth of High Schools. Excepting the remarkable growth in college enrollment following the close of World War II, the most rapid growth among American educational institutions is that of the public high school. Of persons who entered high school in 1870, the girls were, for the most part, preparing to become teachers, and the boys were expecting to enter one of the professions. Only the larger communities supported high schools in those days, and only about one per cent of the children of high school age attended this school.

Following 1890, both small and large communities began to establish high schools, and high school enrollment increased by leaps and bounds, as will be observed from the following table. Enrollment approximately doubled from 1890 to 1900, increased about 60 per cent from 1900 to 1910, and approximately doubled each decade from 1910 to 1930; the increase since 1930 has been slower, and in 1942 a decrease was shown for the first time. The decrease in enrollment has continued since 1942, and it is predicted by the U. S. office of education that the decrease will continue until 1953 because of the decline in the birth rate during the thirties.

According to the U. S. office of education, 1,199,700 graduated from public high schools in 1950. That office also reports that in 1880 less than 3 out of every 100 persons of high school age were in public high schools and approximately 1 of these 3 were graduating. At present, about 70 out of 100 are in public high schools, and of those 70 about 48 are graduating. An additional 10 out of 100 are in private high schools.

Whereas in 1870 the average man found it possible to enter upon his life work with a little knowledge of reading and writing, the modern boy finds that it is quite impossible for him to secure any advantageous position in the commercial or industrial world without a knowledge which extends very far beyond the rudimentary subjects taught in the elementary schools. If he is going to enter industry, he must know something of the source of the raw materials with which his industry deals; he must be prepared to understand something of the scientific principles on which his industry depends.

Increasing Complexity of Civic Relations. Citizenship has also come to be a very much more complex matter than it was in former days. Formerly, where communities were small and every one knew personally the man who was sent to the legislature, voting was a matter of choice among acquaintances. As communities expanded, however, the problem of government became more complex, and the selection of the individual who should serve as a representative in the legislative assembly became infinitely more complicated, because of the lack of direct contact between voter and legislator. As a result, public intelligence with regard to governmental policies must in the present period be cultivated through a broader knowledge of history and civics.

To be sure, American schools have not always developed these broader forms of knowledge as fully as they might, but we have come to the belief that they must if our citizenship is to be intelligent. At the same time the conviction has certainly gained general acceptance that it is quite impossible for a modern state to be conducted on the basis of an elementary school training. As a result, pupils in ever increasing numbers have left the elementary school with the expectation of going on to higher institutions. Especially has it been true that after every great economic and social disturbance attendance in the high schools has increased. It may be said, almost literally, that the high school sprang into existence after the Civil War. Later panics and depressions in the economic world have driven

FEDERAL GOVERNMENT ALLOTMENT FOR SCHOOL LUNCH PROGRAMS

Source: U. S. Department of Agriculture

State	1951	1952	State	1951	1952
Alabama	$2,513,816	$2,547,922	New Jersey	$1,490,545	$1,346,512
Arizona	420,599	394,893	New Mexico	394,224	431,728
Arkansas	1,701,055	1,579,484	New York	3,799,985	3,858,774
California	3,197,370	2,908,374	North Carolina	3,100,647	2,966,406
Colorado	514,800	526,193	North Dakota	282,202	305,993
Connecticut	607,019	529,908	Ohio	2,803,740	2,505,441
Delaware	84,813	79,537	Oklahoma	1,508,514	1,296,643
Dist. of Columbia	187,511	158,897	Oregon	665,316	526,936
Florida	1,250,731	1,232,052	Pennsylvania	3,134,712	3,597,044
Georgia	2,445,825	2,363,855	Rhode Island	242,196	240,495
Idaho	311,121	295,925	South Carolina	1,855,374	1,876,422
Illinois	2,394,660	2,420,704	South Dakota	210,785	265,195
Indiana	1,638,864	1,471,749	Tennessee	2,345,252	2,287,726
Iowa	971,080	1,017,508	Texas	3,905,698	3,495,215
Kansas	824,855	768,537	Utah	396,710	366,001
Kentucky	2,224,937	2,144,069	Vermont	186,853	181,511
Louisiana	1,824,767	1,666,075	Virginia	1,698,641	1,764,262
Maine	428,277	431,343	Washington	924,404	748,500
Maryland	709,191	770,130	West Virginia	1,280,246	1,299,019
Massachusetts	1,550,121	1,426,507	Wisconsin	1,354,429	1,315,518
Michigan	2,334,144	2,205,589	Wyoming	118,688	113,572
Minnesota	1,262,408	1,241,743	Continental U. S.	65,770,000	63,618,975
Mississippi	2,115,064	2,248,813	Alaska	10,551	13,419
Missouri	1,606,215	1,442,717	Hawaii	73,320	96,139
Montana	186,817	211,866	Puerto Rico	2,377,490	2,353,944
Nebraska	483,481	487,823	Virgin Islands	43,639	37,523
Nevada	48,476	43,528			
New Hampshire	232,822	214,321	Total	$68,275,000	$66,120,000

DEGREES CONFERRED BY INSTITUTIONS OF HIGHER EDUCATION: 1953-54

Source: Office of Education, U. S. Department of Health, Education, and Welfare.

Major field of study	Number of degrees conferred								
	Bachelor's and first professional[1]			Master's and second professional[2]			Doctor's[3]		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Total[4]	292,880	187,500	105,380	56,823	38,147	18,676	8,996	8,181	815
Agriculture	7,832	7,687	145	1,302	1,279	23	515	508	7
Animal husbandry	1,203	1,174	29	.....	137	3	64	64	.....
Architecture	1,623	1,531	92	158	147	11	3	1	2
Biology	5,847	4,161	1,686	435	336	99	147	127	20
Business and commerce	40,944	35,255	5,689	3,114	2,829	285	118	113	5
Chemistry	5,791	4,727	1,064	1,098	972	126	1,013	968	45
Dentistry, D. D. S. only	3,102	3,063	39	.....	.....	.....	.....	.....	.....
Economics	6,728	5,938	790	609	547	62	245	233	12
Education	56,817	16,885	39,932	27,785	15,423	12,362	1,498	1,237	261
Engineering	22,329	22,264	65	5,001	4,189	15	594	594	.....
English	12,566	4,729	7,837	1,674	862	812	356	290	66
Fine arts	15,894	7,522	8,372	3,027	1,992	1,035	249	217	32
Forestry	904	902	2	127	127	.....	30	30	.....
Geology	1,632	1,553	79	412	397	15	136	130	6
History	9,385	6,418	2,967	1,220	864	356	355	321	34
Home economics	7,467	81	7,386	590	10	580	25	5	20
Industrial arts	2,521	2,456	65	444	423	21	14	14	.....
Journalism	2,244	1,495	749	242	201	41	6	5	1
Language, modern	3,793	1,473	2,320	820	439	381	230	182	48
Law	9,298	8,976	322	341	329	12	31	30	1
Mathematics	4,090	2,722	1,368	706	579	127	227	213	14
Medicine, M. D. only	6,757	6,414	343	.....	.....	.....	.....	.....	.....
Music	6,239	2,545	3,694	1,577	1,034	543	73	68	5
Nursing	5,109	62	5,047	482	18	464	2	.....	2
Optometry	706	686	20	2	2	.....	1	1	.....
Pharmacy	3,885	3,542	343	147	139	8	75	72	3
Philosophy	1,845	1,582	263	251	207	44	103	95	8
Physical education	6,913	4,592	2,321	1,266	979	287	96	75	21
Physics	1,952	1,877	75	714	685	29	485	479	6
Political science	5,332	4,314	1,018	534	455	79	153	143	10
Psychology	5,758	3,085	2,673	1,254	885	369	619	553	66
Religious education	2,972	2,049	923	653	347	306	57	56	1
Social work	2,163	744	1,419	186	82	104	5	4	1
Sociology	5,702	2,387	3,315	440	323	117	184	156	28
Speech and dramatic arts	3,418	1,653	1,765	731	446	285	147	126	21
Theology	4,463	4,344	119	657	615	42	169	164	5
Zoology	1,696	1,300	396	323	258	65	221	204	17

[1]Based on curricula of 4 years or more. Includes B. A. and B. S. degrees and first professional degrees such as M. D., D. D. S., LL. B., and B. D.

[2]M. A., M. S. degrees, and professional degrees such as M. Chem. E., LL. M., M. B. A., and Th. M.

[3]Ph. D., Ed. D., LL. D., and Sc. D.

[4]Includes data for fields not shown separately; also includes estimates for institutions not reporting. Excludes honorary degrees.

INSTITUTIONS OF HIGHER EDUCATION ENROLLMENT IN SUMMER SESSION AND IN EXTENSION AND CORRESPONDENCE WORK: 1920 TO 1952

Source: Office of Education, U. S. Department of Health, Education, and Welfare.

Year	Enrollment		Year	Enrollment	
	Summer session[1]	Extension and correspondence[2]		Summer session[1]	Extension and correspondence[2]
1920	132,489	101,662	1938	429,864	295,351
1922	220,311	155,163	1940	456,679	292,236
1924	278,125	194,147	1942	426,849	278,554
1926	340,461	324,819	1944	479,326	244,842
1928	382,776	360,246	1946	515,602	535,957
1930	388,755	354,133	1948	955,429	759,909
1932	414,260	265,265	1950	943,021	848,695
1934	303,754	208,507	1952	880,752	843,923
1936	370,026	251,469			

[1]For odd years, 1919, 1921, etc.

[2]Includes both collegiate and noncollegiate students; data on number of noncollegiate students included are as follows: 1932, 174,921; 1934, 45,484; 1936, 46,452; 1938, 75,822; 1940, 70,145; 1942, 80,904; 1944, 98,496. Not requested separately for 1946, 1948, and 1950.

people to seek a broader education. Finally, World Wars I and II made the importance of intellectual and technical training so obvious that, since 1918, the higher institutions of the country have been flooded with students seeking better training than that which could be afforded by the elementary school.

ENROLLMENT IN VOCATIONAL CLASSES, 1954

Source: Office of Education, U. S. Department of Health, Education, and Welfare.

	Evening	Part Time	All Day	All Type
Agriculture . .	247,275	46,164	444,063	737,502
Distributive Occupations.	152,413	68,206	.....	220,619
Home Economics .	501,263	79,710	799,174	1,380,147
Trades and Industry . .	411,776	167,628	247,179	826,583
Total	1,312,727	361,708	1,490,416	3,164,851

Expansion of the Colleges. What has been said with regard to the expansion of the secondary schools can be repeated with regard to the expansion of the college.

FALL ENROLLMENT IN HIGHER EDUCATIONAL INSTITUTIONS: 1955

Source: Office of Education, U. S. Department of Health, Education, and Welfare.

Type of Institution	Fall Enrollment		Increase	
	1955	1954	Number	Percent
All institutions.....	2,720,929	2,499,750	221,179	8.8
Men.....	1,784,158	1,601,984	182,174	11.4
Women.....	936,771	897,766	39,005	4.3
Universities.....	1,241,101	1,166,459	74,642	6.4
Men.....	889,360	822,646	66,714	8.1
Women.....	351,741	343,813	7,928	2.3
Liberal arts colleges..	712,685	646,573	66,112	10.2
Men.....	396,955	349,735	47,220	13.5
Women.....	315,730	296,838	18,892	6.4
Separately organized professional schools:				
Teachers colleges	243,652	216,032	27,620	12.8
Men.....	114,535	96,009	18,526	19.3
Women.....	129,117	120,023	9,094	7.6
Technological schools.	84,633	75,121	9,512	12.7
Men.....	79,636	70,983	8,653	12.2
Women.....	4,997	4,138	859	20.8
Theological schools...	30,965	28,760	2,205	7.7
Men.....	24,728	22,710	2,018	8.9
Women.....	6,237	6,050	187	3.1
Other.....	56,173	54,291	1,882	3.5
Men.....	45,065	42,888	2,177	5.1
Women.....	11,108	11,403	295	2.6
Junior colleges.....	351,720	312,514	39,206	12.5
Men.....	233,879	197,013	36,866	18.7
Women.....	117,841	115,501	2,340	2.0

Higher Education and Democracy. The final conclusion to be drawn is that the school system of the United States has been seeking to attain the general democratic ideal of a higher education for every one who is willing to spend the time and effort in securing such an education. The distinction which has been maintained historically in Europe between the upper classes of society and the common people is being entirely eliminated in this country through an expansion of the upper schools. It required a long period of development in American national life to bring even the common schools to the level where the average man could be trained in subjects other than the rudiments of "the three R's." Once the common school reached its development, however, the ambition for a higher education has exhibited itself with phenomenal rapidity. Of the persons 25 years of age or older who reported on their educational attainments under the 1940 census, 4.6 per cent were college graduates, while an additional 5.5 per cent had had from 1 to 3 years of college work. These percentages will rapidly increase because in 1947 more than 2,000,000 persons were enrolled in college —approximately 500,000 more than ever before.

REORGANIZATION OF EDUCATION

There are certain natural consequences which issue from these expanding ideals of a democratic school system. In the first place, there is a growing impatience with any delay in the introduction of useful subjects, such as natural science and civics. Formerly, the elementary schools did not attempt to teach the common people very much science or very much about the principles of government. These subjects were first introduced in the higher institutions of the American educational system. It was assumed that only people of the higher degrees of intellectual maturity could understand them.

Now that even the common people are sharing in a higher education, however, there is a disposition to introduce science and civics and all of the other subjects at the earliest possible moment. The result is that a reorganization of the curriculum of the lower schools is being carried forward very rapidly.

The Elective System. The administration of this broader course of study requires some flexibility in the arrangement of the program of individual pupils. Not all pupils will want the same type of training. Some of them are preparing to enter professions, while others are attending the higher schools with the expectation of entering upon industrial or commercial careers. The enriched course of study includes material appropriate to all of these different expectations, but no single individual can take advantage of all the different opportunities offered. The common practice in all higher institutions is, therefore, to allow the student to select those types of training most directly related to his individual needs. This is perhaps the most radical change which has taken place in the relations of the student and the school administration.

CURRENT EXPENDITURE PER PUPIL IN AVERAGE DAILY ATTENDANCE FOR PUBLIC ELEMENTARY AND SECONDARY DAY SCHOOLS, 1952

Source: Office of Education, Department of Health, Education, and Welfare.

N.Y.	$352	Calif.	$261	Vt.	$220
Del.	318	Iowa	261	Idaho	212
Oreg.	316	N. Mex.	261	Mo.	212
N. J.	312	R. I.	259	Fla.	206
Wyo.	312	N. Dak.	256	Utah	196
Mont.	302	N. H.	255	W. Va.	183
D.C.	301	Colo.	253	Maine	181
Conn.	291	Ind.	253	N. C.	176
Ill.	291	S. Dak.	251	Va.	169
Wis.	285	Kans.	246	Ga.	166
Wash.	284	Nebr.	246	S. C.	154
Minn.	277	U. S.	244	Ky.	151
Mass.	267	Md.	243	Ala.	150
Mich.	267	La.	237	Tenn.	148
Pa.	264	Ohio	232	Ark.	123
Ariz.	263	Okla.	226	Miss.	96
Nev.	263	Tex.	223		

THE SCIENCE OF EDUCATION

THE beginnings of the scientific study of education are to be traced to the German philosopher and educator, Herbart (1776–1841), who did his work between 1800 and 1841. He pointed out the fact that educational operations must be guided by scientific principles derived from the study of human nature, or psychology, and from the study of that science which deals with the rules of proper conduct, namely, ethics.

EXPERIMENTAL PSYCHOLOGY

The movement which Herbart inaugurated was effective in Germany in stimulating a number of lines of scientific inquiry. In the first place, it gave rise to a more careful study, in laboratories designed for that purpose, of the mental processes of adults and children. The development of the science of psychology during the last century is in a very large measure to be traced directly to the influence of Herbart. The movement was accelerated and augmented by the contributions of the physiologists and of those who were interested in measuring the processes of sensation.

The Child Study Movement. In 1881 G. Stanley Hall, who had just returned to Johns Hopkins university from a period of training in the psychological laboratory in Leipzig, Germany, began to collect and publish material on child psychology. He attracted a great deal of attention among teachers and school administrators for the views which he developed in regard to the reorganization of schools.

The "child study movement," as it was called, was carried forward vigorously by Hall and his students for a period of twenty years, and was one of the important sources of the present scientific study of education.

This movement suffered, however, because its methods of investigation were somewhat unsystematic and likely to lead to erroneous conclusions. The chief method of this school was that which has been called the "questionnaire" method. Various series of questions in regard to different aspects of children's mental lives were formulated. These were sent to parents and teachers in different parts of the country, and their answers were tabulated. Conclusions were drawn from these answers without very serious regard to the validity of the answers themselves. The results of the use of this method were numerous collections of interesting material about the development of children; but it was found that educational practice could not rely upon the relatively loose information thus collected.

Culture Epochs Theory. Herbart's influence was effective along lines other than those briefly traced in the foregoing statements about psychology. Numerous practice schools were set up in Germany, and theories in regard to education were tried out in these schools. One important theory of this sort was known as the "culture epochs theory." It was held that the line of development followed by children parallels closely the line of development which has been followed by the race. Thus, the race began with no ability to write and gradually evolved this ability. The race began with very crude graphic art and gradually refined this art through the cultivation of taste in color and through studies of form and perspective. Children's drawings show the same crudities as do those of primitive peoples, and the same stages of gradual development appear as children refine their taste for color and their knowledge of form. Such analogies as these encouraged the followers of Herbart to reach the general conclusion that they could lay out a course of study appropriate for the schools, provided they could find by a careful study of the history of the race the different stages or epochs through which civilization has passed. A vigorous effort was accordingly made in Germany and in this country to prepare natural courses of study on this pattern. The result was an interest in such matters as the habits and abilities of children and primitive peoples, and much new and stimulating study was undertaken both of human nature and of materials to be used in instruction.

The culture epochs theory, like the child study movement, spent itself because of its crude generalizations; but, before it was abandoned, it had stimulated so much skepticism about the older traditional methods of teaching and had aroused so much interest in the possibilities of a new course of study that later generations of teachers and supervisors have profited greatly by its impulse.

Studies of Teaching Methods. Furthermore, the experimental schools which were set up by the followers of Herbart gave a great deal of attention to methods of teaching and developed new formulas to guide teachers in their work. The Herbartian movement came to the United States in very vigorous form during the '80's and led to the organization of a society of educators who called themselves the Herbart Society. The members of this group produced numerous books on methods of teaching and aroused the teachers of the country to the realization of the possibilities of improving their work.

Encouragement of Scientific Studies. In addition to the suggestions looking toward a science of education which can be traced directly to Herbart, there were natural forces at work in American civilization tending in the same direction. In the first place, as has been pointed out in an earlier section, great expansion was going forward in the American school. The secondary school was developing rapidly, and teaching was becoming a more and more highly specialized type of activity. By the early '90's, therefore, everything was ready for the launching of a movement which gradually gained impetus during the decades between 1890 and 1910, and which has gone forward rapidly since that time.

The Tests of J. M. Rice. In the early '90's an editor, Mr. J. M. Rice, began to collect for the magazine called *The Forum* a series of descriptive accounts of the great school systems of the country. He found such wide differences in the methods of work and in the achievements of the school systems which he visited that he ultimately decided to undertake a measurement of results secured in some of the subjects of instruction. He went to the leading cities of the United States and asked for permission to test the pupils in spelling and arithmetic. This he did during the years 1894 and 1895. The results were very astonishing. He found in his tests in spelling that, while there were the greatest differences in the amounts of time devoted to this subject in the school systems of different cities, the results seemed to show uniformly that children of a certain age can spell correctly about the same percentage of words. That is, it makes no difference how much time is given to instruction in spelling, children of the sixth grade will always show about the same degree of efficiency. Mr. Rice concluded that spelling develops as the child matures, almost independently of the work in the school.

His tests in arithmetic were no less astonishing in their results. They showed that children are by no means so well trained in this subject as their teachers had been in the habit of assuming. Furthermore, he found that the personality of the teacher is much more significant than any other factor in determining the success of instruction. He was therefore critical of the ordinary methods of organizing arithmetic, and was able to show that school systems are in the main highly deficient in this field. When he reported his results to the department of superintendence of the National Education Association, his statements were received with great skepticism.

School people thought that the methods of testing were inadequate. But the facts were so impressive that, from that time on, numerous other investigators were led to devise tests and to examine in detail the results of instruction, not only in arithmetic, but in other subjects as well. Mr. Rice's investigation constituted, therefore, in a very definite sense, the starting point in the measurement movement, which in recent years has included all the subjects of the curriculum of the elementary school, and is now rapidly spreading into the high school and even into the field of college education.

Superintendent Maxwell's Reports. Superintendent Maxwell of New York City was another of the pioneers in the scientific movement in education. In the early years of this century, he called attention to the fact that numerous assumptions with regard to the progress of children through the grades of the elementary school were entirely without support in fact. His most striking pronouncement in regard to this matter was a statement that in New York schools a very considerable percentage of the pupils, instead of being in the grade in which they should be, according to their ages, were very far behind. To be exact, he said that 39 per cent of the children in the schools of New York City were below the grade in which they might normally be expected to be found.

The statements made by Superintendent Maxwell, with the tests which had been made by Rice and others who immediately followed him, proved to school people and to students of psychology and related subjects that there must be a very much more definite knowledge with regard to the actual success or failure of schools than that which could be gathered from the assumptions of teachers about the effectiveness of their work. Studies began to be made with regard to all of these matters, and the modern scientific movement was launched.

Biological and Anthropological Measurements. The scientific movement in education was influenced very early in its course by a parallel type of scientific development which was going on in biology and anthropology. Students of biology and of anthropology, who in the early stages of their sciences had depended on mere observation of the facts of life, began, about two decades ago, to realize that they must be much more exact in their information regarding plants and animals and human beings, if their sciences were to develop. They therefore began to measure and to make comparisons which were based on these exact measurements. They soon reached certain generalizations which have proved to be of very great importance in the study of education, as well as in the study of phenomena of other types. An example will serve to illustrate the type of measurement to which reference is here made.

The Normal Distribution of a Group. If, in a given large group of people, measurements of the heights of the individuals are made, it will be found that there are in the group a few very tall and a few very short persons. Between these two extremes, there is a distribution of the people, such that a gradual increase in the number of each class appears as one passes from the extremes, made up of very tall and very short people, toward the middle group, which is made up of those who are of average height. That is, while there are a few exceptionally tall people, there are a somewhat larger number who are very tall; there are a still larger number who are tall enough to attract attention but are neither exceptionally tall nor very tall. When we come to the average group, we find that it includes the largest number of individuals. Facts of this sort appear in any field in which a biological characteristic is measured.

Mental characteristics, like physical characteristics, seem to follow the same law of distribution. There are a few geniuses in the world and a few idiots; between these two extremes, the average members of society group themselves around the average ability.

This general discovery that individuals of a group distribute themselves around a center, or average, according to a definite law, has served to guide in a very important way the measurements which have been made in education. In measuring the ability of children to read or spell, it is found that members of any large group exhibit a tendency to collect around the average ability.

Stimulated by the early studies of the workers in sciences, the names of which have been mentioned, and by the criticisms of schools made by Maxwell and other practical school people, students of education began to gather all of the available facts about school situations. They began to collect and compile school statistics on various matters. It may be well to follow their work in some detail.

Studies of Retardation. The term "retardation" was devised, by those who measured the progress of children through the schools, to indicate the fact that certain children fail of promotion in their school work, and hence fall behind the grades in which they ought to be if they had progressed steadily and successfully each year of their school lives. Thus, a child who is six years of age and just entering school may be accepted as a normal individual. If he fails to complete the work in the first grade satisfactorily, he becomes what is known as a "repeater," and he will be, not seven years of age, but eight, when he enters the second grade.

Acceleration. Acceleration is the opposite of retardation. If a child who is ten years of age and is in the fourth grade is allowed to pass directly into the sixth grade, thus gaining a year over children of like age, he is said to be accelerated. Theoretically, if the course of study administered in the elementary school were of average difficulty, bright children ought to be able to complete it in less time than dull children, and there ought to be as many accelerants as there are retards. The school, however, is not so organized as to push forward those who can do the work rapidly, and in most systems retardations accumulate without any balancing accelerations.

Elimination. When a child leaves school he is said to be eliminated, especially if he leaves before completing the eighth grade. Elimination is heaviest among retarded pupils. These retarded pupils often reach the legal limit of compulsory education while in the lower grades. Thus a child who has lost two or three years through non-promotion may be found in the fifth or sixth grade at the time when he is fourteen years of age. Under the laws of many of the states, he is now allowed to leave school and enter upon some industrial task. A very large proportion of the children who are retarded and allowed under the law to leave school at fourteen years of age do so.

The present average age of completion of the eighth grade is 14.7 years. This average would be much higher if all who are eliminated remained in school.

Some of the most productive scientific studies carried on in the field of education in the early part of this century were studies of retardation and elimination. Great practical interest is attached to these studies. E. L. Thorndike and L. P. Ayres were leaders in this movement. Ayres prepared in 1909 a book entitled *Laggards in Our Public Schools*, as a summary of the studies which had been made up to that time. The influence of this book has been very large indeed. Most school systems now publish in their annual reports tables known as "age-grade tables," setting forth the number of children of different ages in each of the grades. Such a table calls attention to the retardation in the schools and stimulates teachers and administrators to try to improve the situation. So great has been the influence of such tables and studies of this matter, that the number of children who now complete the eighth grade is double that which it was before these scientific studies began.

ACTUAL AND ESTIMATED ENROLLMENTS IN PUBLIC SCHOOLS ACCORDING TO GRADE GROUPS*
Source: Office of Education, U. S. Department of Health, Education, and Welfare.

School year	Grades K-6	Grades 7-8	Total K-8	Grades 9-12	Total K-12
1	2	3	4	5	6
1919-20	16,175,826	3,203,101	19,378,927	2,199,389	21,578,316
1921-22	17,178,311	3,187,907	20,366,218	2,873,009	23,239,227
1923-24	17,672,831	3,226,099	20,898,930	3,389,878	24,288,808
1925-26	17,568,633	3,415,369	20,984,002	3,757,466	24,741,468
1927-28	17,656,427	3,611,990	21,268,417	3,911,279	25,179,696
1929-30	17,647,484	3,631,109	21,278,593	4,399,422	25,678,015
1931-32	17,401,075	3,734,345	21,135,420	5,140,021	26,275,441
1933-34	16,857,103	3,907,934	20,765,037	5,669,156	26,434,193
1935-36	16,470,605	3,921,956	20,392,561	5,974,537	26,367,098
1937-38	15,852,876	3,895,298	19,748,174	6,226,934	25,975,108
1939-40	15,023,437	3,808,661	18,832,098	6,601,444	25,433,542
1941-42	14,434,134	3,740,534	18,174,668	6,387,805	24,562,473
1943-44	14,054,157	3,658,939	17,713,096	5,553,520	23,266,616
1945-46	14,187,164	3,490,580	17,677,744	5,622,197	23,299,941
1947-48	14,740,101	3,551,126	18,291,227	5,653,305	23,944,532
1949-50	15,705,604	3,699,089	19,404,693	5,706,734	25,111,427
1950-51	16,020,000	3,880,000	19,900,000	5,769,000	25,669,000
1951-52	16,662,000	4,019,000	20,681,000	5,851,000	26,532,000
1952-53	17,563,000	4,009,000	21,572,000	6,167,000	27,739,000
1953-54	18,674,000	4,120,000	22,794,000	6,389,000	29,183,000
1954-55	19,755,000	4,325,000	24,080,000	6,583,000	30,663,000
1955-56	20,683,000	4,532,000	25,215,000	6,811,000	32,026,000
1956-57	21,509,000	4,741,000	26,250,000	7,101,000	33,351,000
1957-58	22,336,000	4,942,000	27,278,000	7,401,000	34,679,000
1958-59	23,347,000	4,935,000	28,282,000	7,772,000	36,054,000
1959-60	23,728,000	5,503,000	29,231,000	8,132,000	37,363,000

* These enrollment figures are for the continental United States only.

DEVELOPMENT OF STANDARDS

A second type of scientific study in education is that which issued in the creation of scales and standards of school work. One of the earliest standards prepared was that which was worked out by E. L. Thorndike in 1909 in the form of a handwriting scale. Thorndike collected a large number of specimens of children's handwriting. These he submitted to competent judges, asking them to arrange the specimens in order of excellence. By a mathematical calculation of the judgments which he thus secured, Thorndike arranged the specimens in a series of equal steps from the poorest handwriting to the best. He then reproduced the selected specimens, which were separated from each other by equal steps of excellence, and published them as samples with which teachers could compare the work of their pupils. Any specimen of handwriting which was to be rated by the teacher could be held near the scale which had been prepared by Thorndike, and its relative position in the scale could be readily determined. The scale was marked with certain figures which made it possible to describe any given specimen in numerical terms.

The Handwriting Scale in Use. The importance of the handwriting scale consists in the fact that teachers no longer need to make the assumption that children in the different grades can write perfectly. It has long been known, of course, that third-grade children cannot equal the copy of the writing books, but just how far third-grade children commonly depart from that copy was not easily decided before the handwriting scale was perfected. It is now possible to compare the work of the third-graders, or that of any other children, with the standard scale, and to determine quite definitely the level of excellence which in general can be expected from pupils of the grade in question.

It may be remarked in passing that some people think of standardization as the reduction of all school work to absolute uniformity. That is not the significance of the term. School work can never be made absolutely uniform. One child's handwriting will differ in many ways from the handwriting of other children, but school work can be standardized in the sense that the teacher can ascertain the degree of excellence which has been attained and can govern his or her methods of instruction with this knowledge clearly in mind.

After Thorndike prepared the handwriting scale, numerous other workers perfected this and other scales for the study of children's work. There are scales for the measuring of excellence in English composition, scales for the measurement of various kinds of drawings, scales for the study of reading, and so on.

Courtis Arithmetic Tests. One of the most widely used instruments of educational measurement is the series of Courtis tests for the measurement of ability in arithmetic. By an ingenious composition of various number groups, S. A. Courtis prepared a series of exercises in the fundamental arithmetical operations of addition, subtraction, multiplication, and division. These are presented in such form that the pupils are asked to carry out at as rapid a pace as possible the various operations. The ability of any given child is measured by the number and accuracy of the operations which he can complete in a given period of time. The achievement of the whole grade can be measured by ascertaining the ability of the average child.

Spelling. Standard tests have been devised in other fields. A striking illustration may be found in the field of spelling. Formerly, the practice of schools was to teach spelling by resorting to the dictionary and selecting words in alphabetical order, arranging them in groups of gradually increasing length and complexity and making children learn them. There was no limit to the number of words that the schoolmaster attempted to use in his drill of children.

Ayres conceived the idea of attempting to determine what words are needed in ordinary life. To this end he brought together the results of various studies of words. He ascertained what words recur in business correspondence by going through numerous business letters and tabulating the words which he found. The same thing was done with the Sunday newspaper and with the Bible. When all of these different lists of commonly used words were brought together, the astonishing result appeared that about

one-half of the ordinary usage of words is limited to 50 common words, and the first 1000 words encountered in such a list exhaust the ordinary probabilities of use.

Ayres established, therefore, a list of 1000 most commonly employed words. He then gave these words to children in 84 school systems and found how far children of different grades are likely to be in error in spelling these common words. Through these measurements of error, he was able to arrange the words in ascending order of difficulty and to prepare a scale which can be used by any teacher to determine whether a given child or a given class has ordinary ability to spell common words.

Scales and Tests in Various Subjects. The preparation of scales and standards has gone forward in recent years very rapidly. Numerous authors have improved upon the original handwriting scales and the scales in other fields, and accurate tests have been prepared, not only in "the three R's," but also in such subjects as algebra, history, geography, and Latin, and in other subjects of instruction both in the elementary school and in the high school.

An Arithmetic Test. Perhaps the best method of showing the character and content of both the scales and the standard tests is to reproduce portions of one of the widely used series of tests in arithmetic. For the purpose of the school survey in the city of Cleveland an arithmetic test was devised, based on the materials prepared by Courtis. This test is made up of eight pages, the first page of which is reproduced below in full. On the last page one-half of the space is devoted to instruction for examiners. This also is reproduced. The remaining pages of the test contain numerous examples of different degrees of difficulty. One set of each type of examples is reproduced. It should be understood that these are mere specimens of the types of examples of which the full test is made up.

First Page

CLEVELAND SURVEY ARITHMETIC TESTS

Devised by Cleveland Survey Staff

City..... County..... State..... Date.....

Name ..... Age today..... (years months)

Race ..... Sex..... School.....

Grade ..... Teacher.....

Instructions to Examiners

After telling the children not to open the papers, ask the children on the front seats to distribute the papers, placing one upon the desk of each pupil in the class. Have each child fill in the blank spaces at the top of this page. Then say to them: "Inside this folder are examples which you are to work out when the teacher tells you to begin. Work rapidly and accurately. There are more examples in each set than you can work out in the time that will be allowed. Answers do not count if they are wrong."

"Begin and stop promptly when the signal is given."

Additional instructions are given on the last page of this folder.

Record Scores in Spaces Below

Set	A	B	C	D	E	F	G	H
Ats.								
Rts.								

Set	I	J	K	L	M	N	O	
Ats.								
Rts.								

Ats. = attempts; Rts. = rights.

Last Half of Last Page

Instructions for Examiners

Have the children start and stop work together. Let there be an interval of half a minute between the sets of examples. Take two days for the test; give down through I the first day, and complete the test on the next day. The time allowances below must be followed exactly.

Set A ..... 30 seconds	Set F ..... 1 minute	Set K ..... 2 minutes
Set B ..... 30 seconds	Set G ..... 1 minute	Set L ..... 3 minutes
Set C ..... 30 seconds	Set H ..... 30 seconds	Set M ..... 3 minutes
Set D ..... 30 seconds	Set I ..... 1 minute	Set N ..... 3 minutes
Set E ..... 30 seconds	Set J ..... 2 minutes	Set O ..... 3 minutes

Have the children exchange papers. Read the answers aloud and let the children mark each example that is correct, "C." For each set let them count the number of problems attempted and the number of C's and write the numbers in the appropriate columns at the right of the page.

The record should then be transcribed to the first page. Please verify the results set down by the pupils.

Specimens of Various Types of Examples

SET A—Addition

1	6	9	0	4	1	7	9	3	2	1	3	6
2	6	5	1	2	3	7	6	0	4	5	8	9

SET B—Subtraction

9	7	11	8	12	1	9	13	4	12		
9	3	6	1	3	0	7	8	3	6		

SET C—Multiplication

3	4	9	0	5	4	2	7	4	9		
2	7	8	2	6	1	9	6	0	5		

SET D—Division

3)9 4)32 6)36 2)0 7)28 9)9 3)21

SET E—Addition

5	2	9	2	6	1	4	9					
2	8	8	8	3	4	6	7					
2	8	0	5	4	2	5	1					
0	5	7	0	8	5	3	5					
4	1	6	6	8	4	4	3					

SET F—Subtraction

616	1248	1365	1092	716								
456	709	618	472	344								

SET G—Multiplication

2345	9735	8642	6789	2345								
2	5	9	2	6								

SET H—Fractions

$\frac{3}{5} + \frac{1}{5} =$ $\frac{6}{9} - \frac{4}{9} =$ $\frac{4}{9} + \frac{1}{9} =$ $\frac{8}{9} - \frac{7}{9} =$

SET I—Division

4)55424 7)65982 2)58748 5)41780

SET J—Addition

7	9	4	7	2	9	6	7	7	8	9	4	3	2
5	2	5	1	9	6	9	1	8	0	5	3	1	1
4	4	8	9	4	2	6	5	5	7	3	7	7	6
2	8	1	4	8	4	7	1	4	1	4	7	6	6
6	2	4	3	5	7	0	4	1	8	6	0	9	1
0	7	8	2	1	1	4	6	8	5	2	2	6	8
5	5	5	8	5	3	3	5	2	1	3	9	3	6
1	3	1	5	2	9	7	3	1	3	9	5	4	9
8	6	3	2	4	2	1	3	3	7	2	6	5	7
3	1	9	7	3	3	6	7	9	4	2	3	4	5
2	4	6	7	6	8	0	6	8	9	8	4	2	2
9	8	3	1	7	5	6	1	4	4	5	8	9	2
9	8	5	9	6	5	6	7	5	4	6	8	9	4

SET K—Division

21)273 52)1768 41)779 22)462 31)837

SET L—Multiplication

8246	3597	5739	2648
29	73	85	46

SET M—Addition

7493	8937	8625	2123	5142	3691
9016	6345	4091	1679	0376	4526
6487	2783	3844	5555	4955	7479
7591	4883	8697	6331	9314	2087
6166	1341	7314	6808	5507	8165

A Silent Reading Test. A second example of a standard test in a somewhat more complex field than that of arithmetic may be taken from the scale for the measurement of silent reading published by the Russell Sage Foundation of New York City. The directions for the tests and three samples of the reading passages used are given herewith:

DIRECTIONS

Giving the Tests.—1. See that each child has a pencil and that the teacher has a watch. 2. Distribute scales, face down. 3. Have children write on backs of sheets their names, grade, and date. 4. Tell children they are to have a test in reading. Hold scale up and explain that each paragraph tells them to do something to the picture above it with their pencils. They must read carefully, to make sure just what they are to do. They are to read and mark the paragraphs in order, starting at the top and working down, through the first, second, third, and so on. They must do as many as they can in five minutes. 5. Make sure that the pupils understand; then tell them to turn papers over and begin. Allow exactly five minutes. Collect papers.

Marking the Papers. Count every paragraph correct in which the marking, no matter how crude it may be, exactly follows instructions. Count every paragraph wrong in which the marking does not exactly follow instructions. Remember this is a test of reading, not of drawing. The pupil's score is the number of paragraphs correctly marked. Write this number at the top of the paper.

Giving Credit. The credit to be assigned in each grade for each number of paragraphs correctly marked is shown in the table given below. A third-grade child having ten paragraphs right should be marked 80, a fourth-grade child having seven right, 50, and so on. Credits in table are for February 1. To adjust for other periods add or subtract from each child's mark as follows:

Grade 3 Oct. 1, +6 Dec. 1, +3 April 1, −3 June 1, −6
Grades 4–8 +2 +1 −1 June 1, −2

Give no marks less than 0 or more than 100. Write the credit the child receives at the top of his paper.

Results Usually Found. In the diagram shown under the table, columns show per cent of children in the average grade receiving each mark from 0 to 100. Figures below columns show marks or credits, and figures above columns show per cents of children commonly receiving those credits. Thus 12 per cent usually receive a mark of 50, eight per cent one of 68, and so on. The lowest third in the average class receive marks of from 0 to 38; the middle third, from 44 to 56, and the best third, from 62 to 100.

CREDIT CORRESPONDING TO EACH NUMBER OF PARAGRAPHS MARKED IN EACH GRADE

Grade	Number of Paragraphs Read and Marked Correctly																				Grade
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
3	0	26	32	38	44	50	56	62	68	74	80	86	92	98	100	..	..	..	..	..	..	3
4	0	14	20	26	32	38	44	50	56	62	68	74	80	86	92	98	100	..	..	..	..	4
5	0	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92	98	100	..	..	..	5
6	0	2	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92	98	100	..	..	6
7	..	0	2	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92	98	100	..	7
8	..	..	0	2	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92	98	100	8

SPECIMENS OF TEST PASSAGES

1. This naughty dog likes to steal bones. When he steals one he hides it where no other dog can find it. He has just stolen two bones, and you must take your pencil and make two short, straight lines, to show where they are lying on the ground near the dog. Draw them as quickly as you can, and then go on.

2. This man is an Eskimo who lives in the far north where it is cold. There has just been a big storm, and all the ground is white with snow. The man has been walking and has made many footprints in it. With your pencil quickly make four of these in the snow just behind him.

3. This book is lying on the desk, but it is hard to make it stay open. With your pencil draw a single straight line to represent a ruler lying across the book to hold the pages open. Be sure to make the line from one side to the other, across the book, instead of making it go up and down.

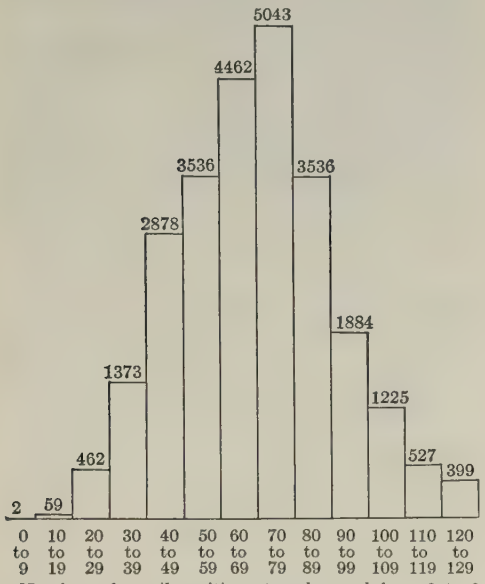
Methods of Employing Tests. Such tests as have been described are used in various ways by different school officers. Teachers very frequently succeed in discovering by their use those pupils who are in need of special attention. They can then direct instruction to the remedy of the defects thus found. Such a use for the diagnosis of school difficulties is perhaps the most productive to which tests can be put.

Sometimes the superintendent of schools uses tests to find out whether teachers are getting on well with their classes. Such measurement of results for administrative purposes has proved to be very helpful in standardizing the practices of large school systems where the superintendent cannot come into personal contact with all of the teachers. The results in such cases must however be interpreted with great caution if injustices are to be avoided; for a teacher may very often have a class of low ability or of especially difficult type, as when she attempts to teach English to a group of children from homes where the English language is not spoken.

Tests have also been used in general school surveys where experts from outside a school system have been called in by the board of education or by the citizens in order to make a study of the virtues and defects of the system.

Typical Results of Measurements. Turning from the scales and tests to some of the results which have been secured by their application, we may at the same time give an illustration of the way in

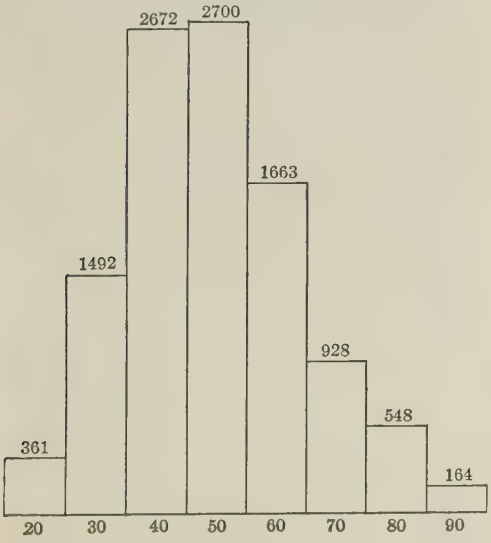
which people distribute themselves in any field in which measurement has been made. The following graph, taken from the survey of the Cleveland schools, shows how pupils distribute themselves with respect to the rate of handwriting:



Number of pupils writing at each speed from 0 to 9 letters per minute to 120 to 129 letters per minute. Data for 25,387 pupils in four upper grades.

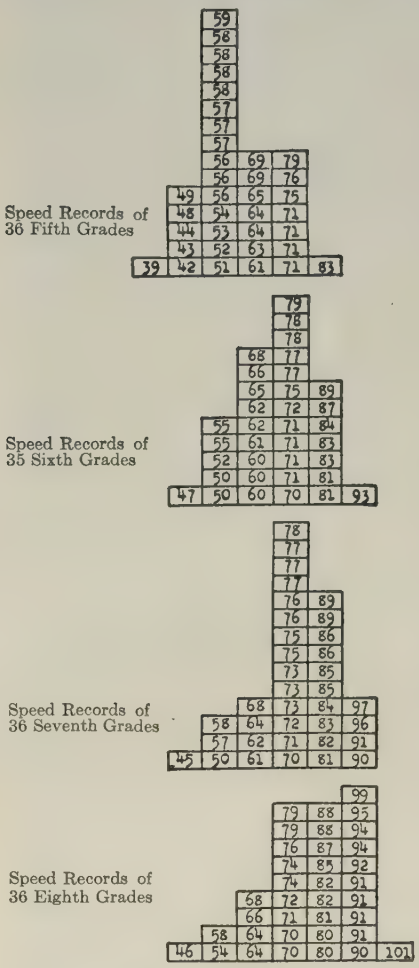
The numbers at the tops of the columns in this figure indicate the number of pupils who write in a minute the number of letters indicated at the bottom of the figure.

Quality of handwriting can be measured by comparing examples with the standard scale. In the case of the series of determinations of quality shown in the following figure, the scores are based on the so-called Ayres handwriting scale. The figure shows the distribution of pupils in the Cleveland schools with respect to quality of their handwriting:



Number of pupils writing at each quality from 20 to 90. Data for 10,528 pupils in four upper grades.

In order to show how different grades and different schools vary in the results which they show in speed of handwriting the following figures are reproduced.


Speed Records of 36 Fifth Grades
Speed Records of 35 Sixth Grades
Speed Records of 36 Seventh Grades
Speed Records of 36 Eighth Grades

Average handwriting speed in letters per minute in four upper grades of 36 schools.

Improvements Based on Measurements. Schools have been greatly stimulated by the results of these studies. Measurement has given, first, a better understanding of what ought to be expected at the different levels of education. No teacher, however isolated, needs to be in any doubt as to the success or unsuccess of his work, because it is now thoroughly known what may be expected of children of different ages. Secondly, the tests and experiments have served as a means of deciding between different methods of instruction. Some methods are good and produce excellent results rapidly; other methods of teaching are less satisfactory, and students make slower progress when these less satisfactory methods are employed. With the scales and tests it is possible to determine accurately the rates of progress. It is, therefore, becoming increasingly difficult for a poor method of teaching to survive in a school. It is also becoming increasingly difficult for individual teachers to escape the necessity of cultivating at all times acquaintance with the best methods that have been devised for the treatment of the various topics in the course of study.

GENERAL INTELLIGENCE TESTS

A type of test which has come into great prominence in recent years and has been very much discussed in connection with the work in the schools is the so-called general intelligence test. This has been applied in schools, and it has been employed also in industry in determining the efficiency of different sorts of workers. It was used on a large scale in the United States army, during the World War, for the purpose of classifying recruits and officers.

This type of test originated many years ago in the experimental studies of the psychologist Ebbinghaus (1850–1909). Ebbinghaus devised a so-called completion test. He took a simple narrative and dropped out a word here and there. He then asked the person whose general intelligence he wanted to test to supply the omitted words. A comparison of different individuals showed that the persons of largest intelligence were those who could supply most rapidly and most correctly the missing words in the narrative. It is obvious that great service will be rendered to society if it is possible to devise some plan by which the general intelligence of a person can be rapidly measured, in the same way that his physical condition can be measured by his strength and endurance. Psychologists have, therefore, steadily pursued this matter in the effort to improve on the tests of Ebbinghaus and enlarge their application.

Cattell attempted to make use of the general intelligence test in the classification of college freshmen at Columbia university, during the late '90's, but his tests proved to be too crude for the purpose, and the results did not at that time seem very satisfactory. However, Cattell and his students pursued the matter until now numerous tests have been devised and are in use for measuring the general intelligence of all classes of students, as well as of persons who are to be selected for professional and business positions.

Binet and His Scale. In 1905 the Paris authorities asked the eminent psychologist Binet to devise some way of picking out the defective children in the elementary school. Binet devised, in response to this invitation, the now famous scale which bears his name.

The special character of Binet's scale lies in the fact that he brought together a number of questions and a number of tests of skill for each age. He thus set up a series of tests which ought to be passed by an ordinary child of three years of age and another set somewhat more difficult for children of four years of age, and so on up the scale. The way in which he determined the appropriateness of these tests for different ages was to try them out on a large number of pupils. He thus determined how far three-year-old children under ordinary circumstances can go in solving the various questions which he laid down in his series.

Various revisions of the Binet scales have been prepared, and a formula has been developed by means of which the relative intelligence of an individual can be expressed in a single numerical term. If the age of a person is compared with his achievements in the Binet series of tests, it can be determined whether the individual compares favorably with those of his own age or is above or below expectation. Thus, if a ten-year-old child passes the ten-year-old test and no higher, he has exactly fulfilled expectations. By dividing ten, the intellectual age of the child according to the expectations of the Binet scale, by his chronological age ten, we get the quotient one. This is known as the intelligence quotient and is commonly expressed by the letters I. Q. Another child of ten years of age might succeed in passing the test for twelve-year-old children; his I. Q. would then be 1.2. A third child of ten years of age might show a deficiency and be able to pass only the eight-year-old test. His I. Q. would be .8.

Stanford Revision of the Binet Scale. The following summary of the tests to be used with children of different ages constitutes the so-called Stanford revision of the Binet tests. The examples here given cover years three, four, five, and six. Similar lists have been prepared for the later years of the child's life.

THE STANFORD REVISION AND EXTENSION

"YEAR III. (6 tests, 2 months each.)

1. Points to parts of body. (3 of 4.)
   Nose; eyes; mouth; hair.
2. Names familiar objects. (3 of 5.)
   Key, penny, closed knife, watch, pencil.
3. Pictures, enumeration or better. (At least 3 objects enumerated in one picture.)
   (a) Dutch Home; (b) River Scene; (c) Post-Office.
4. Gives sex.
5. Gives last name.
6. Repeats 6 to 7 syllables. (1 of 3.)

Al. Repeats 3 digits. (1 success in 3 trials. Order correct.)"

"YEAR IV. (6 tests, 2 months each.)

1. Compare lines. (3 trials, no error.)
2. Discrimination of forms. (Kuhlmann.) (Not over 3 errors.)
3. Counts 4 pennies. (No error.)
4. Copies square. (Pencil. 1 of 3.)
5. Comprehension, 1st degree. (2 of 3.)
   (Stanford addition.) 'What must you do': 'When you are sleepy?' 'Cold?' 'Hungry?'
6. Repeats 4 digits. (1 of 3. Order correct.)
   (Stanford addition.)

Al. Repeats 12 to 13 syllables. (1 of 3 absolutely correct, or 2 with 1 error each.)"

"YEAR V. (6 tests, 2 months each.)

1. Comparison of weights. (2 of 3.)
   3–15; 15–3; 3–15.
2. Colors. (No error.)
   Red; yellow; blue; green.
3. Æsthetic comparison. (No error.)
4. Definitions, use or better. (4 of 6.)
   Chair; horse; fork; doll; pencil; table.
5. Patience, or divided rectangle. (2 of 3 trials. 1 minute each.)
6. Three commissions. (No error. Order correct.)

Al. Age."

"YEAR VI. (6 tests, 2 months each.)

1. Right and left. (No error.)
   Right hand; left ear; right eye.
2. Mutilated pictures. (3 of 4 correct.)
3. Counts 13 pennies. (1 of 2 trials, without error.)
4. Comprehension, 2d degree. (2 of 3.) 'What's the thing for you to do':
   (a) 'If it is raining when you start to school?'
   (b) 'If you find that your house is on fire?'
   (c) 'If you are going some place and miss your car?'
5. Coins. (3 of 4.)
   Nickel; penny; quarter; dime.
6. Repeats 16 to 18 syllables. (1 of 3 absolutely correct, or 2 with 1 error each.)

Al. Morning or afternoon."

Note.—Al. signifies alternative.

The following examples will serve to illustrate the way in which each of these lists of tests is elaborated in the instructions prepared for those who are to give the tests:

"III, 1. POINTING TO PARTS OF THE BODY

Procedure. After getting the child's attention, say: 'Show me your nose.' 'Put your finger on your nose.' Same with the eyes, mouth, and hair.

"Tact is often necessary to overcome timidity. If two or three repetitions of the instruction fail to bring a response, point to the child's chin or ear and say: 'Is this your nose?' 'No?' 'Then where is your nose?' Sometimes, after one has tried two or three parts of the test without eliciting any response, the child may suddenly release his inhibitions and answer all the questions promptly. In case of persistent refusal to respond it is best not to harass the child for an answer, but to leave the test for a while and return to it later. This is a rule which applies generally throughout the scale. In the case of one exceptionally timid little girl, it was impossible to get any response by the usual procedure, but immediately when a doll was shown the child pointed willingly to its nose, eyes, mouth, and hair. The device was successful because it withdrew the child's attention from herself and centered it upon something objective.

"Scoring. Three responses out of four must be correct. Instead of pointing, the child sometimes responds by winking the eyes, opening the mouth, etc., which is counted as satisfactory.

"Remarks. Binet's purpose in this test is to ascertain whether the subject is capable of comprehending simple language. The ability to comprehend and use language is indeed one of the most reliable indications of the grade of mental development. The appreciation of gestures comes first, then the comprehension of language heard, next the ability to repeat words and sentences mechanically, and finally the ability to use language as a means of communication. The present test, however, is not more strictly a test of language comprehension than the others of the 3-year group, and in any case it could not be said to mark the *beginning* of the power to comprehend spoken language. That is fairly well advanced by the age of 2 years. The test closely resembles III, 2 (naming familiar objects), and III, 3 (enumeration of objects in a picture), except that it brings in a personal element and gives some clue to the development of the sense of self. All the data agree in locating the test at year III.

"III, 2. NAMING FAMILIAR OBJECTS

Procedure. Use a key, a penny, a closed knife, a watch, and an ordinary lead pencil. The key should be the usual large-sized doorkey, not one of the Yale type. The penny should not be too new, for the freshly made, untarnished penny resembles very little the penny usually seen. Any ordinary pocketknife may be used, and it is to be shown unopened. The formula is, 'What is this?' or, 'Tell me what this is.'

"Scoring. There must be at least three correct responses out of five. A response is not correct unless the object is named. It is not sufficient for the child merely to show that he knows its use. A child, for example, may take the pencil and begin to mark with it, or go to the door and insert the key in the lock, but this is not sufficient. At the same time we must not be too arbitrary about requiring a particular name. 'Cent' or 'pennies' for 'penny' is satisfactory, but 'money' is not. The watch is sometimes called 'a clock' or 'a tick-tock,' and we shall perhaps not be too liberal if we score these responses plus. 'Pen' for 'pencil,' however, is unsatisfactory. Substitute names for 'key' and 'knife' are rarely given. Mispronunciations due to baby-talk are of course ignored.

"Remarks. The purpose of this test is to find out whether the child has made the association between familiar objects and their names. The mental processes necessary to enable the child to pass this test are very elementary, and yet, as far as they go, they are fundamental. Learning the names of objects frequently seen is a form of mental activity in which the normally endowed child of 2 to 4 years finds great satisfaction. Any marked retardation in making such associations is a grave indication of the lack of that spontaneity which is so necessary for the development of the higher grades of intelligence. It would be entirely beside the point, therefore, to question the validity of the test on the ground that a given child may not have been taught the names of the objects used. Practically all children 3 years old, however poor their environment, have made the acquaintance of at least three of the five objects, and if intelligence is normal they have learned their names as a result of spontaneous inquiry.

"Always use the list of objects here given, because it has been standardized. Any improvised selection would be sure to contain some objects either less or more familiar than those in the standardized list. Note also that three correct responses out of five are sufficient. If we required five correct answers out of six (like Kuhlmann), or three out of three (like Binet, Goddard, and Huey), the test would probably belong at the 4-year level. Binet states that this test is materially harder than that of naming objects in a picture, since in the latter the child selects from a number of objects in the picture those he knows best, while in the former test he must name the objects we have arbitrarily chosen. This difference does not hold, however, if we require only three correct responses out of five for passing the test of naming objects, instead of Binet's three out of three. All else being equal, it is of course easier to recognize and name a real object shown than it is to recognize and name it from a picture.

"III, 3. ENUMERATION OF OBJECTS IN PICTURES

Procedure. Use the three pictures designated as 'Dutch Home,' 'River Scene,' and 'Post-Office.' Say, 'Now I am going to show you a pretty picture.' Then, holding first one before the child,, close enough to permit distinct vision, say: 'Tell me what you see in this picture.' If there is no response, as sometimes happens, due to embarrassment or timidity, repeat the request in this form: 'Look at the picture and tell me everything you can see in it.' If there is still no response, say: 'Show me the ....' (naming some object in the picture). Only one question of this type, however, is permissible. If the child answers correctly, say: 'That is fine; now tell me everything you see in the picture.' From this point the responses nearly always follow without further coaxing. Indeed, if rapport has been properly cultivated before the test begins, the first question will ordinarily be sufficient. If the child names one or two things in a picture and then stops, urge him on by saying, 'And what else?' Proceed with pictures (b) and (c) in the same manner.

"Scoring. The test is passed if the child enumerates as many as three objects in one picture spontaneously; that is, without intervening questions or urging. Anything better than enumeration (as description or interpretation) is also acceptable, but description is rarely encountered before 5 years and interpretation rarely before 9 or 10.

"Remarks. The purpose of the test in this year is to find out whether the sight of a familiar object in a picture provokes recognition and calls up the appropriate name. The average child of 3 or 4 years is in what Binet calls 'the identification stage'; that is, familiar objects in a picture will be identified but not described, their relations to one another will not be grasped.

"In giving the test, always present the pictures in the same order, first Dutch Home, then River Scene, then Post-Office. The order of presentation will no doubt seem to the unitiated too trivial a matter to insist upon, but a little experience teaches one that an apparently insignificant change in the procedure may exert a considerable influence upon the response. Some pictures tend more strongly than others to provoke a particular type of response. Some lend themselves especially to enumeration, others to description, others to interpretation. The pictures used in the Stanford revision have been selected from a number which have been tried, because they are more uniform in this respect than most others in use. However, they are not without their difference, picture (b), for example, tending more than the others to provoke description.

"There seems to be no disagreement as to the proper location of this test."

TESTS IN WORLD WARS I AND II

General Intelligence Tests. Since the improvement of the Binet scale, especially by Professor L. M. Terman of Leland Stanford Junior university, significant programs for the measurement of intelligence have been conducted, principally by the schools and by the United States armed forces in World Wars I and II. World War I gave the intelligence-testing movement the greatest stimulus which it has ever had. The chief testing instrument used by the army during World War I was known as the Army Alpha Test; it is reproduced on pages 1652–1655. During World War II, all branches of the armed forces used intelligence tests known as General Classification Tests. These were given to all enlisted personnel and to officers.

The chief purpose of these tests was to aid in eliminating all persons who were so incompetent that they could not understand and follow orders. Another purpose was to aid in the selection of those persons with the highest degree of intelligence for positions of command. The tests were also used to assist in making promotions from one rank to another rank. In brief, the tests were used in both wars to measure the degree of intelligence of the military personnel. Because of their success in the wars, their use in the schools of the nation received a tremendous impetus.

Occupational Tests. During World Wars I and II, the armed forces also needed a system of classification whereby they could place their personnel in the various occupations which were necessary for carrying on military operations. The locating of persons suited to the various occupations was effectively handled, in part, through a knowledge of the earlier occupations pursued by the persons. In many instances, however, it was necessary to place persons in occupations which were different from those pursued by them in civilian life, and tests were needed in order to avoid, so far as possible, misfit assignments. Fortunately the methods for making such tests had been developed in much detail by psychologists and educationists even before World War I. With this beginning, many occupational tests were developed during World War I, and following that war and during World War II many other occupational tests were developed.

The Army Alpha Test. This is the most extensively used of the army tests.

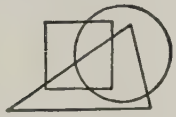
REPRODUCTION OF ARMY ALPHA, FORM 5.

TEST 1

1. ○ ○ ○ ○ ○

2. ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

3.

4. 

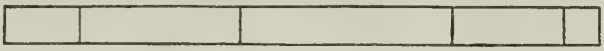
5. ○ ○ ○ *Yes No*

6. ○ ○ ○ ○ ○

7. **A B C D E F G H I J K L M N O P**

8. ○ ○ ○ *MILITARY GUN CAMP*

9. **34-79-56-87-68-25-82-47-27-31-64-93-71-41-52-99**

10. 

11. 7F △ 4 ○ 3 △ 5A ○ 8 □ 2 △ 6 ○ 9B □ 3

12. **1 2 3 4 5 6 7 8 9**

This is an oral directions test. The directions given are as follows:

TEST I, FORM V

1. "Attention! 'Attention' always means 'Pencils up.' Look at the circles at 1. When I say 'go,' but not before, make a cross in the first circle and also a figure 1 in the third circle.—Go!" (Allow not over 5 seconds.)

2. "Attention! Look at 2, where the circles have numbers in them. When I say 'go,' draw a line from Circle 1 to Circle 4 that will pass *above* Circle 2 and *below* Circle 3.—Go!" (Allow not over 5 seconds.)

3. "Attention! Look at the square and triangle at 3. When I say 'go,' make a cross in the space which is in the triangle, but not in the square, and also make a figure 1 in the space which is in the triangle and in the square.—Go!" (Allow not over 10 seconds.)

4. "Attention! Look at 4. When I say 'go,' make a figure 1 in the space which is in the circle, but not in the triangle or square, and also make a figure 2 in the space which is in the triangle and circle, but not in the square.—Go!" (Allow not over 10 seconds.)

(N. B. Examiner.—In reading 5, don't pause at the word CIRCLE as if ending a sentence.)

5. "Attention! Look at 5. If a machine gun can shoot more bullets a minute than a rifle, then (when I say 'go') put a cross in the second circle; if not, draw a line *under* the word No.—Go!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'go,' put in the second circle the right answer to the question: 'How many months has a year?' In the third circle do nothing, but in the fourth circle put any number that is a wrong answer to the question that you have just answered correctly.—Go!" (Allow not over 10 seconds.)

7. "Attention! Look at 7. When I say 'go,' *cross out* the letter just before C and also draw a line *under* the second letter before H.—Go!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. Notice the three circles and the three words. When I say 'go,' make in the *first* circle the first letter of the *first* word; in the *second* circle the *first* letter of the *second* word; and in the *third* circle the last letter of the *third* word.—Go!" (Allow not over 10 seconds.)

9. "Attention! Look at 9. When I say 'go,' *cross out* each number that is more than 20, but less than 30.—Go!" (Allow not over 15 seconds.)

10. "Attention! Look at 10. Notice that the drawing is divided into five parts. When I say 'go,' put a 3 or a 2 in each of the two largest parts and any number between 4 and 7 in the part next in size to the smallest part.—Go!" (Allow not over 15 seconds.)

11. "Attention! Look at 11. When I say 'go,' draw a line through every even number that is not in a square and also through every odd number that is in a square with a letter.—Go!" (Allow not over 25 seconds.)

12. "Attention! Look at 12. If 7 is more than 5, then (when I say 'go') cross out the number 6 unless 6 is more than 8, in which case draw a line under the number 7.—Go!" (Allow not over 10 seconds.)

TEST 2

Get the answers to these examples as quickly as you can. Use the side of this page to figure on if you need to.

Samples

1. How many are 5 men and 10 men? Answer . . . . . (15

2. If you walk 4 miles an hour for 3 hours, how far do you walk? Answer . . . . (12

1. How many are 30 men and 7 men? Answer . . . (
2. If you save $7 a month for 4 months, how much will you save? Answer . . . . . (
3. If 24 men are divided into squads of 8, how many squads will there be? Answer . . . . . (
4. Mike had 12 cigars. He bought 3 more, and then smoked 6. How many cigars did he have left? Answer . . . . . (
5. A company advanced 5 miles and retreated 3 miles. How far was it then from its first position? Answer (
6. How many hours will it take a truck to go 66 miles at the rate of 6 miles an hour? Answer . . . . (
7. How many cigars can you buy for 50 cents at the rate of 2 for 5 cents? Answer . . . . . (
8. A regiment marched 40 miles in five days. The first day they marched 9 miles, the second day 6 miles, the third 10 miles, the fourth 8 miles. How many miles did they march the last day? Answer. (
9. If you buy two packages of tobacco at 7 cents each and a pipe for 65 cents, how much change should you get from a two-dollar bill? Answer . . . . (
10. If it takes 6 men 3 days to dig a 180-foot drain, how many men are needed to dig it in half a day? Answer . . . . . (
11. A dealer bought some mules for $800. He sold them for $1,000, making $40 on each mule. How many mules were there? Answer. . . . . (
12. A rectangular bin holds 400 cubic feet of lime. If the bin is 10 feet long and 5 feet wide, how deep is it? Answer . . . . . (
13. A recruit spent one-eighth of his spare change for post cards and four times as much for a box of letter paper, and then had 90 cents left. How much money did he have at first? Answer . . . . . (

14. If 3½ tons of coal cost $21, what will 5½ tons cost? Answer . . . . . (

15. A ship has provisions to last her crew of 500 men 6 months. How long would it last 1,200 men? Answer . . . . . (

16. If a man runs a hundred yards in 10 seconds, how many feet does he run in a fifth of a second? Answer . . . . . (

17. A U-boat makes 8 miles an hour under water and 15 miles on the surface. How long will it take to cross a 100-mile channel, if it has to go two-fifths of the way under water? Answer . . . . . (

18. If 241 squads of men are to dig 4,097 yards of trench, how many yards must be dug by each squad? Answer . . . . . (

19. A certain division contains 3,000 artillery, 15,000 infantry and 1,000 cavalry. If each branch is expanded proportionately until there are in all 20,900 men, how many will be added to the artillery? Answer . . . . . (

20. A commission house which had already supplied 1,897 barrels of apples to a cantonment delivered the remainder of its stock to 29 mess halls. Of this remainder each mess hall received 54 barrels. What was the total number of barrels supplied? Answer. (

TEST 3

This is a test of common sense. Below are sixteen questions. Three answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the best answer to each question, as in the sample:

Sample

Why do we use stoves? Because

- ☐ they look well
- ☒ they keep us warm
- ☐ they are black

Here the second answer is the best one and is marked with a cross. Begin with No. 1 and keep on until time is called.

---

1. Cats are useful animals, because
   - ☐ they catch mice
   - ☐ they are gentle
   - ☐ they are afraid of dogs
2. Why are pencils more commonly carried than fountain pens? Because
   - ☐ they are brightly colored
   - ☐ they are cheaper
   - ☐ they are not so heavy
3. Why is leather used for shoes? Because
   - ☐ it is produced in all countries
   - ☐ it wears well
   - ☐ it is an animal product
4. Why judge a man by what he does rather than by what he says? Because
   - ☐ what a man does shows what he really is
   - ☐ it is wrong to tell a lie
   - ☐ a deaf man cannot hear what is said
5. If you were asked what you thought of a person whom you didn't know, what should you say?
   - ☐ I will go and get acquainted
   - ☐ I think he is all right
   - ☐ I don't know him and can't say
6. Streets are sprinkled in summer
   - ☐ to make the air cooler
   - ☐ to keep automobiles from skidding
   - ☐ to keep down dust
7. Why is wheat better for food than corn? Because
   - ☐ it is more nutritious
   - ☐ it is more expensive
   - ☐ it can be ground finer
8. If a man made a million dollars, he ought to
   - ☐ pay off the national debt
   - ☐ contribute to various worthy charities
   - ☐ give it all to some poor man
9. Why do many persons prefer automobiles to street cars? Because
   - ☐ an auto is made of higher grade materials
   - ☐ an automobile is more convenient
   - ☐ street cars are not as safe
10. The feathers on a bird's wings help him to fly because they
    - ☐ make a wide, light surface
    - ☐ keep the air off his body
    - ☐ keep the wings from cooling off too fast
11. All traffic going one way keeps to the same side of the street because
    - ☐ most people are right handed
    - ☐ the traffic policeman insists on it
    - ☐ it avoids confusion and collisions
12. Why do inventors patent their inventions? Because
    - ☐ it gives them control of their inventions
    - ☐ it creates a greater demand
    - ☐ it is the custom to get patents
13. Freezing water bursts pipes because
    - ☐ cold makes the pipes weaker
    - ☐ water expands when it freezes
    - ☐ the ice stops the flow of water
14. Why are high mountains covered with snow? Because
    - ☐ they are near the clouds
    - ☐ the sun seldom shines on them
    - ☐ the air is cold there
15. If the earth were nearer the sun
    - ☐ the stars would disappear
    - ☐ our months would be longer
    - ☐ the earth would be warmer
16. Why is it colder nearer the poles than near the equator? Because
    - ☐ the poles are always farther from the sun
    - ☐ the sunshine falls obliquely at the poles
    - ☐ there is more ice at the poles

TEST 4

If the two words of a pair mean the same or nearly the same, draw a line under same. If they mean the opposite or nearly the opposite, draw a line under opposite. If you cannot be sure, guess. The two samples are already marked as they should be.

Samples good—bad . . . . . same—opposite
little—small . . . . . same—opposite

1	wet—dry	same—opposite	1
2	in—out	same—opposite	2
3	hill—valley	same—opposite	3
4	allow—permit	same—opposite	4
5	expand—contract	same—opposite	5
6	class—group	same—opposite	6
7	former—latter	same—opposite	7
8	confess—admit	same—opposite	8
9	shy—timid	same—opposite	9
10	delicate—tender	same—opposite	10
11	extinguish—quench	same—opposite	11
12	cheerful—melancholy	same—opposite	12
13	accept—reject	same—opposite	13
14	concave—convex	same—opposite	14
15	lax—strict	same—opposite	15
16	assert—maintain	same—opposite	16
17	champion—advocate	same—opposite	17
18	adapt—conform	same—opposite	18
19	debase—exalt	same—opposite	19
20	dissension—harmony	same—opposite	20

21	repress—restrain	same—opposite	**21**
22	bestow—confer	same—opposite	**22**
23	amenable—tractable	same—opposite	**23**
24	avert—prevent	same—opposite	**24**
25	reverence—veneration	same—opposite	**25**
26	fallacy—verity	same—opposite	**26**
27	specific—general	same—opposite	**27**
28	pompous—ostentatious	same—opposite	**28**
29	accumulate—dissipate	same—opposite	**29**
30	apathy—indifference	same—opposite	**30**
31	effeminate—virile	same—opposite	**31**
32	peculation—embezzlement	same—opposite	**32**
33	benign—genial	same—opposite	**33**
34	acme—climax	same—opposite	**34**
35	largess—donation	same—opposite	**35**
36	innuendo—insinuation	same—opposite	**36**
37	vesper—matin	same—opposite	**37**
38	aphorism—maxim	same—opposite	**38**
39	adjure—renounce	same—opposite	**39**
40	encomium—eulogy	same—opposite	**40**

TEST 5

The words A EATS COW GRASS in that order are mixed up and don't make a sentence; but they would make a sentence if put in the right order: A COW EATS GRASS, and this statement is true.

Again, the words HORSES FEATHERS HAVE ALL would make a sentence if put in the order ALL HORSES HAVE FEATHERS, but this statement is false.

Below are twenty-four mixed-up sentences. Some of them are true and some are false. When I say "go," take these sentences one at a time. Think what each **would** say if the words were straightened out, but don't write them yourself. Then, if what it **would** say is true, draw a line under the word "true"; if what it **would** say is false, draw a line under the word "false." If you can not be sure, guess. The two examples are already marked as they should be. Begin with No. 1 and work right down the page until time is called.

Samples	a eats cow grass	true—false	
	horses feathers have all	true—false	
1	lions strong are	true—false	**1**
2	houses people in live	true—false	**2**
3	days there in are week eight a	true—false	**3**
4	leg flies one have only	true—false	**4**
5	months coldest are summer the	true—false	**5**
6	gotten sea water sugar is from	true—false	**6**
7	honey bees flowers gather the from	true—false	**7**
8	and eat good gold silver to are	true—false	**8**
9	president Columbus first the was America of	true—false	**9**
10	making is bread valuable wheat for	true—false	**10**
11	water and made are butter from cheese	true—false	**11**
12	sides every has four triangle	true—false	**12**
13	every times makes mistakes person at	true—false	**13**
14	many toes fingers as men as have	true—false	**14**
15	not eat gunpowder to good is	true—false	**15**
16	ninety canal ago built Panama years was the	true—false	**16**
17	live dangerous is near a volcano to it	true—false	**17**
18	clothing worthless are for and wool cotton	true—false	**18**
19	as sheets are napkins used never	true—false	**19**
20	people trusted intemperate be always can	true—false	**20**
21	employ debaters irony never	true—false	**21**
22	certain some death of mean kinds sickness	true—false	**22**
23	envy bad malice traits are and	true—false	**23**
24	repeated call human for courtesies associations	true—false	**24**

TEST 6

Samples	2	4	6	8	10	12	*14*	*16*
	9	8	7	6	5	4	*3*	*2*
	2	2	3	3	4	4	*5*	*5*
	1	7	2	7	3	7	*4*	*7*

Look at each row of numbers below, and on the two dotted lines write the two numbers that should come next.

3	4	5	6	7	8	....	....
10	15	20	25	30	35	....	....
8	7	6	5	4	3	....	....
3	6	9	12	15	18	....	....
5	9	13	17	21	25	....	....
8	1	6	1	4	1	....	....
27	27	23	23	19	19	....	....
1	2	4	8	16	32	....	....
8	9	12	13	16	17	....	....
9	9	7	7	5	5	....	....
19	16	14	11	9	6	....	....
2	3	5	8	12	17	....	....
11	13	12	14	13	15	....	....
29	28	26	23	19	14	....	....
18	14	17	13	16	12	....	....
81	27	9	3	1	⅓	....	....
20	17	15	14	11	9	....	....
16	17	15	18	14	19	....	....
1	4	9	16	25	36	....	....
3	6	8	16	18	36	....	....

TEST 7

Samples
- sky—blue : : grass—**table green warm big**
- fish—swims : : man—**paper time walks girl**
- day—night : : white—**red black clear pure**

In each of the lines below, the first two words are related to each other in some way. What you are to do in each line is to see what the relation is between the first two words, and underline the word in heavy type that is related in the same way to the third word. Begin with No. 1 and mark as many sets as you can before time is called.

1	gun—shoots : : knife—**run cuts hat bird**	**1**
2	ear—hear : : eye—**table hand see play**	**2**
3	dress—woman : : feathers—**bird neck feet bill**	**3**
4	handle—hammer : : knob—**key room shut door**	**4**
5	shoe—foot : : hat—**coat nose head collar**	**5**
6	water—drink : : bread—**cake coffee eat pie**	**6**
7	food—man : : gasoline—**gas oil automobile spark**	**7**
8	eat—fat : : starve—**thin food bread thirsty**	**8**
9	man—home : : bird—**fly insect worm nest**	**9**
10	go—come : : sell—**leave buy money papers**	**10**
11	peninsula—land : : bay—**boats pay ocean Massachusetts**	**11**
12	hour—minute : : minute—**man week second short**	**12**
13	abide—depart : : stay—**over home play leave**	**13**
14	January—February : : June—**July May month year**	**14**
15	bold—timid : : advance—**proceed retreat campaign soldier**	**15**
16	above—below : : top—**spin bottom surface side**	**16**
17	lion—animal : : rose—**smell leaf plant thorn**	**17**
18	tiger—carnivorous : : horse—**cow pony buggy herbivorous**	**18**
19	sailor—navy : : soldier—**gun cap hill army**	**19**
20	picture—see : : sound—**noise music hear bark**	**20**
21	success—joy : : failure—**sadness success fail work**	**21**
22	hope—despair : : happiness—**frolic fun joy sadness**	**22**
23	pretty—ugly : : attract—**fine repel nice draw**	**23**
24	pupil—teacher : : child—**parent doll youngster obey**	**24**
25	city—mayor : : army—**navy soldier general private**	**25**
26	establish—begin : : abolish—**slavery wrong abolition end**	**26**
27	December—January : : last—**least worst month first**	**27**
28	giant—dwarf : : large—**big monster queer small**	**28**
29	engine—caboose : : beginning—**commence cabin end train**	**29**
30	dismal—cheerful : : dark—**sad stars night bright**	**30**
31	quarrel—enemy : : agree—**friend disagree agreeable foe**	**31**
32	razor—sharp : : hoe—**bury dull cuts tree**	**32**
33	winter—summer : : cold—**freeze warm wet January**	**33**
34	rudder—ship : : tail—**sail bird dog cat**	**34**
35	granary—wheat : : library—**desk books paper librarian**	**35**
36	tolerate—pain : : welcome—**pleasure unwelcome friends give**	**36**
37	sand—glass : : clay—**stone hay bricks dirt**	**37**
38	moon—earth : : earth—**ground Mars sun sky**	**38**
39	tears—sorrow : : laughter—**joy smile girls grin**	**39**
40	cold—ice : : heat—**lightning warm steam coat**	**40**

TEST 8

Notice the sample sentence:

People **hear** with the **eyes ears nose mouth**

The correct word is **ears**, because it makes the truest sentence.

In each of the sentences below you have four choices for the last word. Only one of them is correct. In each sentence draw a line under the one of these four words which makes the truest sentence. If you can not be sure, guess. The two samples are already marked as they should be.

Samples
- People **hear** with the **eyes ears nose mouth**
- **France** is in **Europe Asia Africa Australia**

1 **America** was discovered by **Drake Hudson Columbus Balboa** **1**

2 **Pinochle** is played with **rackets cards pins dice** **2**

3 The most prominent industry of **Detroit** is **automobiles brewing flour packing** 3
4 The **Wyandotte** is a kind of **horse fowl cattle granite** 4
5 The **U. S. School for Army Officers** is at **Annapolis West Point New Haven Ithaca** 5

6 **Food products** are made by **Smith & Wesson Swift & Co. W. L. Douglas B. T. Babbitt** 6
7 **Bud Fisher** was famous as an **actor author baseball player comic artist** 7
8 The **Guernsey** is a kind of **horse goat sheep cow** . 8
9 **Myrna Loy** is known as a **suffragist singer movie actress writer** 9
10 **"Hasn't scratched yet"** is used in advertising a **duster flour brush cleanser** 10

11 **Salsify** is a kind of **snake fish lizard vegetable** . . 11
12 **Coral** is obtained from **mines elephants oysters reefs** 12
13 **Rosa Bonheur** is famous as a **poet painter composer sculptor** 13
14 The **tuna** is a kind of **fish bird reptile insect** . . . 14
15 **Emeralds** are usually **red blue green yellow** . . 15

16 **Maize** is a kind of **corn hay oats rice** 16
17 **Nabisco** is a **patent medicine disinfectant food product tooth paste** 17
18 **Velvet Joe** appears in advertisements of **tooth powder dry goods tobacco soap** 18
19 **Cypress** is a kind of **machine food tree fabric** . . 19
20 **Bombay** is a city in **China Egypt India Japan** . . 20

21 The **dictaphone** is a kind of **typewriter multigraph phonograph adding machine** 21
22 The **pancreas** is in the **abdomen head shoulder neck** 22
23 **Cheviot** is the name of a **fabric drink dance food** . 23
24 **Larceny** is a term used in **medicine theology law pedagogy** 24
25 The **Battle of Gettysburg** was fought in **1863 1813 1778 1812** 25

26 The **bassoon** is used in **music stenography bookbinding lithography** 26
27 **Turpentine** comes from **petroleum ore hides trees** 27
28 The number of a **Zulu's legs** is **two four six eight** 28
29 The **scimitar** is a kind of **musket cannon pistol sword** 29
30 **Nylon** is the name of a **metal vegetable textile bird** 30
31 The author of **"The Raven"** is **Stevenson Kipling Hawthorne Poe** 31
32 **Spare** is a term used in **bowling football tennis hockey** 32
33 A **six-sided figure** is called a **scholium parallelogram hexagon trapezium** 33
34 **Isaac Pitman** was most famous in **physics shorthand railroading electricity** 34
35 The **ampere** is used in measuring **wind power electricity water power rainfall** 35

36 The **Chrysler car** is made in **Buffalo Detroit Flint Toledo** 36
37 **Mauve** is the name of a **drink color fabric food** . 37
38 The **stanchion** is used in **fishing hunting farming motoring** 38
39 **Mica** is a **vegetable mineral gas liquid** 39
40 **Scrooge** appears in **Vanity Fair The Christmas Carol Romola Henry IV** 40

Interpreting Results of the Alpha Test. The results of the army tests have been compiled by various writers in an effort to bring out the mental characteristics of the army recruits from different sections of the country and from different nationalities. One author has compiled the results of these tests in such a way as to show very definitely that the immigrants who come to the United States from the southeastern European countries are not able to pass the test with as high a grade as the immigrants who come from the northern European states. In view of the fact that recent immigration has been predominantly from the countries in the southeastern part of Europe, these findings raise grave social questions.

Another general fact brought out by these tests is that the average recruit was able to answer the tests only about as well as school children between 13 and 14 years of age. On the basis of this fact, the statement is sometimes made that the average American citizen is intellectually between 13 and 14 years of age. Against this statement it has been argued that the tests include only those types of intellectual effort which belong to a school training. Beyond 13 years of age the ordinary man does not continue to cultivate the same type of thinking which he cultivated in the school. Consequently, the test does not uncover the mental development which has been going on, for example, in business or in practical mechanics. There is nothing in the test to show what a man who works in a foundry has been learning since he left school.

Controversy as to the meaning of the test has arisen at another point also. There are some who regard the test as a measure of native ability, while others regard it as a measure of acquired information. If the test measures native ability, then it is not to be expected that anyone who passes the test well at any given time will be of low mental ability at any other time in his life. Conversely, anyone who is not able to pass the test at a level that comports with his age cannot be expected to show intellectual ability of a higher order later. Those who believe that the test measures acquired information, on the other hand, interpret the results to mean that a man has had certain intellectual opportunities if he passes the test well, and that he has been deprived of these opportunities if he does not pass well.

It has been shown very clearly that the ability of recruits from different states parallels closely the efficiency of the school systems of these states. This fact would seem to indicate that the test measures school training quite as much as it does native intelligence. In general, this latter conclusion is probably more nearly the exact truth than the statement that the test measures only native ability.

Applications of Intelligence Tests. There can be no doubt that the experience of the army demonstrated the value of the various tests which were used. Some people were so much impressed by the success of the army tests that they believed a method had been found of classifying all human beings for all sorts of purposes, and the most extreme positions have been taken with regard to the use of these tests.

For example, it has been asserted by some that anyone who passes with a low grade should not be educated in a high school, and certainly not in college, on the theory that it is uneconomical for society to bestow its training on those who are endowed with only moderate degrees of intelligence.

Furthermore, extremists have appeared in some school systems who would rearrange the classification of pupils, sometimes even to the extent of ignoring the judgment of teachers, putting into a given grade only those children who stand at the same level in a general intelligence test.

These extremists have been met by vigorous objectors who hold that it is quite impossible on the basis of a single test to determine a person's intelligence and his probable achievements in the intellectual world. The objectors have marshaled a large body of evidence to show that the tests are in need of elaboration if they are to be relied upon at all, and that it is necessary to administer more than one test before any reliance can be placed upon the classifications which they suggest.

As a matter of actual practice, these tests are now extensively used to supplement the judgments of teachers in classifying students in all grades of schools. This is undoubtedly the legitimate use to which they can be put. They cannot be used to the exclusion of the other evidences in regard to students' achievements, but they are proving in their refined forms to be very much more reliable than any other single type of evidence, and because of their extended use they certainly supply a basis for the comparison of educational institutions and of teachers.

Furthermore their extensive use has led to a careful scrutiny of all the other devices for measuring human ability, such as examinations and teachers' judgments. The net result has been a refinement of the methods of placing pupils in the school and of graduating them at the completion of their courses. The indirect advantages have therefore often equaled the direct.

LABORATORY STUDIES

Another and somewhat more elaborate form of scientific study which has contributed to the better organization of schools and to improved methods of teaching may be described under the name "laboratory studies." There are certain types of investigation which teachers cannot readily carry on in the classroom, the results of which are yet very useful in directing educational work. An illustration of this type is to be found in the studies which have been made on the maturing of the child's physical organism. A little child is immature in his physical structures in the same degree as he is immature in his intellectual development. The physical changes through which he passes are in some respects easier to observe and record than are the intellectual changes. A good deal of energy has therefore been devoted to taking physical measurements of children.

Reaction Measurements. Direct laboratory measurements of children's special abilities are also made. One of the earliest of these, which has been influential in affecting school practice, is the measurement of so-called "reaction times." The amount of effort necessary to carry out a certain intellectual process is indicated by the length of time which it requires. Thus it requires more time to work out an elaborate problem in multiplication than to solve a simple problem in addition. The exact measurement of time required for various mental processes can be made by means of elaborate time measuring devices used in the laboratory. By the use of such apparatus, it is found that a child can recognize a word in the same length of time that is required for him to recognize a single letter. This being the case, it is evidently much more economical, in the early stages of reading, to train him to recognize word-wholes rather than to require him to recognize the letters which make up words. Guided by these laboratory experiments and by practical experience, teachers have found it advantageous to abandon the A-B-C method of teaching reading in favor of the word-whole method.

Reading and Eye Movements. The most productive laboratory studies that have been made of school subjects are the studies of the reading of pupils. The mental processes through which a child passes in looking at a series of words have been measured by photographing the movements of his eyes. If the eyes move rapidly across a page, the indication is that the child has been able to recognize the successive words fluently. If, on the other hand, the eyes move very slowly across a line of printed matter, it is evident that the child has not been able to recognize the successive words fluently.

Photographs of eye movements have brought out the fact that no one looks at each individual letter of a line of printed matter; the eye moves forward in steps of greater or less length. The reader takes in at each step a number of letters or words, and then moves forward to the next position, from which a new group of letters or words may be taken in. The length of the steps made by the reader is a fair measure of his range of recognition. It has been found that little children move their eyes in short steps along a line of printed matter. The trained adult, on the other hand, is able to take in whole phrases at a time, and his eye movements are rapid and long.

By means of similar photographs it has been possible to discover the various types of difficulty which arise in training children to read. It has also been possible to study minutely the effects of various methods of teaching, and in this way to devise ways to remedy defects in children who show incompetency in school work.

Studies of Pre-school Children. Special experimental schools have been established in a number of centers for the study of children from two years of age to the age when they pass into the kindergarten. The physical, emotional, and intellectual development of children of pre-school age conditions so largely the activities and attainments of later life that intensive studies of the earliest years are now recognized as essential to a complete science of education. A voluminous literature of interest to parents as well as teachers is appearing as a result of such studies.

SCHOOL SURVEYS

The scientific methods which have been reviewed up to this point deal with particular aspects of school work. It is highly desirable that some method be developed by which a general measure of the efficiency of an educational institution or of a school system can be secured. A productive suggestion of the way in which this broader problem could be solved came to educators from the experience of communities which conducted what are known as social surveys. A number of the earlier social surveys were organized to investigate such matters as the housing conditions in cities or the situation regarding employment. Following the examples of these social surveys, educators organized a number of general school surveys.

The New York Survey. The first great school survey was that of New York City, made in 1912. The city board of estimate and apportionment found itself in disagreement with the board of education with regard to the funds which could be legitimately apportioned from the budget of the municipality to the maintenance of schools. The board of education, which was directly responsible for the organization of the schools, demanded more money than the financial board thought it ought to have. The financial board thereupon raised the question whether the schools were being efficiently conducted, and proceeded to organize a survey. They appointed as director of this survey Professor Hanus, head of the department of education of Harvard university. They made it possible for him to employ some of the leading students of education in the country, and directed him to look into all of the activities of the New York City schools.

The results of this general survey were published in three large volumes, and excited a tremendous amount of controversial discussion among school officers of the city. The schools were severely criticized in a number of respects, and the organization of the school administration was criticized. Wherever it seemed necessary to the surveyors to suggest changes, they encountered protests from the school officials which raised pointedly the question whether the methods employed by the surveyors were adequate to the task of evaluating the work of a great school system.

The Portland Survey. Shortly after the New York survey, a survey was organized in the city of Portland, Oregon. The taxpayers of that city found that their school expenditures had grown very rapidly, and they employed experts to look into the situation. Professor Cubberley, head of the department of education at Stanford university, was made director of the survey.

The report of this inquiry, published in 1913, is notable for the very full statement it makes of the theory of administrative organization which ought to prevail in a city system like that of Portland. It was found that the relations between the board of education, the superintendent, and the principals were not satisfactory, and the report recommended a complete reorganization. Here again much discussion followed the publication of the report.

The Springfield Survey. After 1913, there appeared in rapid succession reports of surveys of cities in all parts of the United States. Conspicuous among them and constituting a turning point in their methods of inquiry and publication is the survey of Springfield, Illinois, conducted by the department of education of the Russell Sage Foundation under the leadership of L. P. Ayres. The Spring-

field survey gave unusual attention to the school buildings. It was found that many of the buildings were in bad condition, and it was also found that the management of the finances of the board of education in respect to building construction was not of the most efficient type. The Springfield survey used the methods of measurements and tests, which up to that time had been devised, with more completeness than did any of the earlier surveys. The result was a report much less open to question than any of the earlier reports and much more significant as an illustration of exact scientific methods of evaluating school organization.

The Cleveland Survey. The survey movement reached its climax in a very elaborate study which was made of the school system of Cleveland, Ohio. This survey was conducted under the financial auspices of the Cleveland Foundation and had as its director L. P. Ayres. The results of this survey are published in a series of 25 volumes, which covers in detail every aspect of school organization and classroom work. The Cleveland survey includes also a very full account of the industrial demand of the city of Cleveland and of the methods which should be adopted to train young people for their places in the industrial activities of the city.

Other Surveys. Surveys similar to those just mentioned have been recently made in hundreds of school systems. Some of these have been state surveys such as those of California, Maryland, New York, Texas, Virginia, Washington, and West Virginia. Most of them, however, have been of local school systems and of colleges. Among the better known of the more recent surveys of local school systems are those of Boston, Chicago, Cincinnati, Los Angeles, Minneapolis, Montgomery County (Ohio), Pittsburgh, and St. Louis. Among the better known of the college surveys are those of the University of Chicago and of the land-grant colleges of the United States, the latter having been conducted by the U. S. office of education.

Survey Agencies. The school surveys have been made by various agencies. Most of them have been made by university professors. The unquestioned leader in this work has been Professor George D. Strayer of Columbia University who has directed more than 100 surveys of local and state school systems. Certain state departments of education and the United States office of education have also made surveys.

BUREAUS OF RESEARCH

Finally, it is becoming common for school systems to provide themselves with agencies that can make continuous studies of their school operations. Many of the leading school systems of the country now have such bureaus of investigation.

All these indications of the mature application of the science of education make it certain that the preliminary stages of this movement have passed, and that the schools of the country will from this time on depend increasingly on scientific methods for the determination of their efficiency. A striking example of the use of scientific methods in administering a school system can be found in the city of Detroit, where the whole supervisory scheme is based on systematic tests, and where the organization of the classes in the schools is controlled by the measurements made by a department of research.

STUDIES OF THE CURRICULUM

A review of the development of the science of education would not be complete without indicating some of the newer lines of inquiry which in recent years have been pushed forward. The most productive of these relate to the curriculum of the schools. For a long time the courses administered in schools of all grades have simply followed traditions. Additions have, indeed, been made to the older curriculum, but these additions have come very slowly and they have not changed the essential character of the fundamental courses. There have been changes also in the fundamental courses, but these have been in the nature of slight revisions here and there, rather than radical reconstructions of the whole course.

In recent years, it has become apparent that a very large body of new instructional material must be put into the schools. The changes in social and industrial life, which have come with expanding civilization, require training of the young people of the country in lines which were never thought of when the school course was first laid down. The question immediately arises, under these conditions, as to what new subjects are most urgently demanded and how the time can be found for inserting them into the school program. Obviously, revision of the older courses must involve an elimination of any material which is not essential to a complete education. Additional material of value must be found. Studies of the curriculum have aimed, therefore, to discover what parts of existing courses may be dispensed with and what new material must be added in order to make the school serviceable to the modern community.

The methods which have been employed can be illustrated as follows: For the purpose of discovering what topics should be emphasized in geography, newspapers and periodicals have been carefully scanned with a view to determining those places in the world with which the public of today is most concerned. It is evident, for example, that the people of the United States must have some knowledge of the geography of the countries with which they carry on commercial relations. It is more important that the young people of this country know intimately about South America and the Orient than that they be fully informed about the interior of Africa.

JOB ANALYSIS

Another type of study which is common is described by the term "job analysis." The children who go out of the schools must be prepared, as far as the school can prepare them, for the activities of life. If a boy is to become a salesman or a printer, the training which is given him during the last few years of his schooling ought to be intelligently directed toward these activities. This will be possible only if the actual demands of these activities are fully understood. Various educational agencies, therefore, have attempted to analyze the demands made upon the printer and the salesman. Careful tabulations of the daily routine of these and other occupations are undertaken, and in the light of these tabulations an effort is made to determine exactly what knowledge of a literary and scientific sort will best prepare one to deal with these demands.

This method of job analysis has suggested that schools include in their training much material which has been overlooked or ignored. For example, it is perfectly clear that the salesman must know how to meet people in such a way as to get their attention. The school has not ordinarily attempted to deal with such social matters and has nowhere in its curriculum provided for training in social leadership. The modern school is beginning to realize that success in life may depend upon direct emphasis on personal and social qualities, quite as much as on spelling, arithmetic, and literature.

THE SCIENCE OF EDUCATION AND EDUCATIONAL REORGANIZATION

Enough of the scientific movement in education has been described to justify the assertion that schools in the United States are in process of constructive reorganization under the guidance of scientific investigators. The defects and virtues of the American educational system are being demonstrated by exact methods, and significant improvements are being introduced at a rate never before equaled in the history of schools.

MODERN SCHOOL SYSTEMS OF FOREIGN COUNTRIES

EDUCATION IN GERMANY

THE school system of Germany has had four periods of development. The first period extends from the Napoleonic wars (1800–15) to the close of World War I in 1918. During this time the *Volksschule*, the *Gymnasium*, and the university were the major developments. The *Volksschule* was an eight year school for the laboring classes. This school was for children 6 to 14 years of age and was free to all. It was followed by a three year continuation school. The *Gymnasium* was a nine year classical school for pupils 9 to 18 years of age, largely of the upper classes. Similar to the *Gymnasium* in organization were the *Realgymnasium* and the *Oberrealschule* which were developed during the latter part of the period in response to a demand for more emphasis on modern languages and science. The first three years preparatory to entering these upper class schools were done in a separate elementary school known as the *Vorschule*. During this period the universities of Germany became world famous, and many graduate students from the United States and other countries attended them.

Period of the Republic. This, the second period, extends from the close of World War I to the coming to power of Adolph Hitler in 1933. During this period the most important school changes were (1) the establishment of an elementary school (*Grundschule*) for all children between the ages of 6 and 10; (2) the reforming of instruction in the upper years (10-14) of the *Volksschule*; and (3) the reform in the training of teachers.

Period of Hitler. The third period is that under Hitler from 1933 to the defeat of Germany in World War II in 1945. Although the structure of the school system did not change much during this period, the curriculum and teaching methods were radically changed. Hitler's *Mein Kampf* was widely used as a text, and the school system became a blatant instrument of propaganda for the Nazi party. Academic freedom was dead during this sad period.

Period After Hitler. The fourth period began with the allied occupation of Germany after her military debacle. During their occupation the allied powers took steps to eliminate all Nazi materials and employees from the schools. All Nazi textbooks were ordered destroyed and more democratic ones procured.

Grundschule. As was stated above, this is a four year school for beginners, and all children attend it. It takes the place of the first four years of the old *Volksschule* and also of the preparatory work of the secondary schools. In it, pupils learn the three "R's" and some of the better German culture. This school, provided by the Weimer Constitution of 1919, was an attempt to lessen the gap between the classes. It has practically eliminated illiteracy.

Secondary Schools. These schools admit pupils after they have had the four years of preparation provided by the *Grundschule*. They are tuition schools, and less than 15 per cent of the German youth attend them. The great majority of pupils continue their education from four to six years in the old *Volksschule* or in some type of *Mittleschule*, in which, in turn, they prepare for the vocational schools. In these vocational schools the pupils complete the thirteenth year of education at about the age of nineteen.

For those select pupils who are preparing for the universities and the professions, there is ample provision through the *Gymnasium*, 466 in number, which is the traditional school with emphasis on the languages; the *Realgymnasium*, 686 in number, with emphasis on Latin and the modern languages; the *Oberrealschule*, 319 in number, dedicated largely to mathematics and science with some emphasis on modern languages; and the *Deutsche Oberschule*, 70 in number, with a curriculum devoted largely to German culture and the arts. In recent years, all schools give some emphasis to German culture. During the 19th century the *Gymnasium* was by far the most important of these schools. In recent decades, however, these traditional classical schools have been giving away more and more to the modern schools with emphasis on science and social studies. These secondary schools are nine year institutions, beginning with the fifth grade. Their work is thus more advanced than that of the secondary school in the United States. While there are some provisions for pupils to pass from the *Volksschule* to these other secondary schools, only a small per cent of the pupils in these higher schools are from the working classes.

It may be noted that in the *Gymnasium* the study of Latin begins in the first year and continues throughout the curriculum of the *Gymnasium*, so that in the aggregate a pupil spends 68 year-hours in the study of this language. The result of this intensive study of Latin is that the average graduate of the *Gymnasium* is able to read any Latin text with ease. As compared with American institutions, these higher schools in Germany secure much more efficient results of the type just described than are secured in American colleges or universities, even among most students who specialize in the classical languages. The advantages of early specialization and continued study of a given subject are thus secured in full measure.

It is the universal attitude of the teachers in the higher institutions in Germany that the training which they give is much superior to that which is given in the American high school. On the other hand, it is to be pointed out that the breadth of training which is given in the *Gymnasium* is relatively less than the breadth of training given in an American school. For example, the opportunities for the study of general history are very slight. So also are the opportunities for the study of natural science. The curriculum of the *Gymnasium* is heavily loaded on the literary side, and, while it is intensive, it is lacking in the possibilities of general training.

The American high school, by contrast, aims at the cultivation of many different kinds of interests on the part of students. The adoption of the elective system in American high schools is in striking comparison with the rigidity of curriculum exhibited in the *Gymnasium*.

Universities. There are 25 German universities. Enrollment of students in 1933 was 88,298 and, in 1935, was 68,148. About 16 per cent of these are women. Of the total enrollment, not more than 4 per cent were from the working classes. In 1934, only 4700 new students were admitted to the universities, of whom 700 were women. No Jews were admitted. Restriction on admissions is motivated by considerations of the difficulty in finding employment. University admission is based on examination on the part of graduates from the *Gymnasium* or other schools of the same level. Universities in Germany are research and professional institutions, not groups of colleges as in England.

The method of instruction is the lecture method. The degree granted by these institutions is that of doctor of philosophy. Commonly, such a degree may be taken by a student only after three years of residence, and very frequently a German student takes a much longer period to complete the work for the degree. It is the habit of the German student to migrate from institution to institution, spending a semester in each of a number of the leading universities, thus coming in contact with the prominent lecturers in the different institutions and fields.

The German student life is relatively free from restrictions. The university has complete jurisdiction over its students. A regular university court

adjusts all matters of student discipline, and the student is answerable not to the city police but to the university court, it being assumed that as a non-resident of the city he is under the jurisdiction of the university rather than of the municipality.

The universities are maintained by royal grants, by student fees, and by appropriation from the state. An instructor receives a certain fee for each student who registers in his courses.

The University Professor. The German university professor is socially of the highest rank. In many instances the rulers of Germany have decorated professors with civic honors. Their salaries are superior to those of any except the governmental officials of highest rank. There is a long period of apprenticeship before the professor can secure his appointment. He is first allowed to give lectures in the university in a capacity which is almost purely private. The title which attaches to his position at that stage is *Privatdocent.* If the young instructor is successful in his lectures at this level, he may be appointed to an assistant professorship, as it would be called in America. Ultimately, from this level he may be advanced to a full professorship.

The universities of Germany have no officer corresponding to the president of an American college. The academic professors meet from year to year and recommend three of their number from whom the Ministry of Education appoints a *rector.* The duties of this *rector,* however, are not at all those of the American college president; he is merely a temporary representative of the academic group without authority over them.

Landjahr. One of the first acts of the Nazi party was to create in 1934 an organization known as the *Landjahr.* The organization was an outgrowth of the Youth Movement founded in 1898, and under Hitler and his Nazi régime it became an effective instrument for molding in the Nazi pattern the attitude of German youth. The 1934 regulation creating the organization provided that all youth in the industrial cities who had completed eight years of elementary schooling must spend the next nine months in the rural districts. The youth were required to make contacts with the land, to learn to work, to see how people live in the country, to obtain physical training, and above all to become enthusiastic Nazis. Persons who spent this period in the organization were given preference when applying for admission to the universities. Most of them, however, found positions or were drafted into the armed services, and did not enter a university. Soon after the beginning of World War II in 1939, the organization was abandoned. It had, however, served a Nazi purpose.

Coeducation. The sexes in Germany attend kindergarten together, and, to a degree, the university. In other schools, as a rule, the sexes are separated. By far the majority of the students in the secondary schools and the universities are men, but the percentage of women students is slowly increasing.

The Training of Teachers. Germany was one of the first countries to require professional training for teachers. In amount of training, its secondary school teachers have for several decades led the world. Most secondary school teachers possess the Ph.D. degree or the equivalent. The elementary school teachers have had between two and three years of training, which is similar in amount to that of the typical teacher in the elementary schools of the United States. The secondary school teachers receive larger pay and have higher social standing than the elementary school teachers. As in the schools of the United States, the elementary school teachers have been struggling for professional and financial equality in comparison with the secondary school teachers. Their efforts have been rewarded but not to the extent that similar efforts in the United States have been rewarded.

Administration. The German system of schools is decentralized; that is, administered and supported largely by the provinces or local states. Local autonomy was almost complete till the coming of the Nazis into power in 1933. Although this status continued to some degree during the Nazi régime, extensive supervisory power was given to the Central government. In control of this supervisory power, Hitler was enabled to change the entire philosophy of German education, to modify the curriculum, and to control the training, the appointment, the promotion, and even the thinking of the teachers. He brought the universities under his supervision, and practically extinguished academic freedom, which has been the historic pride of great universities everywhere.

The Curriculum. In his *Mein Kampf,* Hitler gave specific suggestions for the new curriculum for the schools. In his totalitarian state, which was Germany during this régime, the schools were to be used to indoctrinate the youth concerning the Nazi policies. The following statement summarizes his views on how history was to be taught:

History in the German schools need not be greatly concerned about world attitudes and other nations. More attention must be given to German history. Tacitus was misinformed about the low cultural level of the early Germans. The Nordics have been most important in history. The Germans are pure Nordics. Propaganda and education go hand in hand. History is to be taught to discredit the Republic and to extol the Nazis. It is to be taught not impartially as a part of world history, but as German history.

Such views took firm hold of the German people, and the allied armies of occupation are not finding it easy to supplant the views with democratic ones. They are, however, making progress in these efforts, and it is believed that eventually a democratic school system will serve a German republic.

EDUCATION IN FRANCE

The French school system consists of two distinct branches. The *école primaire* is the common school, and in it attendance is compulsory for all pupils to the thirteenth or fourteenth year. The subjects taught are history, geography, grammar, arithmetic, literature, drawing, manual training, and physical education. Enrollment in this school at present is approximately 5,000,000, of which about 20 per cent attend private schools. The *école primaire* may be followed in the case of the brighter children by the *école supérieur.* At present, about 5 per cent of the children continue their studies in these superior schools. The number of, and the attendance at, these schools has grown rapidly during recent years.

Secularization of Schools. There is one striking characteristic in which the French public schools differ from those of Germany. The French schools do not teach religion. Formerly the Church was dominant in the public schools of France as it was throughout Europe. After many struggles a law was passed in 1881, secularizing the French schools and substituting training in civics and morals for the earlier courses in religion. In 1886 a law was passed providing that no clerical teachers shall give instructions in the common schools. In 1904, teaching by the clerical congregations was suppressed, and public schools were substituted for those which had been controlled by the Church. The laws thus successively enacted provide that no teacher shall deal with religious matters.

Lycées, Collèges, and Universities. The higher schools of France include the *lycées,* the *collèges* scattered throughout the country, and the universities, chief among which is the University of Paris.

The curriculum of the *lycée* is the traditional classical curriculum, and leads to the baccalaureate degree, which corresponds roughly to the American bachelor's degree. Lately a scientific course, corresponding to that of the *Realschule* of Germany, has been organized in some of the *lycées.* About

5 per cent of the population 11 to 18 years in age attend secondary schools. Approximately 150,000 attend the Catholic schools. The *Lycées for Girls* had an enrollment of 48,046 in 1935.

At the colleges, and more especially at the universities, instruction is made easily accessible to all comers. The method is that of the lecture. A great many students attend these lectures without attempting to secure any degree. The degree of doctor of philosophy conferred by the French universities is a higher degree than the degree of the same name conferred by the German universities. Indeed, before the World War, it was so difficult for a foreign student to qualify for this degree that very few such students were to be found in the French universities. Since the War, however, an effort has been made on the part of the French universities to interest foreign students in attendance at French institutions, and certain degrees have been provided with a view to accommodating foreign students to the French system of higher education. There are 17 of these universities in France, of which 5 are Catholic. The total enrollment in 1936 was nearly 100,000.

Control. The control of the French educational system is vested in a ministry of the central government. This minister of education prescribes in great detail the courses of study and the form of organization of all the institutions. Support of the lower schools is secured from taxation, while the support of the higher schools is derived very largely from student fees.

The Training of Teachers. In each so-called department or subdivision of the French state, there is a normal school for the training of boys and another for the training of girls who are to enter the teaching profession in the lower schools. Progress through one of these schools is dependent upon the success of the candidate in passing competitive examinations. Positions in the teaching profession are eagerly sought after, as they are permanent when once they are secured, and at the end of his professional career the teacher receives a pension for life.

The Training of Teachers for Higher Institutions. The normal school method of training teachers has been carried by France into its higher educational system. There is a special advanced school for those who are to teach in the *lycées* and in the *collèges*. Here the higher subjects of instruction are taught. This advanced normal school now has connection with the University of Paris.

Vocational Education. Attendance at vocational schools is nominally compulsory for part time. Since the World War, attendance has increased very rapidly. Enrollment in 1935 was 240,982.

Private Resources of the Universities. The law of 1896 gave the universities the rights of civil persons, that is, the right of accepting gifts and legacies, of holding private property, and of administering it without restrictions. Each university has a budget in which are included the receipts from fees for courses, from registration, and from library and laboratory fees paid by the students in accordance with the regulations. The income from this source may be spent on the following objects: expenses for laboratories, libraries, and collections; erection and maintenance of buildings; establishment of new courses; grants in the interest of students, as, for example, subsidies to student associations. The French universities have not, up to the present time, met with such generous donors as those of the American universities. A good beginning, however, has been made, and at the University of Paris the names of benefactors are inscribed on a marble tablet; while Lyon, Montpellier, Bordeaux, and others have also received important gifts.

ENGLISH EDUCATIONAL SYSTEM

Education in England is much less compactly organized than in France and Germany. England has followed the theory of individual freedom expressed by John Stuart Mill in 1859, which has resulted in a system of education that has three marked characteristics: namely, (a) decentralization of responsibility and control, (b) the use of voluntary agencies in making provision for educational opportunities, and (c) marked freedom of the school administrators and teachers in matters relating to curricula, courses of study, and methods of teaching.

Ministry of Education. Historically, the United Kingdom consists of four distinct national units, England, Wales, Scotland, and Northern Ireland. Administratively, England and Wales comprise one unit and there are accordingly three distinct educational administrative systems in the United Kingdom. The Ministry of Education in London has no authority in Scotland, where the Scottish Educational Department is the appropriate department, and Northern Ireland has its own Ministry of Education.

The Ministry of Education in England, which displaced the old Board of Education, operates through its inspectors, whose headquarters are located in the areas wherein their work lies. The central authority is concerned chiefly with external features of the school rather than with internal matters, and, although their authority is final in some cases, there is a marked degree of local autonomy.

In the absence of a strongly centralized educational system, numerous voluntary agencies, including philanthropic societies, church organizations, and private enterprises of various kinds, supply educational facilities for the youth of England. This has given rise to "vested interests," whose contributions to the educational traditions of England must be reckoned with in any study of the educational system.

The administrators and teachers generally enjoy an unusual degree of freedom within their institutions. Teachers are not civil servants, that is, they are not servants of the state. They are employed and paid by the local authorities, and are subject to them rather than to the Ministry of Education. The latter serves only in an inspecting and advisory capacity. This practice, however, is gradually producing greater homogeneity among the schools of England.

Elementary Schools. School attendance is compulsory in England from the ages of 5 to 14 years. Two types of public elementary schools provide the necessary educational facilities for the children who come within these age limits. The first of these two types of schools are those provided by the local educational authorities and are called *Provided schools*, or *Council schools*, since they are provided by the local councils. The second type of public elementary school is provided by voluntary groups, such as the Church of England or the Roman Catholic Church. Such schools are therefore called *Voluntary schools*.

There are no official figures on the number of pupils in the private and independent schools, but in England and Wales there are some 10,000 Provided or Council schools, and about 11,000 Voluntary schools. Provided schools enroll about three times as many pupils as do the Voluntary schools.

Both these types of public elementary schools, or such of them as are recognized by the Ministry of Education, are maintained by the local educational authorities. "Maintenance" includes salaries for teachers, books, supplies, and equipment, whether the school be Provided or Voluntary. Voluntary bodies must supply their own buildings and keep them in repair, but if they accept public grants for maintenance, they must submit to inspection by the Board of Education.

Teachers for the Provided schools are appointed by the local educational authorities. Those for the Voluntary schools are appointed by the voluntary bodies, subject to the approval of the local authorities. The latter may disapprove of a teacher only on educational grounds, however.

Religious instruction is given in all public elementary schools. In the provided schools this instruction must be non-sectarian. In the voluntary schools it conforms to the religious beliefs of the body providing the school.

Stages in Elementary Schools. Public elementary education in England has long been divided into three stages: the infant stage (from 5 to about 7 or 8 years of age), the junior stage (from 7 or 8 to about 11 years of age), and the senior stage (from about 11 to 14 years of age). Sometimes these three groups have separate schools, especially those in the junior and senior groups, but occasionally they are all grouped together in one school. The latter is particularly likely to occur where the population is sparse.

Since 1926 the organization of public elementary education in England has been undergoing reorganization into primary (from 5 to about 11 years of age), and post-primary (11 to 14 years of age). The object of this reorganization is to make the post-primary schools meet the needs of the older children more adequately than those needs have been met in the past. This has given rise to new types of advanced public elementary schools. The reorganization is not yet complete throughout England.

Nursery school facilities are provided extensively by both public educational authorities and private or voluntary bodies. Such schools care for children between 2 and 5 years of age. Sometimes these provisions for nursery school education are attached to regular elementary schools; sometimes they consist of separate schools.

Secondary Schools. In the main, secondary schools of England provide a general education, i.e., non-vocational, to children from about 11 to 17 or more years of age. Secondary schools are of various types, among which may be included the so-called Public Schools, (Eton, Harrow, Winchester, Rugby, and others), Grammar Schools, County Schools, and Private Schools. Private schools do not participate in public funds, but other types of secondary schools *may* do so. Those which accept state grants are subject to inspection by the Ministry of Education. Many of these secondary schools are not open to girls, the latter having secondary schools of their own. The 1757 secondary schools of England and Wales inspected by the Ministry of Education enroll approximately 500,000 pupils. The uninspected secondary schools are thought to number about 9,000, with approximately 300,000 pupils.

Vocational Education. England provides a wide variety of opportunity for students wishing to specialize in particular vocational or technical school. Hence there are numerous technical, commercial, and art schools and colleges especially designed to meet this need. These schools enroll approximately one million students annually.

Adult Education. The movement for adult education began with university extension lectures at Cambridge in 1873. Since that time the movement has swept throughout England and is today furnishing thousands of classes for adults by means of universities and university colleges, voluntary organizations, local educational authorities, collegiate and other institutions, and charitable trusts.

The Examination System. The higher educational system of England is not as exclusive as the systems on the continent. England is unique in the fact that it has a system of examinations by which children who are especially competent and who have taken their lower training in the common, or board, schools may transfer, when ten years of age or older, to the secondary schools.

In this way England has succeeded in recruiting its upper classes from the lower levels of society much more liberally than have any of the other European nations. It is the pride of England that its civil service officers are drawn from all levels of society, and this fact is to be explained by the examination system just described. Matthew Arnold (1822–88), who was a school inspector, gave a name to this examination system which is commonly used everywhere in England. He called it the "educational ladder."

Municipal Secondary Schools and Universities. In recent years there has developed very rapidly in the great industrial cities of England a series of schools known as "municipal secondary schools" and "municipal universities." These institutions differ from the older secondary schools and universities in the fact that they lay much greater stress on the physical sciences and the practical engineering subjects. There has come up accordingly a sharp cleavage between the older classical type of training and the newer scientific type represented by these newer institutions.

Oxford (1110 or 1120?) and Cambridge (1229). At the head of the conservative type of higher education are the two great universities, Oxford and Cambridge. Both these universities were established in the medieval period, and are made up of separate colleges. These separate colleges can be traced back to religious orders. The whole organization can be understood by observing that the English university is an assemblage of living quarters or fraternity houses that have descended from the religious communities which originally established many of the colleges. As time went on, new colleges were established and endowed by wealthy patrons, some of them royal personages. The English university system thus provides for an intimate social life on the part of its students. The lectures which are conducted in these institutions are not regarded as the major contribution to the student's training. A tutorial system has gradually been evolved, which provides for each undergraduate the opportunity to associate intimately with a tutor who guides the student's readings and who engages him in discussions of what he has read. The student attends such lectures as interest him, but in the main his business is to read and to work independently in the field of his choice under the supervision and partial guidance of his tutor.

The result of this system is that a great many boys attend Oxford and Cambridge with no intention of studious effort. They go to the college merely for the purpose of spending a few years of their youth in pleasant intellectual surroundings. For these young men the college has a so-called "pass" course. On the other hand, those students who devote themselves to strenuous intellectual effort take what is known as the "honors" course. The examinations in these courses are very rigid, and the standards are so high that only a well trained specialist can complete the course.

The Rhodes Trust was founded in 1902 by Cecil Rhodes to provide scholarships to Oxford for 66 men annually. Thirty-two of these are selected from the United States. The Yearbook of Education, 1937, lists seventeen other large educational trusts in England and Scotland.

Examining Universities. There are also in England certain examining institutions. Thus the University of London is not altogether a teaching institution; it awards degrees to candidates who present themselves for examination after independent study in some particular field.

The Fisher Act. During World War I, English enthusiasm for a more liberal type of education ran very high, and there was enacted into the law by the British Parliament an educational code known as the Fisher act. This code provided that every child in Great Britain should be under the supervision of the Ministry of Education until the age of 18 years. The ministry was empowered to develop certain forms of industrial education for many of the pupils and to supervise the employment of all those children less than 18 years of age who were taken into the industries of Great Britain.

The plan laid down in the Fisher act has never been put into actual operation. The costs were found to be too great, and a commission which canvassed the matter reported that it would not be possible under economic conditions then prevailing to begin operating under the act. In 1929 Parliament took action increasing the age of compulsory education to 15 years, thus proceeding with the Fisher program.

Training of Teachers in England. England has numerous institutions for the training of teachers for the lower schools. These institutions are known as teacher training colleges. They are maintained in part by the localities in which they are situated, and in part by grants made by the central board of education for the maintenance of the individual students who are taking the courses.

New Education Bill. In 1944, Parliament enacted a new Education bill which reconstructed the whole system of public education in England and Wales. By this bill the school-leaving age was raised to 16 in 1947. The previous distinction between elementary education, which was compulsory for all, and secondary education, which was limited to pupils who could pass an entrance examination, was abolished. The school system was reorganized into three continuous parts—Primary, Secondary, and Further. In addition to these three parts, nursery schools were to be established by all local education authorities where there is sufficient demand. Attendance at these nursery schools, however, is not made compulsory.

The primary stage remains much as formerly, and includes children between the ages of 5 and 11. Secondary education is available to a much larger number of children and in a larger number of forms for children of various aptitudes.

The term "further education" includes university courses of all types, adult education, and compulsory part-time schooling for boys and girls under 18 who are no longer obtaining full-time instruction. The part-time instruction is given in new "Young People's Colleges," which are organized by local school authorities, and at which instruction is compulsory for at least 44 days in every year. In these colleges, the facilities for technical education are greatly increased.

Although England was already a leader in its provisions for pupil welfare, the new Education bill greatly extends such provisions. The provision for special education for the physically and mentally handicapped is enlarged. And provisions for religious instruction—denominational or undenominational—are made in all schools. In all primary and secondary schools the school day begins with worship. Schools containing pupils with various denominations follow an "Agreed Syllabus" in their religious instruction.

It is worthy of note that England enacted this legislation in 1944, during the dark days of World War II. By so doing she indicated to the whole world the importance of education. And she taxed herself more severely to meet the added cost entailed by the legislation.

RUSSIAN EDUCATIONAL SYSTEM

Education in Russia is a state monopoly. There are no church or private schools. Each of the sixteen republics which make up the U.S.S.R. has its own ministries of education, but these are subordinate to the central ministries which control education throughout the country.

Since 1946 there have been two central or federal ministries—the Ministry of Higher Education and the Ministry of Labor Reserves. The former controls and supervises all institutions of higher education, the universities and higher institutes, and all specialized secondary schools, the technicums and teachers' institutes. With the exception of those for the training of teachers, which are maintained by the republics, the universities and the higher technical and agricultural establishments are maintained by the Ministry of Higher Education.

The other central authority, the Ministry of Labor Reserves, controls all lower vocational education, including factory schools, but does not maintain them.

The local authorities are charged with the maintainance of pre-school institutions, primary and general secondary schools, and with adult education. The latest available statistics show that 60 per cent of educational expenditures are paid for by the local authorities, 19 per cent by the republics, and 23 per cent by the central government.

The educational system of Russia comprises the following types of schools: elementary schools, secondary schools, colleges, technical schools, workers' schools, and apprentice schools. Compulsory education extends from the age of 7 to 15, but is universally enforced only for ages 7 or 8 to 12. Kindergartens are provided for children of 3 to 7 but attendance is not compulsory, and only about 6 per cent of children attend.

Organization. In modern Russia the school system is uniform throughout the country. Education is directed toward service to the state. All nationalities are permitted to use their mother tongue as a medium of instruction in their schools, but the Russian language is compulsory as the secondary language in all non-Russian schools. Public instruction everywhere is secular.

A few pre-school institutions and those for adult education are maintained by trade unions, cooperatives, and collective farms, but they are under the strict control and supervision of public authorities. Primary schools are provided for all, and attendance is compulsory. Schools for the Liquidation of Illiteracy are provided for adults. Great numbers of advanced students assist in the work of these schools as a part of their service to the state.

On the secondary level, in addition to a wide system of secondary schools, are technical schools and "Workers' Faculties." The Workers' Faculties, called Rabfacs, were organized to give systematic preparation to experienced workers who were not ready for regular college work. On the higher levels, not only are there no tuition fees, but the students are supported, and, after graduation, employment is assured. Schools are open to all classes, and 75 per cent of students in the higher schools belong to the working classes. The average age of Russian students is higher than in Western Europe and the United States.

COMPARATIVE EDUCATION

The United Nations Educational, Scientific, and Cultural Organization (Unesco) is entrusted with the task of promoting the advancement of education throughout the world. In its efforts to fulfill this mission, Unesco has included in its program various provisions for the exchange of information about educational methods, activities, and achievements in different countries.

Comparative education, it points out, is a relatively new branch of the science of education which attempts to study educational conditions in different countries, so that increased understanding of those conditions and developments may stimulate and contribute to the general improvement of education in all countries.

"Educational concepts and movements," it goes on to say in its recent publication *World Handbook of Educational Organization and Statistics*," though often characteristically national, have a way of traveling across frontiers. This process is as old as the history of education. Plato's ideas on education, originating in ancient Athens, are today a part of the universal heritage of mankind. So are also, in proportion to their recent origin, the educational theories of John Dewey growing out of the contemporary needs of American life. In the intervening 2400 years the amount of mutual borrowing

CENTRALIZATION IN FOREIGN SCHOOL SYSTEMS

Country	Financial Support in Percentages	
	Central	Local
Centralized		
Belgium	75	25
France	77	23
Italy	70	30
Spain	85	15
Rumania	85	15
Poland	83	17
Yugoslavia	70	30
Decentralized		
Denmark	51	49
Germany	50	50
England	51	49
Austria	25	75
Czechoslovakia	46	54
Hungary	50	50
Bulgaria	40	60

has been so extensive that no treatise on the history of education has yet done full justice to it."

In some cases this educational exchange has taken the form of wholesale copying of methods of organization, of courses of study, of school programs, and even of text books. Unesco notes that students of comparative education rightly look with suspicion at wholesale borrowing and adoption by one country of the ideas and methods developed in another, because educational theories and practices develop as the result of the needs of the country where they originate, and there is danger that they may, to a greater or lesser degree, be unsuited to the country which adopts them.

In view of the prevalence of the practice, however, Unesco saw the needs for international statistics relating to the study of comparative education, but encountered difficulties in collecting up-to-date and reliable data for the intelligent appraisal of the educational conditions and achievements of different countries. While such statistics have become increasingly available through the efforts of national and international agencies, they are still unsatisfactory.

International Statistics. "The development of educational statistics," Unesco states, "has lagged far behind the statistics in other fields. The reasons for this are not hard to find. In the first place the regular collection and publication of statistics on a national scale has been a matter of slow and uneven growth in most countries. Subjects of more immediate need and tangible value, such as figures relating to territory and population, births and deaths, agricultural and industrial production, domestic and foreign trade, prices, wages and the cost of living are usually dealt with first. Statistics on education, public health, and other social services are either left out altogether, or prepared in a very rudimentary and summary form."

In the next place, Unesco proceeds to point out, education in many countries is still in the hands of local authorities or is a matter of private enterprise. Accordingly, except in those countries where there is a high degree of centralized control over education, the national government often finds itself unable to collect complete statistical information from all local or private schools. For this reason, even the most diligent efforts of the central administrations frequently fail to meet the most elementary requirements of completeness, recency, and comparability.

"Finally," Unesco concludes, "educational ideas and methods, though susceptible of international exchange, cannot always be reduced to quantitative expression. On the other hand, such quantitative data as numbers of schools, teachers, and pupils are not suitable for direct international exchange. International requirements for the exchange of currency or commodities, for example, create a direct demand for such statistics on the international level. They even impose a certain degree of uniformity or comparability on the nationally collected statistics. But the need for international exchange of educational ideas and methods is only partially and indirectly met by the collection of statistics. Hence there is not the same sense of urgency regarding their international collection or standardization.

"Thus far, the attempts of international organizations to obtain the desirable statistics on education for international collections have often run far ahead of the actual availability of such statistics."

AMERICAN AND FOREIGN SCHOOLS

A tremendous movement toward the education of the masses has been in operation for many years in practically every country of the world, but progress has been most marked during the past few decades. The movement has been greatly stimulated by the adoption of school attendance laws and by a progressively better enforcement of those laws.

On the elementary level, most countries now have compulsory education. On the secondary level, the United States was formerly the one country in which almost universal opportunity for education existed, but the situation has changed, and the country which does not provide secondary schooling is exceptional. On the college level, the United States still leads the world.

TOTAL POPULATION AND PUPILS ENROLLED IN AND ATTENDING PUBLIC, ELEMENTARY AND SECONDARY SCHOOLS IN CONTINENTAL UNITED STATES, 1910-1950

Item	1910	1920		1930		1940		1950	
	Number of Persons	Number of Persons	Per cent Increase from 1910	Number of Persons	Per cent Increase from 1920	Number of Persons	Per cent Increase (Decrease) from 1930	Number of Persons	Per cent Increase (Decrease) from 1940
Total Population	91,972,266	105,710,620	14.9	122,775,046	16.1	131,891,632	7.4	150,697,361	14.3
Pupils Enrolled	17,813,852	21,578,316	21.1	25,678,015	19.0	25,433,542	−1.0	25,111,433	−1.2
Pupils in Average Daily Attendance	12,827,307	16,150,035	25.9	21,264,886	31.7	22,042,151	3.7	22,288,985	1.1

COMPULSORY SCHOOL ATTENDANCE LAWS

States	Date of First Enactment	Present Age Limits	Minimum Period of Compulsory Attendance	No. Days Schools in Session, 1939-40	Average Days Attended by Each Pupil	No. Attending Daily for Each 100 Enrolled.	Median Grade (n)
United States				175.0	151.7	86.7	8.4
Alabama	1915	7–16	Full school year	153.5	126.7	82.5	7.1
Arizona	(a) 1899	8–16	Full school year	168.9	135.5	80.2	8.6
Arkansas	1909	7–16	100 days	158.6	127.2	80.2	7.5
California	1874	8–16	Full school year	176.6	157.0	88.9	9.9
Colorado	(a) 1889	8–16	Full school year	171.9	154.7	90.0	8.9
Connecticut	(a) 1872	7–16	Full school year	183.1	166.7	91.2	8.5
Delaware	1907	7–17	Full school year (b)	182.1	162.6	89.1	8.5
District of Columbia	1864	7–16	Full school year	178.8	154.0	86.1	10.3
Florida	1915	7–16	Full school year	167.5	148.2	88.5	8.3
Georgia	1916	8–14	120 days	162.2	128.3	79.1	7.1
Idaho	(a) 1887	(c) 8–18	Full school year	174.5	152.8	87.6	8.9
Illinois	1883	7–16	Full school year	184.6	161.5	87.5	8.5
Indiana	(a) 1897	7–16	Full school year	170.0	149.4	87.9	7.7
Iowa	1902	7–16	120 days	176.6	153.1	86.7	8.7
Kansas	1874	7–16	Full school year	172.4	151.6	81.9	8.7
Kentucky	1896	7–16	Full school year	159.1	129.9	81.6	7.7
Louisiana	1910	7-14	140 days	169.0	142.2	84.2	6.6
Maine	(a) 1875	(d) 7–17	Full school year	177.7	161.4	90.8	8.9
Maryland	1902	7–16	Full school year	187.6	167.9	89.5	8.0
Massachusetts	(a) 1852	7–16	Full school year	179.7	161.5	89.9	9.0
Michigan	1871	7–16	Full school year	183.0	162.5	88.8	8.6
Minnesota	1885	8–16	Full school year	172.8	153.9	88.7	8.5
Mississippi (e)	1918	7–17	80 days	145.7	116.1	79.7	7.1
Missouri	1905	7–16	Full school year	179.1	153.2	85.5	8.3
Montana	1883	8–16	Full school year	171.8	157.5	91.7	8.7
Nebraska	1887	7–16	120 days (f)	176.0	154.8	87.8	8.8
Nevada	(a) 1873	(g) 7–18	Full school year	174.1	149.5	85.9	9.6
New Hampshire	(a) 1871	8–16	Full school year	176.2	156.8	89.0	8.1
New Jersey	1875	7–16	Full school year	185.2	164.0	88.6	8.4
New Mexico	(a) 1891	6–16	Full school year	175.0	140.4	80.2	7.9
New York	1874	7–16	Full school year	184.3	158.8	86.2	8.4
North Carolina	1907	7–14	Full school year	164.3	146.5	89.1	7.4
North Dakota	1883	7–17	Full school year	172.7	154.2	89.3	8.3
Ohio	(a) 1877	(h) 6–18	Full school year	180.5	166.8	92.4	8.6
Oklahoma	1907	(i) 7–18	Two-thirds of school year	(j)175.6	(j)139.1	(j)79.3	8.4
Oregon	1889	7–16	Full school year	174.3	153.4	88.0	9.1
Pennsylvania	1895	8–17	Full school year	181.6	163.5	90.1	8.2
Rhode Island	1883	7–16	Full school year	180.0	157.4	87.4	8.3
South Carolina	1915	7–16	80 days	163.0	130.3	79.9	6.7
South Dakota	(a) 1883	7–16	Full school year	174.9	154.1	88.1	8.5
Tennessee	1905	7–16	Full school year	166.3	137.7	82.8	7.7
Texas	(a) 1915	7–16	120 days	171.9	144.4	84.0	8.5
Utah	1890	(k) 8–18	100 days (l)	174.8	158.5	90.7	10.2
Vermont	1867	8–16	170 days	179.2	155.8	86.9	8.8
Virginia	1908	7–15	Full school year	180.2	156.8	87.0	7.7
Washington	1871	8–16	Full school year	178.7	148.0	82.8	9.1
West Virginia	1897	7–16	Full school year	176.1	160.1	90.9	7.8
Wisconsin	1879	7–16	120 days (m)	180.3	164.1	91.0	8.3
Wyoming	1876	7–17	Full school year	176.7	148.5	84.0	9.2

(a) True date may be earlier than the one given.
(b) Children of 14, 15, and 16 years of age must attend 100 days if they have not completed the eighth grade.
(c) Liberal exemptions are granted to children over 15 years of age.
(d) If literate, 7–16.
(e) Four counties are released from the law.
(f) Full school year in cities.
(g) Children above 14 are exempt if they have completed the eighth grade or if their services are needed for themselves or their families.
(h) The lower age limit may be changed to 7 years by local school boards. Exemptions may be granted to children above 16 if they have completed the seventh grade, but part-time schooling is required of them.
(i) Exemptions for children over 16 who have completed course.
(j) For 1938.
(k) Exemption is granted to children over 14 years of age if lawfully employed, but part-time attendance is required of them.
(l) In cities, 150 days, of which 50 are required to be consecutive.
(m) Full school year in cities of the first class; 8 months in all other cities; 6 months in towns and villages.
(n) Median number of school years completed by persons 25 years of age and over.

EDUCATION IN THE UNITED STATES

THE PUBLIC SCHOOL SYSTEM

A DESCRIPTION of the public school system of the United States is difficult to give, because all institutions included within this system are under the control of the various states or of local units, and as a result there is great diversity of practice and standards. Some similarity of organization has resulted from the natural tendency to imitation, which leads a given institution to follow the example of similar institutions about it. Furthermore, the decisions of the courts have established a body of common school law which has tended in some measure to render uniform the practices of different communities. In the main, however, variability rather than uniformity is characteristic of American schools.

Absence of Federal Control. As has been pointed out in earlier sections, there is no central Federal control of schools in the United States. The Constitution makes no provision for participation by our Federal government in school activities. The result is that each of the states has gone its way without interference or supervision from the central government. The only way in which Federal authority has entered into educational matters is through subsidies of various forms, given either to the states or to particular types of institutions within a state.

THE STATE AND THE LOCAL DISTRICT

Within the states very large authority has been left to the local district. Originally the entire control of the school was in the hands of the local district. Even the definition of the boundary of the district was a matter of relatively little concern to the state as a whole, because in the early days communities were so distinct from one another that their boundaries were obvious and natural. It was only after the states came to be somewhat thickly populated that problems of school support and school efficiency which concerned the larger community began to arise and the states assumed the authority which belongs to them. We find, accordingly, that schools were at first controlled by local officers rather than by the sovereign state. The result is that the states seem of late to have taken away from the local districts rights which the latter had long exercised.

Authority of the State. The movement toward centralization of authority in state departments of education has in some cases created friction with communities which regard this modern policy as a usurpation of their rights. Constitutionally, there can be no doubt that the state has a right to prescribe to the local districts in any degree which it will. It may define the extent of the local district and may determine in all detail what shall be done within this district. While this is the constitutional right of the state, the practical fact, even today, is that the local district conducts its school in very large measure according to its own desires, and local officers often look upon state supervision as indefensible interference.

Certification of Teachers. A conspicuous illustration of increasing state control is to be seen in the matter of the certification of teachers. In the colonies and in the older states the community selected the teacher. The trustee or the committee of the district not only employed the teacher but determined whether the qualifications of a given candidate were satisfactory; in other words, the local officers licensed the teacher. When the states began to organize more compact school systems, it immediately became apparent that local districts are not competent to license teachers. The judgment of the trustee is frequently biased by purely personal considerations. The various states, therefore, gradually assumed more or less control in this matter.

Since the assumption of control has been gradual and partial, there are a great many different practices in different parts of the country. There are still local districts which virtually select their own teachers without any large degree of state supervision. In many other cases a unit smaller than the state but larger than the local district has the power of certification. Especially common is certification by the county superintendent. The general tendency, however, is to prescribe by state law the qualifications necessary for a license to teach, and to enforce the requirement through the state department of education.

The results of the older and looser system are present, however, on every hand. It has been estimated that not more than 20 per cent of the teachers of the United States have any professional training. Forty per cent or possibly more have had only a common school education. High school teachers are less definitely controlled by state law than are elementary school teachers. In short, the situation regarding teacher certification is only a little less chaotic than it was when local districts acted without state supervision.

Compulsory Attendance. In other respects, as well as in the employment of teachers, the state has found it necessary to assume control over the local districts. For example, the state has enacted compulsory attendance laws. This has been necessary because some districts are negligent and allow their children to grow up without proper schooling. When these children become adults, it is not the local district alone which suffers, but the whole commonwealth. The state can be economically and socially efficient only if its citizens are trained. The state, therefore, takes the local district and the family in hand and compels the education of all children.

The table on page 1664 shows the diversity of practice in different parts of the country in the matter of compulsory attendance legislation. Special attention is called to the dates at which the different states acted in this matter. No clearer example could be given of diversity of organization in the public school systems of this country.

State Departments of Education. Every state has now for its educational activity a chief executive officer, usually designated state superintendent or commissioner of education. In most of the states these officers are elected by popular vote along with the major state officers. In a number of states, they are appointed by the governors, and in others by the state board of education. In over three-fifths of the states the method of appointment is fixed by the state constitution and is consequently very little open to revision.

In several of the Western states, especially since women received the franchise, state superintendents have been women.

The state superintendent is frequently associated, in the execution of the duties of his office, with a state board of education. Most states have state boards, but a few do not. In several of the states there is a chancellor or commissioner whose duty it is to co-ordinate the work of the state superintendent with that of the officers in charge of the state institutions of higher learning.

State Participation in School Finance. The state always takes some share in the financial support of schools. Usually there is a state fund, derived from the sale of school lands or from certain forms of taxation, which is distributed to the local districts in proportion to the school population or as an incentive to the organization of some particular form of education, such as classes in agriculture or in physical culture. In some cases, the state provides a very considerable proportion of the total expenses of the school system, as, for instance, in Delaware, Utah, Arkansas, and Georgia. In other instances, support is almost entirely local.

EDUCATIONAL RANKING OF STATES*

State	Rank in factors 2-11 (Based on the rank of the sum of the rank.)	Average number of days schools were in session (1950-51).	Average value of school property per pupil enrolled (1949-50).	Mean current expense except transportation and tuition, per classroom unit in public schools (1949-50).	Current expense per pupil in average daily attendance (1950-51).	Average salary for instructional staff (1953-54).	Per cent of elementary-school teachers with less than four years of college preparation (1953-54).	Average number of pupils per teacher (1950-51).	Per cent total public and private school enrollment was of all children aged 14-17 (1950).	Per cent of persons aged 20-29 in 1950 who had completed four years of high school or more.	Per cent of Selective Service registrants given pre-induction examinations who failed the Armed Forces Qualifications Test, July, 1950—June, 1951.
	1	2	3	4	5	6	7	8	9	10	11
Alabama	45.0	28.0	47.0	45.0	46.0	44.0	19.0	48.0	40.0	43.0	45.5
Arizona	23.0	44.0	22.0	10.0	13.0	13.0	1.0	28.0	34.0	33.0	33.0
Arkansas	47.0	46.0	42.0	46.0	47.0	47.0	33.5	41.0	43.0	41.0	45.5
California	11.0	34.0	28.0	5.0	7.0	1.0	10.0	44.0	4.0	9.0	18.0
Colorado	19.0	33.0	17.0	28.0	21.0	21.0	15.5	13.5	25.0	8.0	20.0
Connecticut	7.0	8.0	12.0	6.0	9.0	10.0	17.5	25.0	12.0	19.0	21.0
Delaware	10.0	6.0	14.0	14.0	3.0	4.0	14.0	10.0	32.0	30.0	31.5
Florida	32.0	12.0	38.5	30.0	35.0	20.0	3.0	30.5	28.0	34.0	39.0
Georgia	41.0	17.0	44.0	43.0	44.0	41.0	15.5	32.0	46.0	47.0	41.0
Idaho	25.0	37.5	32.0	33.0	33.0	25.0	27.0	22.0	10.0	13.0	4.0
Illinois	5.0	1.0	2.0	3.0	5.5	8.0	24.0	16.0	17.0	17.0	13.0
Indiana	27.0	42.0	35.0	18.5	27.0	17.0	23.0	34.0	21.0	18.0	16.5
Iowa	16.0	18.0	27.0	29.0	17.0	29.0	46.0	4.0	15.0	3.0	9.5
Kansas	20.5	44.0	10.0	26.0	27.0	32.0	32.0	5.5	22.0	4.0	13.0
Kentucky	46.0	39.0	43.0	47.0	43.0	46.0	39.0	38.0	48.0	44.0	37.0
Louisiana	36.0	23.0	40.0	23.0	27.0	30.5	10.0	33.0	36.0	42.0	44.0
Maine	38.0	12.0	38.5	41.0	38.0	42.0	40.5	22.0	27.0	31.0	31.5
Maryland	28.5	5.0	24.0	21.0	30.0	5.0	22.0	39.0	45.0	35.0	29.0
Massachusetts	8.0	24.0	7.0	8.0	15.5	10.0	30.0	12.0	19.0	10.0	5.0
Michigan	17.0	12.0	11.0	13.0	18.0	10.0	45.0	35.0	9.0	24.0	23.0
Minnesota	13.0	40.5	16.0	16.0	15.5	28.0	13.0	20.0	11.0	7.0	1.0
Mississippi	48.0	47.5	48.0	48.0	48.0	48.0	35.5	47.0	40.0	46.0	47.0
Missouri	35.0	7.0	30.0	35.0	36.0	34.0	25.5	29.0	35.0	28.0	30.0
Montana	14.0	16.0	20.5	12.0	8.0	22.0	43.0	7.0	13.0	14.0	13.0
Nebraska	22.0	25.0	18.0	32.0	24.5	45.0	44.0	3.0	16.0	2.0	19.0
Nevada	6.0	19.5	4.0	11.0	11.0	18.0	10.0	13.5	7.0	15.0	22.0
New Hampshire	26.0	27.0	26.0	20.0	23.0	30.5	40.5	18.5	23.0	23.0	9.5
New Jersey	4.0	4.0	9.0	2.0	2.0	6.0	5.5	8.0	20.0	22.0	24.0
New Mexico	31.0	37.5	31.0	22.0	22.0	7.0	8.0	26.5	30.0	36.0	38.0
New York	1.0	2.0	1.0	1.0	1.0	2.0	4.0	15.0	14.0	21.0	26.0
North Carolina	39.0	15.0	41.0	38.0	41.0	33.0	5.5	46.0	38.0	45.0	42.0
North Dakota	35.0	36.0	19.0	37.0	24.5	40.0	47.0	1.0	31.0	29.0	25.0
Ohio	30.0	47.5	15.0	17.0	34.0	16.0	31.0	40.0	8.0	20.0	27.0
Oklahoma	24.0	30.0	25.0	31.0	32.0	24.0	7.0	26.5	1.0	25.0	34.0
Oregon	2.0	9.0	8.0	4.0	4.0	12.0	28.0	11.0	3.0	6.0	3.0
Pennsylvania	18.0	3.0	13.0	18.5	19.0	14.0	37.0	36.0	18.0	26.0	16.5
Rhode Island	12.0	12.0	3.0	9.0	10.0	15.0	20.0	18.5	33.0	32.0	11.0
South Carolina	43.0	21.5	45.0	44.0	45.0	39.0	21.0	30.5	47.0	48.0	48.0
South Dakota	28.5	30.0	23.0	34.0	20.0	38.0	48.0	2.0	29.0	16.0	15.0
Tennessee	44.0	30.0	46.0	42.0	42.0	43.0	33.5	37.0	42.0	40.0	43.0
Texas	33.0	26.0	34.0	25.0	31.0	26.0	2.0	22.0	39.0	37.0	35.0
Utah	20.5	35.0	29.0	27.0	37.0	23.0	17.5	42.0	2.0	1.0	2.0
Vermont	37.0	45.0	33.0	36.0	29.0	37.0	42.0	17.0	26.0	27.0	28.0
Virginia	40.0	12.0	36.0	40.0	40.0	36.0	29.0	43.0	44.0	39.0	40.0
Washington	3.0	19.5	5.0	7.0	12.0	3.0	12.0	24.0	6.0	5.0	6.0
West Virginia	42.0	43.0	37.0	39.0	39.0	35.0	25.5	45.0	37.0	38.0	36.0
Wisconsin	9.0	21.5	6.0	24.0	14.0	19.0	38.0	9.0	5.0	11.0	7.0
Wyoming	15.0	32.0	20.5	15.0	5.5	27.0	35.5	5.5	24.0	12.0	8.0

*The above table ranking states from an educational viewpoint was worked out by Dr. James R. Bryner, University of Cincinnati, on the basis of materials produced by the U. S. Office of Education, U. S. Department of Labor, U. S. Census of 1950, and the Research Division of the N. E. A. The interpretation of the ranking of the states in this table should be limited to the quantitative factors only. No conclusion is warranted that the ranking describes the qualitative character of the state school systems.

No less divergent are the facts with regard to other matters, such as supervision of teaching and of building construction. In some states the central department is very active and very powerful, as, for example, in New York and New Jersey. In other states the central control is very slight, as in Iowa and Missouri.

THE ELEMENTARY SCHOOL

Enough has been said of state educational organizations to make it clear that the schools of the United States are characterized by local differences. With this general qualification in mind, the following statement may be made with regard to the typical form of school organization in this country. In the main, the system is a *unit system*, that is, there are no parallel lines in the lower grades, as there are in Europe, designed to keep apart different classes of the population. All pupils begin in the same elementary school and progress into the high school.

Curriculum of Elementary Schools. The elementary school is usually divided into a primary division and one or more higher divisions. The primary division commonly consists of three grades. These three grades teach "the three R's" and give the children some opportunity to cultivate observation of nature and to learn something of the fundamental laws of health. Following the primary training, the elementary-school program becomes very different in different parts of the country. In the Southern states the elementary school is usually seven years in length. In the Northern states, it is commonly eight years in length. In a few cases it is nine years in length. The course of study includes subjects which have gradually been added in the course of the development of American schools.

The following table shows the development of the elementary school subjects from the time of the first schools to the present. It will be observed that when new subjects are added, the old ones are nearly always retained. Of course, innumerable changes of a practical nature have been made in the content of the various subjects. Likewise, many improvements have been made in teaching methods. During recent years there has been a marked tendency for teachers "to teach the child as well as the subject." Largely as a result of the Progressive education movement, pupil interests and abilities are being considered by teachers more than ever before. And more services, such as health, free textbooks, libraries, guidance, extracurricular activities, and transportation, are being provided than ever before.

DEVELOPMENT OF THE ELEMENTARY SCHOOL SUBJECTS FROM 1642 TO THE PRESENT

Subjects in 1642	Subjects in 1775
Reading	Reading
Writing	Writing
Bible	Arithmetic
Subjects in 1875	**Subjects at Present**
Reading	Reading
Writing	Writing
Arithmetic	Arithmetic
Spelling	Spelling
Conduct	Character Education
Language and Grammar	Language and Grammar
Geography	Geography
History and Civics	History, Civics, and Current Events
Drawing	Art
Music	Music
Nature Study	Science
Physical Exercises	Health Education and Supervised Play
	Safety Education
	Industrial Arts
	Home Economics
	Agriculture
	Commercial subjects
	Consumer Education

Kindergartens. At present, approximately 700,000 children are enrolled in public and private kindergartens in the United States. The tendency is to establish more public kindergartens, and a few states now give state financial aid for them. The chief purpose of them is to teach social control. Pupils usually enter them at the age of five, spend one year in them, and enter the elementary school at the age of six. Some communities now provide two years of kindergarten work. Kindergartens and nursery schools received a large impetus during World War II.

Platoon School. This term is applied to a school which differs in its organization from the ordinary elementary school in several respects. The platoon school is provided with shops, play facilities, an auditorium, and classrooms. The teachers are specialists and give instruction only in a limited number of lines. For this reason the schools are said to be departmentalized. Pupils devote a part of the day to the conventional elementary subjects under one teacher and are then transferred to the shop, auditorium, gymnasium, or playground where they are given forms of instruction which are not always provided in a conventional school. Schools of the platoon type were first introduced on a large scale by Superintendent Wirt of Gary, Indiana. The plan was called by Superintendent Wirt the work-study-play plan. It is also widely known as the Gary plan.

Forms and Duration of Elementary Schools. The elementary school in rural districts is organized in the form commonly known as the one-room school. A single teacher is in charge of the whole curriculum, and promotes the individual children as in his or her judgment they are ready to go forward with their work. In the larger communities the elementary school is graded; that is, children of different states of maturity and school attainments are assembled in separate rooms, and each room has a teacher in charge of the work in that particular grade. The more highly organized elementary schools usually have, as stated above, eight separate grades. In the larger cities a single school building often houses duplicate grades and includes 32 separate rooms. In some of the less thoroughly organized schools two or three grades are assembled in a single room in charge of a single teacher.

The elementary school is conducted in different communities for different numbers of days during the year. In the more highly organized states, 200 days a year constitute the regular program. In rural districts this number is often reduced to 120 days and even less. The following table shows the diversity of practice in this matter:

THE STATES AND EDUCATIONAL OPPORTUNITY

States	Average Number of Days Schools in Session 1919-1920	Rank 1920	Average Number of Days Schools in Session 1949-50	Rank 1949-50
1	2	3	4	5
United States . .	161.9		177.9	
Alabama . . .	123.1	46	176.3	21
Arizona . . .	162.6	31	170.9	36
Arkansas . . .	126.3	45	173.9	29
California . .	174.0	13	175.0	26
Colorado . . .	167.9	19	176.1	22
Connecticut . .	183.5	3	180.7	8
Delaware . . .	181.7	5	181.9	7
Dist. of Columbia	178.0	8	176.0	23
Florida	133.1	44	180.0	9
Georgia . . .	145.0	40	178.0	16
Idaho.	172.7	15	175.8	24
Illinois	170.9	17	186.6	1
Indiana . . .	155.8	34	173.7	31

THE STATES AND EDUCATIONAL OPPORTUNITY—Con.

States	Average Number of Days Schools in Session 1919-1920	Rank 1920	Average Number of Days Schools in Session 1949-50	Rank 1949-50
1	2	3	4	5
Iowa	174.0	14	179 3	11
Kansas	164.0	28	165.1	38
Kentucky	123.0	47	171.2	35
Louisiana	148.9	38	179.0	14
Maine	169.2	18	180.0	9
Maryland	179.6	6	184.1	3
Massachusetts	179.4	7	178.4	15
Michigan	172.0	16	180.0	9
Minnesota	160.0	33	171.5	36
Mississippi	122.0	48	172.5	33
Missouri	162.8	30	179.1	13
Montana	166.4	23	183.5	4
Nebraska	164.0	28	177.4	17
Nevada	167.0	20	176.6	19
New Hampshire	174.0	12	176.5	20
New Jersey	189.0	1	182.2	6
New Mexico	165.0	26	180.0	9
New York	188.0	2	182.6	5
North Carolina	134.0	42	179.9	10
North Dakota	166.9	22	172.7	32
Ohio	165.0	26	178.0	16
Oklahoma	166.4	23	184.2	2
Oregon	152.0	37	179.2	12
Pennsylvania	176.8	9	182.6	5
Rhode Island	182.1	4	180.0	9
South Carolina	109.6	49	177.4	17
South Dakota	167.0	20	175.0	26
Tennessee	133.5	43	176.7	18
Texas	155.6	35	174.6	28
Utah	166.4	23	175.3	25
Vermont	162.0	32	170.1	37
Virginia	147.0	39	180.0	9
Washington	176.4	10	173.8	30
West Virginia	138.9	41	175.0	26
Wisconsin	175.3	11	181.9	7
Wyoming	152.0	36	174.7	27

Control of Elementary Schools. The method of control of the elementary school differs according to the size of the community. In smaller communities the school trustees are usually in charge of the school. They have the power to employ the teacher and to provide for the material equipment of the school. The local lay school authorities are elected by the community, either at a town meeting or at a regular election. In the larger communities a board of education usually operates under a special charter from the state and has full administrative authority over the schools. It usually appoints, in addition to the teachers, a principal of each school building and a superintendent.

In most cases the teachers and principals are appointed upon the recommendation of the superintendents. In fact, the trend is distinctly toward accepting the recommendations of the superintendent in all professional matters.

In some instances the smaller districts are provided by the state with a supervisory officer. In many of the states the counties are organized under a county superintendent of schools who, like the state superintendent, is usually elected by popular vote.

Powers of the Board of Education. Where there is a board of education it is usually elected by vote. Sometimes it is appointed by some civil officer, such as the mayor or the judges. The board of education in many cities is historically descended from a committee of the common council. It is still very common for the board of education to be dependent on the city government in matters of finance. Thus, in New York City the board of education must submit its budget to the board of assessments and apportionments, which has charge of the finances of all branches of the city government. In other cases the board of education is constituted by state charter into an independent taxing body. This is true, for example, in the city of Denver, Colorado.

The Superintendent of Schools. The relation of the board of education to the officers which it appoints has never been worked out with satisfactory clearness. The superintendent of schools is sometimes the executive officer of the board; that is, he carries out the resolutions of the board and is very definitely restricted in his activities by the votes of the board. In other cases the superintendent has powers assigned to him by law and is, in certain functions, independent of the board. For example, in the city of Saint Louis, Missouri, which has one of the most progressive school charters in the country, the superintendent of schools is empowered to nominate all teachers. The board of education can act in the appointment of teachers only on the nomination of the superintendent. In some other cities the board of education makes the appointments without even consulting the superintendent.

The relation of the board of education to the building principal and to the teacher who has charge of the individual classroom is ordinarily indirect. In most cases the superintendent is authorized by the board to direct the activities of these persons. On the other hand, there are cases where the board of education exercises direct supervision over the details of school organization. In general, this is regarded by students of school problems as a bad form of organization. It survives from the time when the lay officials of the school were in full charge of the employment of teachers and the equipment of the classroom.

Organization of the Board of Education. In the history of American schools, boards of education have differed greatly in their size and in their mode of conducting business. As cities grew up during the last decades of the 19th century, many school boards became unwieldy bodies. Membership had formerly been on the basis of representation of city wards or on some other basis which led, during the rapid growth of the city, to the expansion of the number of the board to a point where the large size of the assembly made it almost impossible to do business. There has been a marked tendency in recent years, therefore, to reduce the size of the board to seven in the larger cities and to five or three in the smaller cities.

Another major item in this connection is the internal organization of the board. In some cases, boards of education have divided themselves into standing committees, each committee being in charge of some aspect of school work. Thus, a committee on finance and a committee on school buildings have been very common in such cases. Practical experience has shown that such a division of the board very frequently results in the assignment to these standing committees of all the business of the board in respect to the matter over which a committee has charge. The board as a whole then loses something of its effectiveness. Students of school organization recommend that boards be not divided into standing committees, and that committees be created only when it is necessary to make a study of some particular problem.

The Business Manager. Boards of education have frequently found it advantageous, especially in the larger cities, to appoint an officer whose duty it is to carry on all of the business operations of the schools, such as purchasing supplies and keeping accounts. In many instances, this business manager has been made independent of the superintendent, on the theory that the superintendent is in charge of instruction, while the business manager is in charge

of material equipment. Such a separation of business management from the instructional activities of the school is unfortunate, since the material equipment is always provided with a view to meeting educational needs. The best practice is that in which a special business officer is made responsible to the superintendent and through him to the board. In the smaller towns, it has been found advantageous to give the superintendent direct charge over the business organization of the schools.

THE JUNIOR HIGH SCHOOL

In recent years, a radical reform has taken place in the course of study and in the administration of the last two years of the elementary school. A new institution, commonly known as the junior high school or intermediate school, has been organized to include the seventh and eighth grades and very frequently to unite these grades with the first year of the high school. The fundamental motive for this new organization is to be found in the fact that formerly the elementary school did not include in its program the advanced studies, such as higher mathematics and foreign languages, nor any of the subjects which lead directly into professional training. In this respect, American schools have been far behind European education.

In all European countries the boys who are destined to enter the professions are introduced to the study of Latin at the beginning of the fourth school year and to higher mathematics by the sixth year. The postponement in American schools of all higher subjects to the high school, which lies beyond the elementary school, has handicapped seriously the pupils who go into the higher institutions. Thus, the failure of the elementary school to include Latin in any of the earlier grades has resulted in a very limited and defective knowledge of this subject on the part of boys and girls in the United States. What has been said with regard to Latin can be said also with regard to algebra, geometry, and numerous other subjects which have been excluded from the elementary school program.

Purpose of Elementary School. The reason why these subjects were originally excluded is that, at the time the elementary program was first formulated, the ordinary pupil usually went to school for only a very short period, and American parents were satisfied if their children enjoyed a relatively meager training in "the three R's" and other rudimentary subjects. Furthermore, the example of the common school of Europe was at first strong in determining the practices of American elementary schools, and the common school of Europe, unlike the schools for the better classes, was very limited in its course of study. The American elementary school was originally organized, in respect to its subjects of instruction, with a very meager program, as though it were intended to serve only the common people, although as a matter of fact it has served to train all classes of pupils, including those who are to go forward to higher institutions.

The Upper Grades. The limitations under which the American elementary school has operated in the past have in recent years been overcome in some measure through the sheer expansion of the educational system. Children have attended school so much more regularly and for so long a period that they have mastered the rudimentary subjects and, by the time they have entered the seventh grade, are ready to take more advanced work than they could have taken in earlier years. The demand has come to be very insistent, therefore, that the seventh and eighth grades shall include the beginnings of work which formerly belonged to the high school. Furthermore, in the course of practical school experience, it has been found that pupils in the seventh and eighth grades are mature enough to be dealt with in matters of discipline and social organization in a fashion wholly different from the way in which primary children and children in the fourth, fifth, and sixth grades ought to be handled.

New Types of Organization. The external organization of the seventh and eighth grades has accordingly undergone a modification in the direction of greater liberalizing of discipline. These pupils have been allowed to move about the building more freely than the younger children, and have been brought into contact with what is known as the departmental organization of their studies; that is, they have a number of teachers who are specialists in the different fields. The departmental form of organization has removed pupils from the close supervision of a single teacher which is common in the lower grades.

The reconstruction of the upper grades of the elementary school has been carried out in every possible degree and manner in different school systems. Sometimes the name junior high school has been applied to seventh and eighth grades when no changes except possibly a slight beginning of departmentalization has been made. In other cases, the junior high school has been housed in its own building, and radical changes have been introduced in the courses of study and in the mode of organization.

An investigation conducted by Professor C. O. Davis in the North Central states shows the extent to which the ordinary curriculum of the seventh and eighth grades has been modified through the organization of junior high schools. The following table shows the percentage of such schools offering the subjects listed:

PER CENT OF JUNIOR HIGH SCHOOLS IN THE NORTH CENTRAL STATES OFFERING SEVERAL SUBJECTS AS ELECTIVES

Latin	27.6
Modern foreign language	27.3
Algebra	24.2
General science	30.4
Manual training	88.7
Domestic science and arts	88.4
Drawing	75.4
Music	71.7
Agriculture	25.9
Ancient history	3.8
General history of modern Europe	6.5
Commercial work	16.7
Distinctive vocational work	5.1
Printing	8.2

Many junior high schools devote themselves in large measure to technical subjects. Indeed, it is the belief of some of the advocates of this school that one of its major functions should be that of preparing for industrial life students who are not likely to go into the high school. In the same investigation to which reference was made in the last table, Professor Davis reports a number of schools in the North Central states which have added technical courses in the junior high school.

PUBLIC HIGH SCHOOLS

Turning from the elementary school and the junior high school to the high school, which is the highest unit of the public school system, we find diversity of practice and of organization even more pronounced than it was in the lower school.

The high school is typically four years in length, and conducts its course with a view to preparing pupils either to enter directly upon the duties of adult life or to enter a college or other high institution. It obviously requires for its maintenance a somewhat larger district than that which supplies pupils to the ordinary elementary school. Cities and large towns have, therefore, been the centers which have most commonly maintained high schools. In recent years, however, rural communities have become very enthusiastic about organizing high schools, and there are striking examples to be found of rural high schools which serve districts lying entirely outside of any large centers of population.

Curriculum of High Schools. The courses of study in the high school cover a great variety of subjects. This condition is traceable directly to the fact that, at this higher level of education, there are few subjects which are regarded as essential to the training of every pupil, and there are evident differences in the individual needs of pupils. Similarities which appear among high schools in the matter of curriculum arise very largely out of the fact that the tradition of higher education, as borrowed from Europe, is that of a classical training. Foreign languages, especially the ancient, and higher mathematics have therefore long been accepted items in the curriculum of American high schools. Even where the high school is organized by a community which is not preparing its pupils to go into the learned professions, there has been a disposition to continue the classical tradition, because the community did not want to deprive its young people of any of the opportunities which young people have had in neighboring schools.

In addition to the classical tradition or in some instances in direct opposition to it, there has been a growing tendency in American communities to provide courses which shall acquaint students with modern civilization. Since the high schools of the country have not been centrally controlled, this desire to enlarge the course of study has expressed itself in the greatest variety of experiments. Courses in science and in literature and in history and civics have been rapidly incorporated into the curriculum.

Latterly, commercial and industrial interests have demanded better training for those who are to enter these callings, and the high school in its effort to meet this new social demand has introduced technical courses. In response to the commercial demand, typewriting, stenography, and bookkeeping have been organized, especially in the early years of the high school curriculum. In response to the industrial demand, home economics, agriculture, and technical courses have been opened upon an astonishingly large scale. The following table, borrowed from a report of the office of education which summarized this matter, gives some insight into the complexity of the organization of the high school curriculum.

High School Districts. In the matter of control, the high school is in some cases included in the jurisdiction of the same lay officials as have charge of the elementary school. In other cases special high school boards have been organized. This latter type of organization is very common in rural districts where the high school pupils are to be drawn from a number of elementary school districts. The uniting of a number of such districts to maintain a higher institution has sometimes led to the chartering of a new type of district. In this way there have come into existence community high schools. Sometimes the district of a community high school coincides with the territory of a pre-established political unit, such as a township. The school is then called a township high school. Sometimes the high school district includes a whole county.

Consolidated Schools. Very frequently the establishment of a high school in a rural district has been the motive for a reconstruction of the elementary school district. The general term which is applied to such reconstructions is "consolidation" of schools. Not every consolidated school offers high school courses, but in general the motive for consolidation is enrichment of instruction, and leads ultimately to the establishment of a high school department.

The problems and results of consolidation can be illustrated in a concrete way by quoting at length from a bulletin of the office of education a description of a case in which successful organization of this type was carried out in a Southern state.

THE WOOL MARKET SCHOOL

"In Harrison County, Miss., about 8 miles out from the Gulf and in a typical south Mississippi rural community, may be found the Wool Market consolidated school, the subject of this brief study. Three medium-sized one-teacher schools—Coalville, Kind, and Oakhead—were brought together two years ago to form this school near the Wool Market post office, on the Biloxi River.

"The new house, built by private subscription at a cost of about $2000, was located within 2 miles of all the children in two of the old districts, while a transportation wagon was used to bring in from 25 to 30 pupils from the Oakhead district, about 3 miles from the new schoolhouse. The territory of the new school covers 27 square miles and now has within its bounds 134 children of legal school age.

PUBLIC ELEMENTARY AND SECONDARY SCHOOLS—NUMBERS AND SALARIES OF TEACHERS

Division, State, or Other Area	Number of Teachers[1]			Salaries of Teachers, Supervisors, and Principals				
				Total ($1,000)		Average salary (dollars)		
	1940	1950	1952	1950	1952	1940	1950	1952
Continental U. S.	875,477	913,671	962,007	2,896,489	3,492,724	1,441	3,010	3,450
New England	49,930	50,773	52,914	168,888	192,764	1,748	3,153	
Maine	6,156	6,323	6,475	13,374	15,366	894	2,115	2,269
New Hampshire	2,945	2,816	3,033	8,270	9,569	1,258	2,712	3,031
Vermont	2,653	2,405	2,581	6,111	6,947	981	2,348	2,598
Massachusetts	24,769	24,596	25,653	87,992	97,869	2,037	3,338	3,553
Rhode Island	3,788	3,984	3,860	13,124	14,814	1,809	3,294	3,603
Connecticut	9,619	10,649	11,312	40,017	48,199	1,861	3,558	3,937
Middle Atlantic:	168,500	162,389	165,434	586,298	718,735	2,167	3,433	
New York	80,553	79,670	79,730	310,097	386,025	2,604	3,706	4,591
New Jersey	26,984	27,109	28,641	99,699	118,450	2,093	3,511	3,922
Pennsylvania	60,963	55,610	57,063	176,502	214,260	1,640	3,006	3,536
East North Central:	164,354	172,264	181,566	590,237	709,372	1,570	3,296	
Ohio	43,671	43,650	46,485	139,525	170,040	1,587	3,088	3,537
Indiana	21,459	23,428	24,092	86,027	100,385	1,433	3,401	3,865
Illinois	45,955	47,224	48,621	170,405	199,319	1,700	3,458	3,903
Michigan	32,716	37,157	40,460	131,720	160,980	1,576	3,420	3,862
Wisconsin	20,553	20,805	21,908	62,560	78,648	1,379	3,007	3,590
West North Central:	115,716	104,003	107,870	278,035	324,558	1,042	2,550	
Minnesota	21,080	19,574	20,784	60,804	71,284	1,276	3,013	3,327
Iowa	22,450	21,319	21,843	55,447	66,649	1,017	2,420	2,895
Missouri	26,423	22,494	23,140	59,601	68,418	1,159	2,581	2,763
North Dakota	7,262	6,537	6,757	15,195	17,130	745	2,324	2,535
South Dakota	7,837	7,127	7,221	15,575	17,406	807	2,064	2,351
Nebraska	13,760	11,949	11,905	28,316	31,208	829	2,292	2,550
Kansas	16,904	15,003	16,220	43,097	52,463	1,014	2,628	2,963

Footnotes on page 1671.

PUBLIC ELEMENTARY AND SECONDARY SCHOOLS—NUMBERS AND SALARIES OF TEACHERS—Con.

Division, State, or Other Area	Number of Teachers[1]			Salaries of Teachers, Supervisors, and Principals				
				Total ($1,000)		Average salary (dollars)		
	1940	1950	1952	1950	1952	1940	1950	1952
South Atlantic:	120,914	135,012	144,310	363,353	462,720	1,014	2,531	
Delaware	1,626	1,846	2,082	6,437	8,709	1,684	3,273	3,919
Maryland	8,638	11,059	12,793	42,106	52,902	1,642	3,594	3,903
District of Columbia	3,057	3,326	3,381	13,841	16,042	2,350	3,920	4,467
Virginia	17,734	19,055	20,637	49,764	60,433	899	2,328	2,627
West Virginia	14,252	14,145	14,450	38,879	48,280	1,170	2,425	2,967
North Carolina	24,530	27,491	28,917	78,304	100,695	946	2,688	3,282
South Carolina	15,042	16,753	17,479	32,074	42,522	743	1,891	2,400
Georgia	22,846	24,380	25,642	48,972	68,242	770	1,963	2,586
Florida	13,189	16,957	18,929	52,976	64,895	1,012	2,958	3,248
East South Central:	73,127	77,538	78,868	158,040	189,818	758	1,983	
Kentucky	18,802	18,097	18,323	37,239	46,927	826	1,936	2,393
Tennessee	20,147	22,202	22,176	51,105	57,799	862	2,302	2,462
Alabama	19,405	21,612	22,353	47,176	58,725	744	2,111	2,537
Mississippi	14,773	15,627	16,016	22,520	26,367	559	1,416	1,617
West South Central:	93,091	94,796	102,774	286,973	316,771	987	2,853	
Arkansas	12,852	12,845	13,014	24,109	25,408	584	1,801	1,884
Louisiana	14,830	15,652	16,369	50,239	57,164	1,006	2,983	3,124
Oklahoma	20,204	15,931	17,948	49,711	56,041	1,014	2,736	3,031
Texas	45,205	50,368	55,443	162,914	178,158	1,079	3,122	3,213
Mountain:	33,662	36,937	39,733	118,717	142,334	1,290	3,003	
Montana	5,195	4,584	5,400	14,626	17,379	1,184	2,962	3,094
Idaho	4,513	4,449	4,498	11,653	13,620	1,057	2,481	2,849
Wyoming	2,551	2,548	2,745	7,530	9,112	1,169	2,798	3,157
Colorado	8,918	9,233	9,627	27,302	32,879	1,393	2,821	3,244
New Mexico	3,798	4,908	5,434	17,555	21,721	1,144	3,215	3,621
Arizona	3,384	5,146	5,516	19,357	23,317	1,544	3,556	4,021
Utah	4,417	4,911	5,218	16,777	19,599	1,394	3,103	3,420
Nevada	886	1,158	1,295	3,918	4,707	1,557	3,209	3,484
Pacific:	56,183	79,959	88,538	345,949	435,650	2,101	4,006	
Washington	10,583	14,624	15,601	54,234	64,774	1,706	3,487	3,919
Oregon	7,296	10,226	11,269	36,789	45,205	1,333	3,323	3,679
California	[2]38,304	55,109	61,668	254,926	325,671	2,351	4,268	[3]4,163
Alaska[4]	302	528	722	2,305	2,909	[5]	4,269	3,958
American Samoa	65	163	[5]	[5]	[5]	[5]	[5]	[5]
Canal Zone	200	309	344	1,200	1,436	1,634	3,519	3,870
Guam	139	269	307	[5]	964	309	[5]	3,079
Hawaii	3,091	3,214	3,424	11,903	13,094	1,830	3,508	3,608
Puerto Rico	6,066	8,958	9,251	14,265	17,556	834	1,509	1,794
Virgin Islands	117	148	173	[5]	281	680	[5]	1,487

[1]Excludes supervisors and principals except when not reported separately. [2]For 1938.
[3]Represents weighted average of median salaries of total instructional staff in elementary and secondary schools.
[4]Data do not include Federal schools for natives. [5]Not available.

Source: Department of Health, Education, and Welfare, Office of Education.

Former Conditions. "Each of the teachers in the abandoned schools, having from 30 to 40 recitations daily, to cover the eight grades of the elementary and grammar grades, had no time to do high school work, and on that account had no high school pupils. As a result of those conditions, the patrons who were able financially to bear the expense sent their children out of the community to school as soon as they were ready for the high school, at an annual cost of from $150 to $200, while the larger number were forced to turn aside to take up life's duties and responsibilities with only the meager training obtained in these little schools. Such conditions obtain in three-fourths of the schools in the South. The Wool Market consolidated school, now serving the same territory, has 23 high school pupils—16 in the ninth grade, 5 in the tenth grade, and 2 in the eleventh grade—and 20 pupils in the music and expression classes under special teachers.

New Working Plan. "The aggregate average attendance for the original schools was 60 pupils, according to the records, while the average attendance now in the consolidated school is 110 pupils, with an enrollment of 125. There are only 9 children of school age in the district not in school. In the old schools the number was too small to form an attractive social center and to justify the employment of special teachers, but the new school is fast becoming the center of all social activities of this larger community, employs special teachers in music and expression, and has in the faculty teachers qualified to give instruction in practical agriculture and domestic science.

"After trying the consolidated school two years, the patrons and other citizens of the Wool Market community voluntarily levied a tax of $7 per thousand on the property of the district to support the school for an eight or nine months' session.

"The Wool Market school, with its four teachers and adequate high school advantages, cost the community only 41 cents per pupil, or a total of $45 per month, more than the three little one-teacher schools. To send the 23 high school pupils out of the community for their high school education would cost the community at least $1000 more than this entire school cost the community and county for eight months. Mr. W. A. Cox, referred to above, is authority for the statement that the value of land in the community had increased during the two years, as a result of the good school, from $10 per acre to $25 per acre."

Transportation of Pupils. In a number of the Northern states, such as Iowa and Colorado, consolidation has gone forward on even a larger scale than is indicated in the quotation given. The returns which the communities receive for additional expenditures in these cases are enlarged opportunities for rural children. It is perfectly clear that rural communities are increasingly demanding a share in those superior social facilities which formerly belonged to the towns and cities, not only in the consolidation of schools, but in such matters as the free delivery of mail and improvements of highways. The rural people of the nation are in this way overcoming the isolation which formerly was characteristic of the farming districts. The development of consolidated schools with superior facilities has

in some states, followed the adoption of laws which provided at first only for transportation from rural districts to the centers where high schools existed.

Break between Elementary and High Schools. Where the high school is part of the same system as the elementary schools, it is common for the pupils who complete the work of the eighth grade to pass without examination into the high school. At this point there is, however, in spite of the unit type of organization, a distinct educational break. The methods of instruction and the social atmosphere of the high school are much freer than were those of the elementary school, and many pupils experience difficulty in adjusting themselves to the new type of environment.

The break encountered by students in passing from the lower to the high schools is due in part to the fact that the teachers in the two institutions are entirely different in preparation and outlook. Elementary school teachers have usually prepared for their professional careers in normal schools, while, especially in the better grade of high schools, the teachers are college graduates. Even though a single board of education controls both schools, and even though there is a single superintendent in charge of the whole system, the elementary school and the high school represent two different types of education.

Types of High Schools. Whenever a community is able to provide an enriched curriculum for its high school, the question arises as to the types of courses to be included. The solution of this problem is very different in different cities. Thus in Cleveland, Ohio, the older high schools were those which devoted themselves to the academic curriculum and prepared students for college. As the curriculum expanded, Cleveland erected technical high schools equipped with shops and laboratories, in which special training was offered with a view to preparing boys for industrial and engineering pursuits. These technical high schools became very popular indeed, but they did not prepare students for some of the colleges which had received the graduates of the academic high schools. Cleveland developed also, in addition to the technical high schools, a special commercial school in which the student population, for the most part, was made up of young women preparing to be stenographers and typists.

As contrasted with Cleveland, the city of Saint Louis has organized its high schools on a plan known as the cosmopolitan plan of organization. The Saint Louis high schools include in each of the institutions both academic and technical courses. The theory on which these cosmopolitan schools have been organized is that every child in every district of the city ought to be given an unlimited opportunity to get all of the varieties of high school training. The system is somewhat more expensive than the differentiated plan of Cleveland, but it suits more fully than does the Cleveland system the demands of each locality.

In such cities as Chicago and New York a compromise between the Cleveland and Saint Louis plans has been adopted. A few schools which are predominantly technical have been established in these cities, but even in the technical schools the courses of study are sufficiently numerous and varied to make it possible for students who want the conventional academic training to secure it. At the same time, there has been introduced into each of the academic schools a limited amount of technical work, so that pupils who are studying academic subjects may secure some training in the practical arts.

The High School Unit. The process of standardizing high schools, which began with the report of the Committee of Ten referred to in the historical section, has gone so far as to develop a definite uniformity in the credits administered by these schools. Formerly it was the practice of high schools to give a number of different kinds of courses. Some of these consisted of two class exercises a week throughout the year; others were made up of four or five class exercises. Much confusion arose because of the variable programs of different schools. The colleges and secondary schools of the country were led by the Committee of Ten to approve a plan whereby each course should be of standard length.

A number of agencies have in recent years powerfully re-enforced the movement toward standardization. The result is that a so-called high school unit is now defined as 120 hours of classroom work in the course of a year, and all secondary schools are supposed to report their work in these terms. The agencies which have co-operated in this process of standardization are certain associations in different parts of the country, which have prepared approved lists of secondary schools and colleges. The Carnegie Foundation also has been very influential in defining the unit.

This foundation became involved in the discussion of high school courses, although it was originally founded for the purpose of granting pensions to college teachers. The administration of pensions required that the foundation should determine when a given institution is an acceptable college. This in turn led back to the entrance requirements of the college, and so to a determination of the type of high school from which the college received its students. The Carnegie Foundation insisted, in its dealings with the colleges, that the entrance requirements should be definitely and clearly standardized.

This was the same demand which was made by such bodies as the North Central Association of Colleges and Secondary Schools. This association includes the colleges and more fully developed secondary schools in the territory from Ohio on the east to Colorado, Wyoming, and Montana on the west; from the Ohio river north, and west of the Mississippi as far as the Rocky mountains and as far south as New Mexico and Arizona. Texas, Louisiana, and Arkansas are the only Southern states west of the Mississippi and east of the Rocky mountains not included in the territory of the North Central Association. This association has annual meetings at which it receives reports from its inspectors and from agents, and it publishes annually a list of approved colleges and high schools. Its standards for these institutions have been very influential in guiding the practice of similar co-operative associations in other parts of the country. These other associations are the Northwestern Association, including Washington, Oregon, Idaho, and part of Montana; the Southern Association of Colleges and Preparatory Schools, covering the states south of the Ohio river; the Association of Colleges and Secondary Schools of the Middle States and Maryland; and the New England Association.

In addition to the activities of these associations which select the higher grades of secondary schools for their approved list, the state education departments and the state universities are active in preparing lists of lesser high schools which organize their courses in standard units even though they are not able to meet the complete standards of the major associations. The results secured by the preparation of these approved lists is a relatively high degree of uniformity, at least on the quantitative side of the administration of high school courses.

Methods of College Admissions. Prior to the organization of the standardizing associations, the common practice of American colleges was to administer entrance examinations to all students passing from the secondary school into college. The entrance examination system came to this country from England, where it is the chief means of regulating the work of all educational institutions. It is still the dominant method of college admission in the states east of the Allegheny mountains. The University of Michigan, established in 1837, devised the method of admission by certificate and

thus broke away from the examination system of the older American institutions.

The theory on which the University of Michigan proceeded was that, as the highest institution of learning in the state, it had responsibilities which obligated it to provide through inspection and advice for the development, not only of its own courses, but also of the courses of the other institutions in the state. The University of Michigan, therefore, began to send members of its faculty to visit the high schools and encourage them in perfecting their methods of organization. When a student came from one of these inspected high schools he was received into the college as a satisfactory student, because the institution from which he came was known to conform to the requirements of the university. The certificate system has spread rapidly, especially in the Middle West and the West, and is today the accepted mode of college admission west of the Allegheny mountains.

In recent years the use of general intelligence tests has been advocated as a much better device than examination or certification to determine who shall pass from the high school into college. Elaborate studies have been made of the success with which the work of college students can be prognosticated on the basis of their school records, by entrance examinations in the particular subjects, or through general intelligence tests. It has been found that the school record and general intelligence tests are distinctly superior to examinations in particular subjects. General intelligence tests serve also to correct the estimate of the student based on his school record. The school record is determined in many instances by other considerations than native intelligence. Thus, an industrious student who is dull may sometimes make a better record than a bright student who is not attentive to his work. College officials have found it advantageous, therefore, in dealing with students, to collect the information supplementary to the school record, as a basis of the classification and administration of the school body.

Educational Guidance. With the growing complexity of the high school curriculum and with the influx into the high school of a student population that includes a great many different kinds of young people who are looking forward to all sorts of careers, it has become necessary to add to the administrative machinery of these schools agencies which shall be able to give students more advice than was formerly necessary in the choice of studies. As was pointed out in an earlier section, the high schools of 1870 had a very meager course of study, and students were very much of the same type. The very fact that they came to the schools showed that they had selected their careers and were prepared to fit into the very definite régime of the school.

The point has now been reached where one-third of the population of the country which is of high school age is attending high school. In the more thickly settled sections of the country this proportion sometimes runs as high as 60 or 70 per cent of the young people of high school age. It is evident from these figures that there is no such definiteness in the expectations of students or of their teachers as was common at an earlier date. High school administrators are finding it necessary, therefore, to study the problem of course elections very carefully and to offer advice to students about the best ways of preparing themselves for those activities to which their capacities and desires lead them. Most of the larger high schools of the country have recently added to their staff, for the purpose of giving such advice to girls, an officer not formerly found in the schools, that is, a dean of girls. It is the business of this officer to supervise in an intimate way the social and personal activities of the young women in the schools. An assistant principal is usually provided in the larger schools, who performs the same functions for boys; and in an increasing degree the principal of the high school devotes himself to the solution of the personal problems of the pupils.

One of the most urgent problems of guidance is the choice of technical courses and the selection of suitable industrial opportunities for a given pupil. As a special phase of educational guidance, so-called vocational guidance has been provided in many schools. Vocational guidance in some cases has gone to the extent of providing courses in the industries of the city, so that pupils may become aware of the opportunities which are open to them in later life. Whether such special courses are given or not, it has been found desirable to give personal advice to students and to help them choose their courses and prepare themselves definitely for callings which are open to them.

In a later paragraph vocational guidance will be briefly discussed. It is mentioned here as one of the important lines of organization of secondary schools.

Extracurricular Activities. The high school recognizes its obligation to the community in social as well as intellectual lines, and has accordingly provided, under the supervision of the school, social and athletic opportunities which were uncommon in the secondary schools of two decades ago. Many different types of clubs have been set up, with the view to drawing out the student's powers and encouraging him to take part in social activities which would not be aroused by the regular classroom exercises. Various forms of student self-government have in some cases arisen out of these social activities. Not infrequently the high school has come to be a center of organization, not only for the young people of the community, but also for adults. Reference to this general matter will be made again in a later section dealing with the social center movement.

Federal Encouragement of Technical Courses. In recent years the Federal government has encouraged the organization within high schools of special courses in agriculture and technical subjects. This encouragement has been given through certain supervisory agencies which have been provided from Washington, and through appropriations to the different states by the Federal government for the support of these special courses. The Federal government has no direct control over the secondary schools of the country, but it has set up elaborate machinery for approving plans made in various communities for the introduction of technical courses, and thus indirectly has exercised a great influence in the enlargement of the high school curriculum. Special reference will be made to this matter in a later section dealing with industrial education.

COLLEGES AND UNIVERSITIES

The lack of uniformity in American standards and practices, which has been a subject of frequent comment in earlier paragraphs, is nowhere more strikingly exhibited than in the organization of higher institutions of learning. Even the terms college and university are frequently interchanged, and in many cases the institutions which call themselves by these names are in reality devoting all of their energy to work of a grade which should be classified as belonging to the secondary school.

College. The college is typically a four-year institution, and is devoted to nonprofessional instruction or, as it is called, instruction in the liberal arts. Formerly the colleges, like the secondary schools, were dominated by the tradition of a classical education, but, as the various sciences have expanded and as modern languages have come to be recognized as equally important with classical languages, the range of college subjects has been enormously expanded. Furthermore, the adoption of the elective system has brought about a condition in American colleges, especially since 1880, which has encouraged the expansion of the curriculum into every possible field of human experience.

The differentiation of the college course has taken place most conspicuously in the junior and senior years. Many institutions have found it necessary, in order to meet the needs of their students, to introduce into these years professional courses leading into the schools of law and medicine to which their graduates are going. Those institutions which have been unable to provide professional courses in the upper years have found that competition has led to the withdrawal of their students.

University. The term university, when strictly used, designates an institution which differs from the college in that it is a composite institution including a number of professional schools. In almost every case, the universities of the country include a college of liberal arts and a graduate school as subdivisions of their organization, and also schools of law, medicine, theology, and agriculture. Not all so-called universities have the full equipment of the schools indicated.

Degrees. With the multiplication of divisions in American universities, there has come a very great expansion of the list of degrees granted. A number of bachelors' degrees have been established for different types of courses. The most common of these, other than the bachelor of arts, is the bachelor of science. There are also degrees of bachelor of philosophy and bachelor of letters.

The universities which give courses beyond the regular four years of the colleges confer numerous advanced degrees. The first of these, following the bachelor's degree, is the master's degree. This is usually conferred on the basis of one year of graduate study, and it may be a master of arts or a master of science degree. The additional year of study required for the master's degree is very commonly spent in a single department or in a narrow range of closely related departments. Formerly the master's degree was given by American institutions, as it is given by the English universities, to any graduate who had been pursuing one of the liberal professions. The conferment of the degree in these earlier cases did not imply any resident study in the university. It is coming to be very uncommon for American institutions to grant the master's degree on any basis other than the actual taking of courses in the institution itself.

Above the master's degree is the degree of doctor of philosophy. The character of this degree is very largely determined by the example of the German universities to which many American students went during the decades between 1880 and 1910. The doctor of philosophy degree is usually conferred after three years of resident study beyond the bachelor's degree. One of the essential requirements for this degree is the preparation of a thesis which shall demonstrate the ability of the candidate to produce an original piece of work in the field in which he is specializing.

American universities confer a number of honorary degrees, chief among which is the degree of doctor of laws. This is conferred upon anyone who has contributed, especially in an administrative or civic way, to the betterment of the community. Other degrees on this same level are the degree of doctor of science, conferred for conspicuous attainments in natural science, and doctor of letters, conferred upon those who have attained eminence in the field of literature or literary research.

Types of Higher Institutions. Three classes of universities and colleges may be distinguished from the point of view of their support and government. These are: privately endowed institutions; state institutions; and municipal institutions.

The most common form of American college is that which is dependent for its support upon endowments. Two-thirds of the colleges of this country derived their initial support from religious bodies. In recent years the endowments of many institutions have come from single donors. Funds thus given to higher institutions are usually committed to a board of trustees. Frequently the trustees are representatives of the religious bodies which organized the institution. In many instances, on the other hand, they constitute a self-perpetuating body. The board of trustees appoints in all cases a president of the college. He is the administrative head of the institution.

State Universities. Beginning with the state of Virginia and extending rapidly through the area which was at one time the Northwest Territory, this movement has given rise to institutions which have grown to be great state universities. The funds for their buildings and current expenses are supplied by the legislatures of their states. These institutions are universities in organization and are usually equipped

FALL ENROLLMENT AND FIRST-TIME STUDENTS, BY STATES

Source: Office of Education, U. S. Department of Health, Education, and Welfare.

State	Total enrollment		First-time students	
	1955	1954	1955	1954
Alabama	38,131	33,963	10,022	9,323
Arizona	19,329	15,687	5,754	4,411
Arkansas	18,192	17,975	5,538	5,557
California	309,277	277,016	87,242	80,378
Colorado	31,846	28,884	8,257	8,124
Connecticut	37,725	35,416	9,073	8,040
Delaware	5,574	5,119	982	867
Dist. of Columbia	36,721	34,068	5,360	5,524
Florida	44,526	39,693	13,634	10,395
Georgia	41,778	39,402	11,497	11,881
Idaho	8,250	7,953	3,030	3,081
Illinois	150,421	139,582	34,686	31,759
Indiana	72,680	67,866	18,093	17,109
Iowa	44,362	40,602	13,180	12,230
Kansas	38,495	34,130	11,886	11,255
Kentucky	33,585	30,907	9,004	8,366
Louisiana	43,401	39,758	11,209	10,348
Maine	8,072	8,446	2,628	2,510
Maryland	39,386	36,925	8,528	7,860
Massachusetts	104,371	97,655	27,366	27,142
Michigan	119,833	107,074	25,996	24,632
Minnesota	50,361*	54,711	14,351	12,780
Mississippi	25,646	24,113	8,400	7,027
Missouri	64,685	58,229	16,617	15,553
Montana	9,288	7,834	2,668	2,713
Nebraska	24,216	22,375	6,798	5,978
Nevada	1,851	1,763	427	418
New Hampshire	9,417	8,665	2,584	2,642
New Jersey	56,611	51,577	12,973	11,098
New Mexico	10,949	10,027	2,795	2,534
New York	314,291	291,610	59,899	55,278
North Carolina	50,652	46,870	15,586	14,922
North Dakota	9,022	7,815	3,294	2,995
Ohio	131,590	121,404	32,215	30,158
Oklahoma	46,552	44,791	12,651	11,985
Oregon	29,409	26,485	9,310	7,903
Pennsylvania	153,638	139,050	33,168	32,796
Rhode Island	13,152	12,496	3,780	3,526
South Carolina	23,750	26,177	7,174	6,227
South Dakota	10,657	9,306	3,689	3,331
Tennessee	44,407	40,219	11,999	11,694
Texas	153,148	138,850	39,839	38,677
Utah	25,951	23,369	7,472	7,151
Vermont	7,209	7,037	2,320	2,165
Virginia	43,397	40,007	10,786	10,358
Washington	46,765	41,881	12,820	11,837
West Virginia	23,313	20,453	6,871	5,929
Wisconsin	56,027	50,399	15,729	14,528
Wyoming	5,055	4,330	1,405	1,342
Service academies	8,376	7,883	2,054	1,871
Total Continental U.S.	2,695,340	2,477,847	682,639	636,208
Possessions:				
Alaska	1,122	409	449	145
Canal Zone	323	262	190	199
Guam	242	219	101	101
Puerto Rico	17,629	15,649	4,756	4,419
Hawaii	6,273	5,364	1,500	1,348

* Does not include 8,077 evening students of college grade enrolled at the University of Minnesota, reported too late for inclusion in tabulations.

with a full quota of professional schools. In many instances they derive support for some of their professional work, especially in agriculture and engineering, from subsidies granted by the Federal government.

Municipal Universities. The third type of organization which has become increasingly common is the municipal university. The first municipal university in this country was organized in Charleston, South Carolina in 1837. Others were at Louisville, Kentucky in 1846; City College in New York City in 1849; and one in Cincinnati, Ohio, in 1873. The success of the University of Cincinnati led the state of Ohio to provide by legislation for the organization in other cities of institutions of similar type. There is a municipal university at Akron and one at Toledo. In states other than Ohio, special charters have in a few instances been granted to municipal institutions. New York City has three municipal institutions which grew up originally to supply the demands in that city for higher education before there was a system of public high schools. Wichita, Kansas, has a municipal university; Buffalo, New York, has developed an institution which is not supported by municipal taxes but is municipal in its range of operations and in the fact that it is supported by the people of that city.

These municipal institutions grow out of the natural demand in large centers of population for easily accessible educational opportunities of a type higher than that which is provided in the public high schools.

The College Year. The college year, or university year, has ordinarily consisted of 36 to 40 weeks, the sessions beginning in the middle of September and ending with graduation exercises late in June. President Harper, at the time of organization of the University of Chicago, pointed out vigorously the lack of economy in an arrangement which left the college buildings and equipment unused from the end of June until the middle of September. His original proposal was for four quarters of twelve weeks each, with a week of vacation after each quarter.

It has not been feasible to carry out this program, because other educational and social institutions do not close and open at dates which would make it possible to arrange sessions strictly in accordance with the quarter plan advocated by President Harper. The result is that the four quarters of the academic year are somewhat irregular in length. In some institutions the summer session is not a full quarter, but is either six or eight weeks in length and is designated as a summer school rather than as a regular quarter of the university work. In other cases the summer quarter is equal in length to the other quarters. Whatever the details of organization, it has come to be very general for universities and colleges to continue their activities during the summer months. During these months the student constituency of the college or university is very different from that during the other months of the year. Teachers of high and elementary schools attend these summer sessions in such large numbers that the universities become, during this period, training places for the teachers of the lower schools. So vigorous has this movement become that city boards of education are cognizant of it, and they frequently offer inducements for their teachers to continue study by giving them additional compensation for it or by basing promotion within the school system on such study.

THE JUNIOR COLLEGE

The junior college is an institution offering training on the level of the first two college years, that is, the two years immediately following the close of the typical high school period. Although, as related below, the beginnings of the movement reach back into the 19th century, the actual development of junior college units unassociated with universities covers a period of little more than three decades.

While the junior college first took hold in California and the Middle West, the South has proved a fertile field for the development of this type of institution. The movement has perhaps made the least progress in the New England and Middle Atlantic states. In these two groups the independent type is in the ascendent, in the South the church, and in the Middle and Western states the public.

Public Junior Colleges. These are institutions which have developed in association with the public school system and which, with few exceptions, are maintained in connection with public high schools, usually with some attempt at separation. They are for the most part under the direction and control of local school authorities, and constitute an upward extension of the public school system, a natural step in evolution in communities which, in something like a satisfactory manner, have taken care of education on the lower levels.

It is obvious from the accompanying table that the publicly controlled junior colleges are increasing in number, while the privately controlled ones are decreasing. Following World War II, junior colleges have been showing a remarkable increase in enrollments and many new colleges have been established.

Church Junior Colleges. Of the privately controlled junior colleges, approximately two-thirds are church operated. More than one-half of these are in the South. Practically all of the larger denominations are represented by at least one junior college, with the Baptists, Methodists, and Roman Catholics having the largest representation both in number of schools and in enrollments. Like other types of denominational schools, the church junior college gives large emphasis to the creeds of the church which sponsors it.

JUNIOR COLLEGES—NUMBER AND ENROLLMENT: 1920–1955

Source: Office of Education, U. S. Department of Health, Education, and Welfare.

Year	Number of Institutions		Publicly Controlled		Privately Controlled	
	Number	Enrollment	Number	Enrollment	Number	Enrollment
1920	52	8,102	10	2,940	42	5,162
1922	80	12,124	17	4,771	63	7,353
1924	132	20,559	39	9,240	93	11,319
1926	153	27,095	47	13,859	106	13,236
1928	248	44,855	114	28,437	134	16,418
1930	277	55,616	129	36,501	148	19,115
1932	342	85,063	159	58,887	183	26,176
1934	322	78,480	152	55,869	170	22,611
1936	415	102,453	187	70,557	228	31,896
1938	453	121,510	209	82,041	244	39,469
1940	456	149,854	217	107,553	239	42,301
1942	461	141,272	231	100,783	230	40,489
1944	413	84,616	210	56,439	203	28,177
1946	460	156,456	235	109,640	225	46,816
1948	472	240,173	242	178,196	230	61,977
1950	483	242,740	256	187,695	227	55,045
1955	505	351,720	292	298,119	213	53,601

Independent Junior Colleges. The privately controlled independent junior college is often incorporated or it may be owned and operated by one or more persons, unincorporated. There are only 98 schools of this type, of which 38 are coeducational. Sixteen are for men, and 44 are for women. This is the least important of the three types both in the number of schools and in the total enrollment.

The table below gives the enrollment by subjects in 32 public junior colleges in California. Social sciences, English, and commerce and law lead the list. Ancient languages rank below aviation; home economics, below art; mathematics below music. These enrollments indicate an important change in interests from a generation ago.

COURSES IN 32 CALIFORNIA PUBLIC JUNIOR COLLEGES

Subjects	Per cent of students enrolled	Subjects	Per cent of students enrolled
Social sciences	18.7	Art	3.8
English	18.0	Orientation	3.0
Commerce and law	11.1	Philosophy	2.7
Modern languages	9.5	Home economics	1.0
Physical sciences	9.1	Aviation	.5
Biological sciences	6.4	Civic health	.5
Music	6.2	Ancient languages	.3
Mathematics	5.0	Agriculture	.2
Engineering, etc.	3.9		

The History of the Movement. The beginnings of the junior college movement reach far back into the 19th century. As early as 1851, the year before he assumed the presidency of the University of Michigan, Henry Phillips Tappan recommended a differentiation between what he designated the "collegial" and the "executive" parts of education, terms which may be taken to have meant with him what we regard as, respectively, preparatory and professional education. He saw the organization for which he was contending exemplified in the relationship between the *Gymnasien* and the universities of Germany.

Perhaps the most influential of those who have fostered the junior college movement was William Rainey Harper, first president of the University of Chicago. This was the first of the universities named above to institute the junior-senior line of division. President Harper was largely influential in the establishment, during the early years of the present century, of the first public junior colleges,—those maintained in connection with the high schools at Goshen, Indiana, and Joliet, Illinois (a township high school), the latter having maintained an uninterrupted existence to the present day. He encouraged also the establishment of junior colleges on private foundations, and contended that by becoming junior colleges many of the smaller colleges could find a logical place and function in the school system.

Among others who gave significant encouragement to the junior college, previously to and during the earliest stages of its actual development, are Edmund J. James, Alexis Lange, and David Starr Jordan.

Junior Divisions in Universities. Another form of reorganization, which has something in common with the three main types of junior college referred to, is the horizontal separation of the first two from the last two years in certain universities, the lower unit being designated as the "junior college," "junior division," or "lower division," and the upper by corresponding names. By 1922 six universities had introduced this line of cleavage. By 1934 this number had increased to 136.

The Place of the Junior College. The claims made for the junior college by its friends are many, among them the following: (1) that it will be able to give satisfactorily the first two years of college or university work; (2) that it will do much to popularize education on this level; (3) that it will hasten the provision of general and occupational training on this level for those who cannot or should not aspire to higher levels of training; (4) that it will accelerate the impending and desirable reorganization of higher education; and (5) that it will help in obviating the large amount of overlapping of high school and college courses which is known to exist at the present time.

That junior colleges are doing satisfactorily the first two years of college work is attested by the fact that most colleges and universities are admitting graduates of properly accredited junior units to third year standing. Comparison of the teaching staffs of junior colleges with those of other higher institutions shows the former to be somewhat less well prepared for the work, when consideration is given to periods of graduate study. At the same time, even in the present early stage of development, teachers in junior colleges are, on the average, much better prepared than are typical high school teachers, and they compensate to some extent for their present lack of graduate training by having had more experience than college and university teachers and by manifesting in class some superiority in teaching procedure. Salaries of teachers in public junior colleges are not so low as to lead to a misgiving that these institutions will not be able soon to compete with other higher institutions in order to secure a satisfactory teaching personnel.

There is evidence to indicate that, because of lowered costs and proximity to the prospective student, the public junior college is in a position to provide education on this level for a much larger proportion of the total population of the country than now receive it.

Reorganization. The tendencies of reorganization in secondary and higher education during a century have been in the direction of making a place for the junior college. The age of freshmen at Harvard experienced an advance of more than two years in the five decades from 1830 to 1880, and in other older Eastern colleges between the same dates large proportions of students entered at 12 to 17 years of age. During the same period and subsequently (by 1900), the extent of subjects required for admission increased from what was the equivalent of seven to nine units of work to fifteen or sixteen units. This is another way of saying that at least two more years of liberal education were being required for admission to college at the close of the last century than near its opening. While these changes were taking place, collegiate subjects were shifting downward, so that courses formerly open to upperclassmen only, like chemistry, physics, and history of English literature, were available for lowerclassmen, and had even been included in enriched rather than in diluted form in the upper high school years.

The operation of similar forces is seen in the gradually decreasing proportion of students enrolled in the upper years of separate colleges of liberal arts. The tendency of students of such institutions when transferring to other schools is to enroll predominantly in professional curricula. In consequence, there is a decreasing proportion of men in the upper years of colleges of liberal arts, while in universities the number of men in the upper years increases out of proportion to the lower classes.

There can no longer be doubt that high school and freshmen and sophomore college courses have much in common. This means two things: first, that, being much alike, the line that divides secondary from college work as at present administered is artificial, for, if the work in the lower unit is "secondary" in character, that in the first two years of the upper unit is also largely secondary; second, that this identity involves much actual repetition for the individual student. The repetition results from

giving similar work in two institutions, the upper of which knows little of what is going forward in the lower.

Other types of claims which appear acceptable on behalf of the junior college are: (1) that, owing to smaller enrollments, there will appear in it less of the "depersonalization" of instruction which now tends to characterize the larger colleges and universities; (2) that in the new unit there will be better opportunities for laboratory training in leadership than in institutions in which leaders are largely selected from upperclassmen.

The Junior College and the Public School. From what has been said in description of the public junior college, it may be judged that, for the most part, it is an upward extension of the secondary school, with some measure of separation from the unit below. In communities with four-year high schools this means a 6–4–2 organization of public education. The junior-senior high school organization beginning with the seventh grade is, however, gaining such headway that in most cities, unless there is to be a regrouping of grades, we shall have a 6–3–3–2 organization, including in effect three secondary school units, two of them three years in length and the third two years in length.

It does not require much consideration of this plan or long experience with it to make one aware of its unwieldiness. In consequence, there has appeared an advocacy of a redistribution of the eight years of the new secondary school into two units of equal length,—a lower one to include the grades from the seventh through the tenth, and an upper to include the last two high school and the first two college years. Such a plan may be seen to be in harmony with the considerations supporting junior college reorganization already discussed. Small school systems will not, of course, even with generous provisions for state aid, be able to justify the support of the full eight-year period of secondary education. In this respect, however, the situation will in no wise differ from that now obtaining, in which communities maintain differing amounts of training beyond the elementary school, according to their resources and the number of children of secondary school age.

UNIVERSITY EXTENSION

The university extension movement began in England more than a century ago. Its motive was described by one of its early advocates in the question: "Though it may be impossible to bring the masses requiring education to the university, may it not be possible to carry the university to them?" After the movement had made much progress in England, it was brought to this country in 1887 through a discussion at a library conference in Albany, N. Y. Very shortly, centers were established in several cities, and in 1890 a society known as the American Society for the Extension of University Teaching was established and maintained by subscriptions in Philadelphia. In 1891 a number of important steps were taken: the state of New York appropriated $10,000; the newly established University of Chicago took over a local society and began extension work on a large scale; and in December a national congress on university extension was held in Philadelphia.

Scope of the Movement. Following these early steps, the movement has spread over the whole country. The state universities especially have taken it up and are now engaged in a great variety of enterprises which are intended to carry opportunities of intellectual improvement to the people of their states. The work of the state universities is in many cases generously supported by appropriations made by the legislature. Local centers also contribute through payment of fees to the maintenance of classes or lecture courses, and many endowed colleges and universities co-operate with the state universities by sending out lecturers or conducting correspondence courses.

The following paragraph from a bulletin published in 1919 by the office of education indicates something of the variety of service rendered and the number of persons reached.

"The reports from the extension divisions do not generally give exact figures as to the number of persons affected by the various activities, chiefly because such figures necessarily must be only approximate; but estimates show that in the aggregate the number of persons who benefit from lectures, courses, institutes, conferences, package libraries, visual instruction, and other devices is very high and is growing from year to year. One rough estimate of the scope of four different kinds of service in the field totals several million persons served. The figures were taken from the reports of only part of the total number of institutions performing similar service."

EXTENT OF EXTENSION SERVICE

	Number of States	Number of Individuals
Extension lectures (1918-19)	24	2,026,330
Debates and discussions	20	936,550
Institutes and conferences	19	308,800
Requests for information answered	14	179,900

Variety of Extension Service. A brief summary of the types of service rendered may be attempted. First, there are bureaus of information. These prepare bibliographies and outlines for schools, clubs, and civic associations which are pursuing systematic studies, supply information on public health, child welfare, municipal problems, and like matters. Second, aid is given in organizing various forms of community activities, such as pageants, community exhibits, farm demonstrations, and other general occasions. Third, bulletins are published on legislation, on civic and state problems, and on recent scientific advances. Fourth, educational and entertainment films are supplied to clubs, churches, and schools. Fifth, packages of books are made up and lent to persons or organized groups who do not have access in their own towns to public libraries. Sixth, debates in schools or in clubs are organized and directed. In many cases selected reading material is supplied with the plans.

Seventh, classes are conducted in all kinds of subjects. Teachers' classes are conducted in educational subjects; farmers' classes in the mechanics of farm machinery; mothers' classes in the care of infants; general classes in literature, history, and science. These classes are conducted either wholly or in part by lecturers who come from the university, and often are made the basis of regular credit toward the degrees of the university. Eighth, correspondence courses are conducted. These also are often made the basis of credit toward graduation.

Securing Extension Work. Detailed information regarding the opportunities offered through the extension divisions of various universities can be secured by writing to any of the state universities. The office of education of the United States published in 1919 a series of bulletins which can be secured from the superintendent of documents, government printing office, Washington, D. C., by calling for bulletins numbers 61, 62, and 84 for the year 1919. Information regarding correspondence courses can be secured through bulletin number 56 for the year 1919. The universities which carry on a great deal of correspondence work are the University of Chicago, and the state universities of Kansas, Minnesota, Wisconsin, Utah, and North Dakota. Several state departments of education participate actively in extension work. This is especially true of the Massachusetts department. Any of the state departments can supply information about opportunities for correspondence work or in regard to methods of securing extension lectures.

It may be remarked that the correspondence study phase of extension education has in recent years been developed by several large private institutions

which devote their entire energy to this line of activity. These private correspondence schools usually specialize in commercial and mechanical courses with a view to giving practical education to students who have terminated their schooling early.

PROFESSIONAL SCHOOLS

The colleges and universities of the country lead into the professional schools. There was a time when training in law and medicine depended upon a general plan of apprenticeship training, whereby the candidate for admission to the profession associated himself with some experienced member of that profession and studied with him in private. Young men "read law," as the phrase put it, in the office of some law firm, or the prospective doctor acted as an assistant to some practitioner. Later the professional men organized institutions where a number of candidates came together and paid fees for training. Professional schools thus grew up on a quasi private basis and in many instances were very profitable because the instruction was given by men who secured their main salaries from the regular professions and took the student fees as additions to their incomes.

As the demands for professional training became more rigid, and especially after legal enactments began to prescribe more in detail the requirements for admission into the professions of law and medicine, the private professional schools found that they had to reconstruct their organization. It was no longer possible to give adequate instruction under conditions which were attractive to the instructors who devoted most of their time to other professional duties. Gradually professional schools began to be assimilated by universities, until finally the private professional training school has very largely disappeared.

Standardization in Medicine. The standardization of professional education is being pushed forward rapidly at the present time. The most vigorous movement of this type is exhibited in the schools devoted to the training of physicians. Under the guidance of the American Medical Council, a survey of the medical schools of the country was made in 1910 and it was found that most of the private institutions were very meager in their equipment and inadequate in their instruction. The Medical Council set up a system of grading medical schools, and, while it had no authority to enforce its grading and classification, the significance of its pronouncements was so great that most of the private medical schools were forced to close their doors. In this way a professional group acting without authority enforced a high standard upon institutions for professional training.

In the professions other than medicine the movement has taken the same general direction, but somewhat more slowly and without any concentrated effort on the part of any single powerful board.

Economy in Professional Training. One of the important problems with which these standardizing bodies for the professional schools have had to deal is that of the relation of professional education to the general training given in the college of liberal arts. In this country the training of a candidate is so far behind that of European candidates in point of time that the professional man in the United States usually enters upon his productive activities two years later than the European candidate. The reasons for this delay in American professional education have already been given in the preceding discussions of the organization of elementary and secondary schools. Elementary education in this country has never been so related to higher education as to introduce those who are going on into higher schools to the advanced subjects as early as do the European institutions.

The professional schools of the United States, however, have not in general gone back in their consideration to the high or the elementary schools, but have attempted to adjust their own relations with the college in such a way as to enable young men to get into the professional courses at a somewhat earlier date. There has been from time to time very vigorous discussion of the possibility of reducing the college course to two or three years. In many cases professional schools have been advised to accept students directly from the high school. At the present time there is no definite solution of this difficulty, and the probabilities are that a solution will not be reached until the professional schools and the higher institutions of learning canvass the whole problem of the organization of American education, from its elementary stages through the professional schools.

Technical Schools. Technical education of a higher grade has developed very rapidly in the United States in recent years. There are a number of engineering schools which are of university grade. These have been especially fostered by the land-grant colleges, and in some instances have come to be such important parts of the educational system that their courses have eclipsed in large measure the liberal arts training which formerly was characteristic of all higher institutions.

SCHOOL FINANCE

The funds for the maintenance of the educational system described in the foregoing pages are derived from public taxes, Federal grants of land, student fees, and donations. In general, it may be said that the revenues for the support of elementary schools and high schools are all derived from taxes and grants of land. Revenues for higher education come from a variety of sources.

The table presented on pages 1638 and 1639 shows that during recent years the percentage of public school support paid by the state has greatly increased, while the percentage paid by the school districts has greatly decreased. The percentage paid by the Federal government has remained fairly constant.

Wealth and Income. The measures of ability to acquire anything are wealth and income. By these measures some states are much more able to support schools than other states. New York, California, New Jersey, and Nevada spend more than $120 annually per pupil enrolled in the elementary and the secondary schools, while several Southern states spend less than $50. The Southern states spend less for schools, although they have higher tax rates for schools than other sections. The Southern states have much less wealth and income than other states.

Inequality of Educational Opportunity. These figures clearly indicate that the education which can be supplied to American children varies according to the available financial resources of the different states.

What is true of states is equally true of districts within the states. Several state surveys which have been made in recent years have found it necessary to dwell on this fact. Neighboring districts having equal school registrations often differ in wealth in the most extreme degrees. Rural children, in general, have much more meagre educational opportunities than urban children. The Negro race will work for generations before obtaining equal opportunities in the South. Somewhat similar conditions prevail among the Mexicans in the Southwest. The children in sparsely settled districts and even states are handicapped even when expenditures are liberal. If the educational system of the United States is to be truly democratic, some method must be found of counterbalancing the inequalities among localities and states.

Bonded Indebtedness. In addition to the revenues for current expenses which are derived from taxes, the public schools of the United States have developed a method of securing funds for making payments on buildings and permanent improvements through the sale of bonds which must in the long run be paid for out of public funds. The amount of bonded indebtedness incurred for schools is very

difficult to ascertain, but it is altogether certain that in many communities obligations have been assumed which constitute a very heavy burden for the future to carry. It is especially true in connection with the erection of rural high schools that communities have been led through a spirit of competition with neighboring communities to invest large sums in the equipment of relatively very elaborate buildings when the prospect of a student population for these high schools is comparatively slight.

Distribution of Funds. The distribution of school funds to the different grades of education is one of the grave problems of school finance. It may be said roughly that high school education costs twice as much as does elementary education. Practices differ very greatly in different parts of the country.

Rapidly Increasing Costs. The increase in school expenditures in recent years has been a source of great anxiety to those who are in charge of public revenues. It has been necessary to pay a much higher rate of salaries to teachers since the war, and the cost of erecting public schools has been very great. The question has been seriously raised in many quarters whether the public schools of this country can be carried forward on the scale which has been set by earlier practices of American committees. One of the chief problems which has led to this discussion in recent years is the problem of financing high schools. A few years ago the attendance on high schools was relatively small, and, though the per capita expenditures were high, the aggregate expenditure for these schools was within easy possibility of support by the public. But, since the high schools have increased in population so rapidly in recent years, they have made a very heavy demand on public resources.

American communities do not usually understand why the cost of education in this country is so much higher than it is in other countries. The reason has been clearly set forth, however, at numerous points in the preceding discussions. No other nation has attempted to maintain a system of free high schools. Furthermore, no other nation has brought into its high schools anything like the proportion of the youth of the country represented in the high schools of the United States. Those who are disposed to advocate a curtailment of expenditures for public education in this country should recognize clearly the fact that they are asking the country to give up an experiment in popular education which is one of the unique characteristics of this democracy.

On the other hand, communities will have to recognize the fact that it is quite impossible to maintain public schools of the sort which exist in the United States without making very heavy demands upon public funds. It is estimated that in many of the cities of the United States from one-third to one-half of the public revenues of the municipalities are expended in the maintenance of public schools. Grave problems of political interference with the schools have arisen in recent years because of the large financial draft made on public resources by this educational system. The whole problem of maintenance, therefore, becomes a problem of public control and political policy as well as of school policy.

INSTITUTIONS OF HIGHER EDUCATION WITH $20,000,000 OR MORE IN ENDOWMENT AND OTHER NON-EXPENDABLE FUNDS, 1950

Harvard University	Cambridge, Massachusetts	$201,775,433
Yale University	New Haven, Connecticut	127,392,152
Columbia University	New York, New York	100,707,278
University of Texas	Austin, Texas	82,637,322
University of Chicago	Chicago, Illinois	77,863,256
Northwestern University	Evanston, Illinois	60,900,559
University of Rochester	Rochester, New York	60,473,402
Duke University	Durham, North Carolina	58,280,050
University of California	Berkeley, California	54,916,786
Massachusetts Inst. of Technology	Cambridge, Massachusetts	51,603,652
Princeton University	Princeton, New Jersey	49,818,878
Cornell University	Ithaca, New York	44,949,027
University of Minnesota	Minneapolis, Minnesota	38,544,466
A and M College of Texas	College Station, Texas	38,497,838
Stanford University	Stanford University, Calif.	36,910,578
Johns Hopkins University	Baltimore, Maryland	36,125,751
Rice Institute	Houston, Texas	31,598,354
Vanderbilt University	Nashville, Tennessee	31,555,082
University of Pennsylvania	Philadelphia, Pennsylvania	31,453,798
Washington University	St. Louis, Missouri	31,012,675
Carnegie Inst. of Technology	Pittsburgh, Pennsylvania	29,448,854
Dartmouth College	Hanover, New Hampshire	27,156,681
California Inst. of Technology	Pasadena, California	24,093,641
Oberlin College	Oberlin, Ohio	23,961,593
Emory University	Emory University, Georgia	22,297,612

Federal Appropriations. As a part of the support of public schools and state institutions of higher learning, certain funds given by the Federal government must be included. These funds will be referred to in the next section, which deals with the participation of the United States government in education. At this point it should be noted that the aggregate of such grants is very large, and the effects of Federal appropriations have in many cases been important in determining educational policy.

State Appropriations for Universities. Appropriations are made by state legislatures for the support of higher institutions. It is estimated that the income of public universities from state, Federal, and municipal sources for the year 1946 was approximately 350 million dollars. The receipts of these institutions from fees and other incidental sources of income was approximately 150 million dollars.

PUBLIC EXPENDITURE ON EDUCATION

Source: Unesco Handbook of Education.

Source of Revenue	Total	Primary and Secondary Education	Higher Education	Other
PUBLIC SCHOOL EDUCATION	$5,221,753,000	$4,311,534,000	$ 810,917,000	$ 99,302,000
Contributions from Federal Government	386,027,000	120,270,000	254,005,000	11,752,000
Contributions from State Governments	2,094,321,000	1,676,362,000	332,096,000	85,863,000
Contributions from local authorities	2,561,812,000	2,514,572,000	47,240,000	.....
School fees	84,518,000	.....	84,518,000	.....
Interest on endowment, gifts, etc.	14,886,000	330,000	14,556,000	.....
Other sources	80,189,000	.....	78,502,000	1,687,000
PRIVATE SCHOOL EDUCATION	1,270,885,000	530,021,000	727,159,000	13,705,000
Subsidies of grants-in-aid from public funds	300,225,000	.....	292,937,000	7,288,000
School fees	220,083,000	.....	220,083,000	.....
Revenue from endowments, gifts, etc.	76,912,000	.....	76,912,000	.....
Other sources	673,665,000	530,021,000	137,227,000	6,417,000

Note: Data refer to income for expenditure on education. Expenditure on administration is included in the figures shown for primary, secondary, and higher education.

Individual Responsibility and Costs. These figures raise an interesting and important question regarding the individual's responsibility for the cost of his education. The student undoubtedly gains great personal advantage from his schooling. He is prepared to earn a higher wage than he would receive if he were uneducated. It is a perfectly legitimate question, therefore, to ask how far he should pay for this improvement in his earning capacity by paying tuition for his education. Especially in the higher institutions does this question become an immediate one in view of the fact that the resources of the higher schools are limited and the population of these institutions is rapidly increasing.

While it may be argued that the lower schools are necessary for the maintenance of the state and may legitimately be paid for by public moneys, it becomes very much more difficult to defend public demands for higher education, especially if such education prepares the individual for professional activities from which he derives returns that are distinctly superior to those received by the ordinary workman. The contrast between 350 million dollars appropriated out of public funds and 150 million dollars derived from fees puts the matter in very concrete terms.

FEDERAL PARTICIPATION IN PUBLIC EDUCATION

In foregoing discussions it has been stated that the Federal government does not have any direct control over the school systems of the various states. It exerts some indirect control, however, through the standards which it establishes for school participation in the various educational funds which it appropriates.

The Federal government has shown its interest in education in two ways: first, through making land and money grants for education; and, second, through establishing various educational agencies such as the United States office of education. Its land and money grants from the beginning to the present time would total several billion dollars, and during recent years its annual appropriations have amounted to several hundred million dollars. Its major appropriations at present are made for the following purposes: education of active participants in World War II, vocational education in public secondary schools, higher education in land-grant colleges, vocational rehabilitation, public schools in the District of Columbia, schools for Indians, education for military service, agricultural extension service, agricultural experiment stations, and the United States office of education.

As a matter of historical development, the Federal government became involved first in education because of its relation to scientific and educational problems.

In the first place, the various departments of the Federal government find it necessary to employ experts. For example, the government must have at its disposal the services of expert engineers for its harbor service and for its management of public lands. The government has also found it necessary in recent years to employ a great many experts who are competent to develop standards of the type needed in commerce and agriculture. There must be experts to prepare crop reports in the department of agriculture, and in the bureau of standards of the department of commerce there must be experts competent to deal with all sorts of scientific problems, such as those which arise in the generation and distribution of electricity. The bureau of standards must be prepared also to test the various raw materials which are imported into this country and distributed to American manufacturers. These illustrations make it clear that the Federal government must participate in the scientific work of the nation. Indeed, the resources of the Federal government are necessary in many cases if scientific work is to go forward on a scale to insure adequate general information for the conduct of modern enterprises.

It becomes a matter of vital importance to the nation that experts be trained for these lines of public service. Furthermore, when they undertake their work they must be supplied with suitable scientific equipment. The government has been forced, therefore, into the most intimate and vital contact with all the educational institutions of the country.

Land Grants. For reasons entirely foreign to those which were cited in the last paragraph, however, the Federal government was drawn into the support of public education. A publication of the office of education written by Professor F. H. Swift states the case as follows:

"On May 20, 1923, will occur the one hundred and thirty-eighth anniversary of the passage of one of the most famous and most significant ordinances ever enacted by the Congress of the United States. Out of this Ordinance of 1785 arose a national policy which has resulted in providing the states with vast grants for public education. This policy was not, however, positively assured until two years later, when Manasseh Cutler, one of the directors of the Ohio Company, held up the Congress of 1787 with the threat to buy land from some individual state unless his demands for school, university, and church lands should be granted.

"Congress, badly in need of money and fearful lest Cutler should carry out his threat, passed, on July 23, 1787, an ordinance authorizing the board of treasury to contract for the sale of lands to the Ohio Company on the terms demanded by Cutler, which included the following grants of land: Two townships for an institution of higher learning, and, within each township, one section of land for the ministry and one for schools. Thus began a national policy which resulted in granting to the states, Federal lands and moneys for public schools. Every one of the 30 public land states, i. e., states carved out of Federal domain, received

extensive grants of Federal lands for endowing schools, which have been largely devoted to establishing permanent state endowments for public schools.

Extent of Grants. "Some Federal lands granted to the states have been given specifically for public schools; others, such as swamp lands, salt lands, and internal improvement lands, although not given specifically for schools, were devoted to schools by many states. Every public land state admitted prior to California, in 1850, received from the national government for the support of public schools the section numbered 16 in each congressional township. California and every subsequently admitted state, except Utah, Arizona, New Mexico, and Oklahoma, received sections 16 and 36. The first three of these states received sections 2 and 32 as well as 16 and 36. Oklahoma offers a special case also.

"In addition to township school sections aggregating approximately 73 millions of acres (73,155,075) (*a*), Congress, under separate acts, has granted to public land states approximately 11,000,000 acres of public domain for purposes of internal improvement; salt lands aggregating over 606,000 acres, and swamp lands aggregating more than 64,000,000 acres. It should be noted that lands granted as swamp lands, as in the case of Minnesota, sometimes proved to contain rich mineral deposits which made them among the most valuable lands granted to a state. From these various grants there have been given in all to the 30 public land states approximately 147,000 square miles of school lands, 101,000 square miles of swamp lands, 17,000 square miles of internal improvement lands, and 900 square miles of salt lands.

Colonial School Lands. "The policy of reserving for schools one or more sections of land in newly surveyed townships had become fairly well established in colonial days. As early as 1659, the general court of Massachusetts granted the towns of Charlestown and Cambridge 1000 acres of land each on condition that they be forever appropriated to maintain a grammar school. In 1672, Connecticut granted 600 acres each to the four county towns of Fairfield, New London, New Haven, and Hartford for the support of a grammar school. In 1687, the Connecticut colony granted more than one-half of what is now Litchfield county to the towns of Hartford and Windsor to save this land from the cupidity of the royal governor Andros. Hartford and Windsor refused to restore this land to the colony when the troublesome times ceased. A controversy arose which resulted in a compromise. In 1726, the territory was divided in half. The eastern half was given to Hartford and Windsor. The colony took the western half, which it laid out in seven townships. Five of these townships were divided into 53 parts each. One of these 53 parts in each town was reserved for the support of a town school, and two for the support of the ministry. In 1733, the assembly of the colony of Connecticut enacted that seven towns belonging to the colony be sold and the proceeds divided among the towns already settled, in proportion to their list of polls and ratable estate, the proceeds to be set apart by each town as a permanent school fund.

"From the proceeds of this policy of Connecticut two classes of permanent funds arose: (1) The fund belonging to the colony which was distributed among the towns of the colony; (2) funds belonging to new towns, arising from reservations of school lands within the towns.

"The colonial policy of reserving lands in each town was adopted soon after the formation of the Union by several states. Georgia, in 1783, provided for the reservation of 1000 acres of land in each county for the support of free schools. New York, in 1786, and Massachusetts, in 1788, provided for the reservation, in state-owned lands, of lots for schools and for the ministry."

"(*a*) Exclusive of approximately 21,000,000 acres of school lands reserved in Alaska; approximately 94,000,000 acres if Alaskan reservations be included."

Land-Grant Colleges. The interest of the Federal government in science, together with its method of appropriating land as a device for aiding the states in promoting education, led during the Civil War to the adoption of the so-called Morrill act of July 2, 1862. This act gave to each state 30,000 acres of public land for each senator and representative to which it was entitled in Congress, the states not having enough public lands within their borders receiving land scrip for the deficit. The money derived from the sale of these lands was to constitute an endowment fund, the interest of which was to be used for the support of "at least, one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." The legislative assent of a state to the provisions of the act was made necessary before the state could participate in the benefits of the act.

On March 2, 1887, Congress appropriated $15,000 annually to each state, to be used by the state in conducting researches and in verifying experiments in the agricultural experiment stations under the direction of the land-grant colleges. The appropriations were made from money arising from the sale of public lands.

The second Morrill act, of August 30, 1890, appropriated annually, out of money derived from the sale of public lands, $15,000 to each state and territory for the further endowment and maintenance of the land-grant colleges, this to be increased annually by $1000 for ten years, after which time the amount for each state and territory was to be $25,000 annually. This money was to be applied only to instruction, and none of it could be used for buildings.

Subsequent acts have increased from time to time the appropriations to the institutions established under the acts mentioned in the foregoing paragraphs.

Many of the land-grant colleges were started in states which did not have state universities and in due time were expanded into state universities. Every state now has at least one land-grant college. Each of the Southern states has two such colleges, one for whites and the other for Negroes.

On the curriculum of higher education the land-grant colleges have exerted a large influence by popularizing the advantages of vocational education, especially in agriculture and engineering. Through their teaching, their research, and their extension work and other services they have promoted the rapid development of agriculture and engineering. Over the years they have had generous financial support from the Federal government and from the states.

Other Federal Subsidies for Education. For many years the Federal government has made annual appropriations for various educational enterprises. In addition to the annual appropriations for land-grant colleges, it now makes annual appropriations for the following purposes: U.S. office of education, vocational rehabilitation, vocational education at secondary school level (see pages 1683-1684), education of veterans (see page 1682), Federal schools for Indians and natives of Alaska, Federal oil and mineral royalties, national forest funds, U.S. Military Academy, U.S. Naval Academy, state marine schools, public schools in Canal Zone, Howard University, National Training School for Boys, Columbia Institution for the deaf, public schools of the District of Columbia, and school lunches.

In addition to the subsidies just mentioned, the Federal government often makes emergency grants to education. These grants run only for the duration of the emergency. Among such grants, all of which have since been withdrawn, were those for the National Youth Administration, the Work Projects Administration, and the Civilian Conservation Corps.

Summary of Federal Land Grants. By its system of land grants to schools, the Federal government has given public education a mighty stimulus. This stimulus was much needed, especially in the early days when the financial resources of the people were limited and when a general interest in education had not yet risen among the people. The income from these land-grants today provides less than one per cent of the support of public schools and colleges, but in the early days the income provided a much larger percentage.

The following table summarizes the land gifts of the Federal government to common schools, to institutions of higher education, and to other types of schools. It is observed that 149,299,775 acres of land have been given to all types of schools.

TOTAL OF NATIONAL GRANTS FOR EDUCATION

Grant and Purpose	Acres Granted	Fund Derived from Sales	Probable Future Income	Total Income
1. *For Common Schools:*				
Sections for Schools	81,064,300	$103,000,000	$410,000,000	$513,000,000
Saline Grants	(c.) 900,000	(c.) 1,000,000	. . . . .	1,000,000
Five per cent of Land Sales	. . . . .	7,187,316	(c.) 7,000,000	14,000,000
Surplus Revenue	. . . . .	(c.) 14,000,000	. . . . .	14,000,000
Internal Imp. Act	5,000,000	(c.) 6,000,000	(c.) 8,000,000	14,000,000
Swamp Land Grants	(c.) 45,000,000	(c.) 15,000,000	(c.) 2,000,000	17,000,000
Forest Reserve Per Cent	. . . . .	(c.) 1,000,000	(c.) 25,000,000	(a) 26,000,000
Totals	(c.) 131,964,300	(c.) $147,187,316	(c.) $452,000,000	$599,000,000
2. *Aid to Higher Education:*				
University Grants	3,407,643	(c.) 5,000,000	(c.) 27,500,000	32,500,000
Land-Grant Colleges				
Grants of Land	11,367,832	13,736,178	(c.) 25,000,000	39,000,000
Exp. Station Grants	. . . . .	(c.) 14,000,000	30,000,000	(a) 44,000,000
Laws 1890 and 1907	. . . . .	23,920,000	62,500,000	(a) 86,420,000
Totals	14,775,475	(c.) $ 56,656,178	(c.) $145,000,000	$201,920,000
3. *Grants for Other Types of Schools:*				
Normal Schools	(c.) 1,500,000	(c.) 2,500,000	(c.) 17,500,000	20,000,000
Deaf, Dumb, and Blind	560,000	. . . . .	5,600,000	5,600,000
Reform Schools	(c.) 500,000	. . . . .	5,000,000	5,000,000
Totals	2,560,000	(c.) $ 2,500,000	(c.) $ 28,100,000	$ 30,600,000
4. *Summary of Grants*	(c.) 149,299,775	$206,343,494	$725,100,000	$829,520,000

(a) Calculated for twenty years into the future, at present rate of increase.
(c.) Estimated approximately.

New Department of Education. Since April 1953 the new Department of Health, Education, and Public Welfare has taken over the old Office of Education, which was a special bureau in the Department of the Interior. This office prepared and still prepares elaborate statistical reports, which have been so frequently drawn upon in the course of the earlier discussions of this section that it is hardly necessary to do more than refer to its statistical activities. It has absolutely no authority over public schools. It does not have authority even to demand statistical reports. In spite of this handicap, however, it has succeeded in developing the most valuable educational reports published by any government in the world.

"G. I. Bill of Rights." According to the Servicemen's Adjustment act of 1944 and as amended in 1945, any veteran of World War II who had at least 90 days of active service is entitled to at least 12 months of education at government expense, provided it is started not later than 4 years after separation from active service or 4 years after the end of the war, whichever date is the later. After that 12 months, he is entitled to an additional period equal to the time spent in active service after September 15, 1940, and before the end of the war. The total period cannot exceed 48 months, nor extend beyond 9 years after the end of the war.

The student may select his course and his school, provided it is on the list of the Veterans' Administration. The government pays his fees and for his textbooks up to $500 per school year. It also pays a certain amount each month for his subsistence.

VOCATIONAL EDUCATION

The term "vocational education" has been used in recent times to cover those school courses which prepare for commercial and industrial pursuits. This is a very limited meaning of the words, because preparation for the professions is also in a very proper sense vocational education. If the broader meaning be attached to the term, all education is vocational. Harvard college, the first American institution of higher education, was a vocational school organized to train the clergy. Every college or technical school has in like manner been a school for the training of young men and women to enter upon the duties of adult life.

Considered in a narrower sense, vocational education, or preparation for commercial and industrial positions, is of comparatively recent origin in the United States. Formerly boys and girls were trained for such positions by being apprenticed to individual employers from whom they learned by imitation and without systematic instruction. The apprenticeship system began to break down, however, as soon as modern economic conditions became complex and especially when machine industry replaced the older and simpler handcrafts.

The first type of special training for practical business pursuits in this country was commercial education. The manufacturing processes by which raw materials are worked over were developed on an extensive scale in Europe rather than in this country.

Commercial Schools. As early as 1843, a man named Bartlett established in Philadelphia a school for the training of bookkeepers. Bartlett was followed by others, and soon every large city was supplied with a private business school or college which taught the elements of accounting and gave training in penmanship. These schools flourished because they supplied an urgent practical demand of the business world. Their courses were of short duration and highly intensive. The students were eager and there was a ready market for their services.

As business methods evolved, the courses of study in the private business schools also developed. When the typewriter came into common use, the schools transformed themselves in many cases into schools of typewriting and stenography.

In the early '90's, the interest in commercial education had become so widespread that the attention of the public and of educators was drawn to it, and commercial courses for the public began to be advocated. In 1894 a group of commercial teachers met in Asbury Park and launched the movement.

INCOME AND EDUCATION
FOR ALL MALES 25 YEARS OF AGE AND OVER

Source: United States Chamber of Commerce

Income levels among the male population are shown to be closely related to levels of education:

Those with college or high school education had. . .
73% of the $5,000 to $6,000 incomes
77% of the $6,000 to $7,000 incomes
79% of the $7,000 to $10,000 incomes
82% of the $10,000 or more incomes

Those with an eighth grade education or less had. . .
77% of the incomes below $500
73% of the $500 to $1,000 incomes
65% of the $1,000 to $1,500 incomes
61% of the $1,500 to $2,000 incomes

Since that date, high schools have rapidly developed courses in typewriting, stenography, and business methods, until now commercial education is one of the leading lines of instruction.

Manual Training. The first types of technical training to be adopted in this country were drawing and manual training. The exhibits of skilled workmanship brought from Europe to the Centennial exposition in Philadelphia in 1876 attracted the attention of Americans and convinced them that this country was far behind in the training of artisans. There was at that time no provision in the public schools for training pupils in manual skill. The European systems of woodworking, especially the sloyd system, were therefore borrowed and put into the school programs. Special schools were organized for the purpose of giving manual training courses. The first of these was the manual training school connected with Washington university at Saint Louis.

Manual training was advocated by its early promoters as a useful form of general training appropriate for all pupils, whether they were going into industry or the professions. Skill of hand, these promoters said, is just as important as reading and the sciences for a full development of personality.

The manual training movement has resulted in the introduction of handwork of some type into all schools. As a device for satisfying the demands of the business world for the training of workers, however, it has been superseded by a later and more distinctly technical type of education.

Most schools now use the term, industrial arts, instead of manual training.

Technical Industrial Schools. In 1906 the state of Massachusetts appointed a commission on industrial and technical education. This commission pointed out that boys and girls were urgently needed in the machine industries, and that they were utterly unprepared by the ordinary schools for their places in factories. Indeed, it was clearly the belief of this commission that the ordinary forms of education are in many cases detrimental to industry. With the report of the Massachusetts commission there began a controversy which has been waged continuously from that time. On the one side have been arrayed the industrial leaders of the country, who have advocated two systems of schools, one for industrial workers, and one for the children of the upper classes of society who are to enter the professions. On the other side are the educators and other citizens, who hold that American public education must be a unit system unlike the dual system of Europe. This latter group advocates a reconstruction and liberalizing of common education, but insists that all the children of the United States shall be educated in the same school.

The National Society for the Promotion of Industrial Education, organized shortly after the Massachusetts commission had made its report, was the chief agency in inducing Congress to pass in 1917 the law creating the Federal board for vocational education. This board at first devoted its energy to the promotion of a dual system of education, but has since receded somewhat from that position and is at present co-operating with the high schools of the country in the establishment of industrial courses.

Agricultural Education. Parallel with the growth of technical education in industry, the schools have developed courses in agriculture. The department of agriculture has been influential in promoting such courses, and since 1914 has used a large Federal fund provided under the Smith-Lever act for this purpose.

Home Economics. Special training for girls in the arts of home making, cooking, and dressmaking has developed rapidly in recent years in the upper grades of elementary schools and in the high school.

Part-time and Co-operative Courses. Schools and industrial concerns have arranged to employ students on part-time programs so that there may be opportunities for these students to study and at the same time come into contact with practical processes.

Smith-Lever Subventions. The Smith-Lever act, which became Federal law in 1914, is commonly known as the agricultural extension act. It provides Federal subventions to aid the states in promoting extension work in agriculture and home economics. The act made an appropriation for extension purposes but required each state or local community, or both, that might desire to participate in the funds, to match the Federal appropriation. This was the beginning of the use of the matching principle by the Federal government and, with few exceptions, such as in the case of grants made to the schools for defense training during World War II, the principle has been subsequently followed.

The extension work is carried on chiefly among adults but partly among youth of school age. Under the provisions of this act and its later amendments, approximately 90 per cent of the counties of the United States now employ agricultural agents and approximately 50 per cent of the counties employ demonstration agents of home economics. Approximately 15 per cent of the counties employ club-work agents who work exclusively with boys and girls in 4-H Club work and similar activities.

In each state the extension activities are supervised by the extension division of the land-grant college of the state. Each of these divisions publishes annually many bulletins and these have wide circulation, especially among the farming districts of the state. In addition to the day-to-day work of the county agents and of the club leaders, many institutes and other meetings are held every year.

All in all, these extension activities have constituted the largest experiment in adult education which the world has ever seen. They have not only improved agriculture but they have also improved the homes and the general environment of the rural areas.

Smith-Hughes Subventions. The approval of the Smith-Hughes law in 1917 marked the beginning of a new policy of the Federal government toward the financing of education; in brief, it started the policy of providing subventions for education lower than the college level. This act, which is often called the Federal Vocational Education act, provided for subventions to the secondary schools for instruction in agriculture, home economics, and industrial education. It also provided funds for the preparation of teachers of those subjects. According to the provisions of the act, the subvention was to amount to $1,860,000 in 1917–18, and was to increase annually until a maximum of $7,367,000 was reached in 1925–26. The appropriations have been increased several times since 1925–26, and they now amount to more than $25,000,000 annually. The money is apportioned to the several states on the basis of total population, and in order to be eligible to receive it, the state or local community, or both, shall spend an equal amount for this work; each state and local community must also meet certain other standards prescribed by the act.

These vocational departments of agriculture, home economics, and industrial education are now found in thousands of schools, especially secondary schools, and thousands of new teachers are required annually by the departments. Salaries paid these teachers are somewhat higher than the average salary for teachers of the nation. They must serve 11 months, however, whereas the typical teacher serves only 8 or 9 months; and they must do much more community work than the typical teacher.

General supervision of the Smith-Hughes program is given by the United States office of education. More intensive supervision of the program is provided in each of the states by the division of vocational education of the state department of education. Such a division is required by the Smith-Hughes act. Any school desiring to organize a Smith-Hughes department, or a George-Deen department, should contact its state department of education.

George-Deen Subventions. The George-Deen legislation, enacted in 1937, provides an annual Federal subsidy for training workers for retail selling and other distributive occupation. Departments for the training of these distributive occupations are already found in hundreds of high schools, especially the large schools. The preparation given for such occupations is commonly called "distributive education."

As is the case with the Smith-Hughes subvention, the George-Deen funds are distributed to the states on the basis of total population, and in order to be eligible to receive them, the state or local community, or both, shall spend an equal amount for the program. Certain other standards must also be met.

Corporation Schools. Many industrial concerns have found it necessary to supplement the training given in the public schools by special courses for their own employees. Thus, department stores have found that they must train their salesmen, first, by giving them general information with regard to the duties of salespeople and, second, by giving them special instruction in regard to the particular commodities handled in that special establishment.

Another type of corporation school has been organized by industrial concerns. For example, there are schools for the training of printers. Young boys are taken into these schools and brought up in the trade. Instruction in such schools is much more systematic than was the training formerly given to an apprentice in the trade, and it is also more elaborate in that the boy who is attending the school is given some instruction, not only in the particular activities of the trade itself, but in the use of language and in the simpler elements of the sciences which contribute to the trade.

Continuation Schools. The general term "continuation school" has been used to refer to numerous types of organized education, sometimes conducted by the public school system itself, and very frequently conducted by institutions like the Young Men's Christian Association and the Young Women's Christian Association. A continuation school is a school in which students who have completed the ordinary course are carried further and are given training especially suited to the industrial and commercial activities which they are to take up in adult life. The states of Massachusetts and Wisconsin have been very active in organizing continuation schools. In both of these states a requirement has been made by law that children either shall go forward in the regular educational system beyond the ordinary age limit of 14 years required for common school attendance or shall attend continuation courses. The laws in these states, and in other states where similar measures have been adopted, require employers to release their minor workers for attendance on continuation schools during the regular working hours in the week. Continuation classes are therefore to be distinguished from the evening courses often organized in public schools for the training of adults who are engaged in industry. Continuation classes are one phase of the general movement, which has been going on in recent years in this country, for the education of industrial workers.

Vocational Guidance. The recorded history of vocational guidance in connection with education and philanthropy begins about the year 1908, and is associated with the names of Frank Parsons in Boston and E. W. Weaver in New York. Parsons' initial efforts were sponsored by philanthropy, and placed major emphasis on two units of the guidance program,—occupational choice and the selection of training programs. The High School Teachers' Association, under the leadership of Mr. Weaver, sponsored the New York movement. The dissemination of occupational information and placement received equal emphasis with occupational choice and selection of training programs. Case study was employed in both cities. Neither effort received financial support from, or administrative recognition by, the public educational system.

From this informal beginning, vocational guidance has developed into a regular part of the program of many school systems. There are three distinct types of school activity which can properly be classed under the head of vocational guidance. First, numerous courses are now provided in high schools and colleges in which information regarding vocational opportunities is given. Second, pupils are offered, especially at the junior high school level, courses known as try-out courses in which they are given an opportunity through short periods of contact with various lines of activity to discover whether they are interested in mechanical, artistic, literary, or commercial vocations and whether they have aptitude in any of these lines. Third, many schools have official advisors who make careful studies of pupils, testing their intelligence and abilities and consulting with them regarding their tastes and economic needs. Such advisors sometimes come in contact with pupils when they apply for work certificates. At other times they advise pupils throughout their whole school careers. The program of vocational guidance merges into the general program of educational guidance or, as it is sometimes called, the program of personnel guidance.

In its broadest sense, guidance is concerned with every phase of the life of the individual. Many educators, therefore, hold the view that it is the same as education. Other educators, on the contrary, believe that it is concerned only with crises in the life of the individual. The more important of these crises and types of guidance are the following:

1. School guidance
2. Vocational guidance
3. Leisure-time guidance
4. Health guidance
5. Character guidance
6. Home-membership guidance
7. Civic guidance

The Personnel Problem. Between 1908 and 1918 many educational systems and a large number of industrial plants instituted and operated a considerable variety of personnel units, or "special features," more or less independent of one another, but each intended to assist in the solution of some phase, or some phases, of the personnel problem. During the same period three or four national organizations came into being with the solution of personnel problems as their major objective. National vocational guidance conferences met in 1910 and 1912, and a permanent organization was perfected in 1913.

Organization on a national basis was a war-time accomplishment, and at the close of the war the association paid the penalty of overdevelopment on a nonprofessional basis and disbanded. The American Association of Public Employment Offices was launched in 1913 under the auspices of practical students of employment problems. Each of these organizations has been reorganized, and two have changed their names, but none has made any outstanding contribution to the solution of personnel problems. In addition to the above organizations a considerable number of national associations, with major objectives in other or allied fields, have been interested in and have made minor or local or national contribution within the personnel field. The Young Men's Christian Association, The Young Women's Christian Association, the Knights of Columbus, chambers of commerce, the American Association for Labor Legislation, and the Federated American Engineering Societies are illustrations.

World War and Personnel Programs. The war brought into prominence all the operating units of personnel programs and broadened the vision of both employer and educator relative to the interrelation of such units and the desirability of unification. The study of individual differences, which had long commanded the attention of educators, was applied to army personnel service under the direction of nationally known experts. Rating scales were developed, and the beginnings of job analysis, job classification, and job specification were borrowed from industry and were adapted to war emergencies. Rehabilitation programs tended to renew guidance activities in connection with vocational education; and training programs for counselors and personnel directors were offered by a number of colleges and universities. The United States Employment Service, the Training and Dilution

Service, the War Labor Policies Board, the War Industries Board, and the Women in Industry Service are examples of war-time governmental services which were instituted to deal with personnel problems.

Overvaluation of war-time experimentation and results has tended to discredit the entire personnel movement, and the re-establishment of public confidence now confronts professional students of personnel problems. The standardization of personnel terminology and a fundamental philosophy of personnel service in its relation to all of the varied experiences which an individual meets in the process of occupational preparation and adjustment, demand scientific determination. In the meantime, vocational guidance is still quite generally applied to educational and philanthropic efforts, while employment management, industrial relations, and personnel service are correspondingly common terms in industry. The Second International Conference, Barcelona, 1921, unanimously adopted the terms "vocational guidance" and "vocational selection." Vocational guidance was defined as the choice of an occupation for an individual; vocational selection, as the choice of an individual for a given occupation.

No agency has, as yet, instituted a unit program covering the entire personnel field. It is, however, generally conceded that when such a program is formulated it should co-ordinate all personnel functions and should include the study and interpretation of individual differences, methods of personality culture, and a number of other units. The problem is one of general estimation of all personal traits and of general education. The term "vocational guidance" seems too narrow to cover the whole series of broad considerations that thus appear to be important. The term "personnel guidance" has accordingly been suggested.

Personnel Guidance. The increasing complexity of the industrial activities and of the educational opportunities of the country have tended to confuse the individual in making a choice of his life work. Industrial concerns have found, also, that the securing and placement of workers is a complex and difficult task. This is the justification for emphasizing in schools and in industry personnel guidance.

Evening Schools. In the large cities evening classes are very commonly conducted by the public school system. These are attended either by those who seek a continuation of the regular school training or by adults who have had only a limited opportunity of education. In many cases the evening classes are especially organized for immigrants, to whom instruction in the use of the English language and in the facts about American institutions is given. In some cases these classes are organized into systematic curricula, especially by the Y. M. C. A. and similar organizations, and a student may pursue a systematic course leading to high school graduation or to very definite diplomas of a similar type.

Americanization Classes. The Americanization movement is the name given to a group of educational efforts which were greatly stimulated by the World War, and are aimed at the training of immigrants in a knowledge of American institutions. It became a matter of very keen social consciousness during the war that a great many communities made up of foreign-born persons are not acquainted with the institutions of government and social life in the United States. It was found in some of these communities, which have in a measure segregated themselves, that the cultivation of foreign languages has prevented even the children from becoming acquainted with American ways.

In the army, it became apparent that a great many foreigners did not use the English language with sufficient freedom to carry on intercourse with their American neighbors or to make use of the American newspaper. All of these discoveries with regard to the ineffectiveness of ordinary methods of instruction led the public schools and the Federal government, through its department of the interior, to undertake vigorous efforts for the training of all foreigners in the knowledge of American institutions and in the use of the English language. Many industrial concerns allowed their workers a certain amount of time each day to attend classes. These industrial concerns in many instances also provided space in which classes could be held. Sometimes the public school system supplied teachers; again volunteer workers gave instruction. Subsequent curtailment of immigration reduced somewhat the urgent necessity for this type of training, but in all parts of the country the Americanization movement stimulated attention to the need of training for citizenship.

Adult Education. This term was used in England for a long time before it became common in the United States. It referred originally to courses in which men and women who had only limited educational opportunity were offered instruction in such subjects as religion, literature, and the lines of scientific knowledge which would be helpful to them in their practical lives.

In the United States the movement to provide similar opportunities for persons who were beyond the age when they could attend public schools began in a variety of different forms. Furthermore, it was not merely a movement to provide courses for persons of limited earlier training, but it was to offer educational opportunities for all who wished to cultivate intellectual interests in their later lives.

In recent years the effort has been made to co-ordinate the various agencies which contribute to adult education. The American Association for Adult Education which was organized in 1926 is an organization which includes representatives of school systems and of philanthropic, social, and religious organizations, librarians, industrial leaders, and representatives of labor colleges and of such independent institutions as Cooper Union of New York, the Mechanics Institute of Rochester, N. Y., and Lewis Institute of Chicago.

Some of the early manifestations of the American movement for adult education are as follows:

Lyceums. An organized plan of instruction of adults was inaugurated under the name lyceum in Millbury, Mass., in 1826. This was a voluntary association of farmers and mechanics formed for "self-culture, community instruction, and mutual discussion of common public interests." By 1839 more than 3000 town lyceums were in existence. They usually met weekly and the members presented essays, gave lectures, or engaged in debates and discussions. Later the practice grew up of inviting paid lecturers to address the lyceums. A national organization was formed in 1831 and held conventions until 1839. The local lyceums continued to flourish until the time of the Civil War.

Chautauquas. The chautauqua institution grew out of an annually conducted camp meeting held by the Methodist Episcopal Church at Fair Point (later named Chautauqua), N. Y. In 1874 its character was changed, largely through the efforts of Bishop Vincent and Lewis Miller, from that of camp meeting to an assembly for studying Sunday school methods. Other subjects of instruction were offered until the whole field of education was covered. Popular entertainment and, later, drama were added. The institution was imitated by many other municipalities, and in 1904 a circuit plan was inaugurated by which the same speakers and entertainers appeared successively at different chautauquas. In the third decade of the 20th century, however, the popularity of the chautauqua circuits declined, in part at least, because of the advent of radio with its easily available program of entertainment and instruction.

Recent Extensions. One of the most widespread forms of adult education is that carried on by

commercial correspondence schools. The work is almost wholly vocational and technical. Enrollment is estimated to exceed 2,000,000. See *Correspondence Schools*. Many of the larger universities, following the example of the University of Chicago, provide work by correspondence. Public evening schools and so-called continuation schools, supported by taxes, are numerous in urban centers. In addition there are thousands of business schools operated for a profit. The Y. M. C. A. and kindred organizations are active in supplying education, both vocational and general.

Education for workers is of two types—that offered by employers for immediate practical use in industry, and that provided by agencies for the workers. The Workers' Education bureau of America, organized in 1921, was made the agency for the educational program sponsored by the American Federation of Labor, publishing textbooks and study outlines. The Brookwood Labor college at Katonah, N. Y., has a two-year course and conducts special summer institutes. Alumni schools have been organized by several colleges and universities and in some cases colleges have opened in the summer courses for persons who are not eligible for regular admission during the year.

The American Library association, acting through the public libraries, has taken the initiative in bringing informing books to its readers through reading courses and the establishment of county libraries for rural districts. Public museums are usually centers of instruction on scientific topics, and many of the state and national parks provide education in nature lore. No small factor in the growth of adult education is the increasingly popular use of reference works in the home.

Illiteracy. The most frequently used measure of the extent of education of a people is the amount of illiteracy. In the United States, according to the 1940 census, persons 25 years of age and over who had never attended school are classed as illiterate. Before 1940, adults who could not write were classed as illiterate. In certain other countries, however, the term is otherwise defined. Sometimes it is defined as the inability to read.

ILLITERACY IN CERTAIN COUNTRIES

At its meeting at Hood College, Maryland, in June, 1944, the International Education Assembly requested the representatives of the 26 United Nations there assembled to answer the following question: "To what approximate degree does illiteracy exist in your country?" The following table gives the answers to that question:

Country	Per Cent Illiterate	Date	Comments
Australia	3	....	Inability to read or write.
Belgium	8	1930	16% of persons over 60 and 1% of persons 15 to 20 yrs. were illiterate.
Canada	4	1931	In 1941, 11% over 10 years had less than 5 years of schooling.
Chile	23	1940	Over 7 years and unable to read and write own name.
Czechoslovakia	3	1930	
Dominican Republic	38	1944	Based on total population.
Equador	60	....	
Egypt	88	1927	Based on total population.
Ethiopia	70	....	Estimate.
France	3	1934	Illiteracy among soldiers.
Great Britain	..	....	Has had compulsory education since 1880.
Greece	30	1938	Over 8 years of age.
Guatemala	42	....	Estimate.
Iceland	..	....	Illiteracy practically unknown since 1800.
India	85	....	
Luxemburg	..	....	Illiteracy practically unknown for 50 years.
Netherlands	..	....	Illiteracy practically unknown since 1935.

ILLITERACY IN CERTAIN COUNTRIES—Con.

Country	Per Cent Illiterate	Date	Comments
New Zealand	..	....	
Nicaragua	45	....	Estimate.
Norway	..	....	Illiteracy practically unknown for 100 years.
Panama	35	....	10 years and over, not including 65,000 Indians living in tribes.
Paraguay	23	....	
Peru	58	....	Over 14 years of age.
Philippines	51	1939	Unable to read and write in any language.
Poland	18	1939	
United States	4	1940	Persons 25 and over who had not completed 1 yr. of school.

Recent and exact data for other countries are not now available. It is known, however, that the percentage of illiteracy is less than 1 per cent in Denmark, Finland, Switzerland, Germany, and Sweden. It is known that Austria, Russia, and Japan have less than 10 per cent, and that much higher rates of illiteracy exist in all countries of South America and Africa, in China, in Portugal, in Spain, and in Italy.

The elimination of illiteracy is dependent on the establishment of schools and the enforcement of compulsory attendance laws. Countries which have longest made those provisions have the smallest amount of illiteracy. During recent years every nation has been making an intensive effort to eliminate or to decrease illiteracy.

The following table, computed from the 1940 census of the United States, summarizes the degree of literacy in the United States for persons 25 years of age and over. Since then illiteracy has shown a further decline, reaching a new low in 1952, when, of the 110 million persons who were 14 years of age and over, about 2.5 per cent were unable to read and write in any language.

LITERACY IN U.S.: HIGHEST NUMBER OF YEARS OF SCHOOL COMPLETED BY ADULT POPULATION 25 YEARS OF AGE AND OVER

Amount of Schooling	Number	Per Cent
Four years or more of college	3,407,331	4.6
One to 3 years of college	4,075,184	5.4
Four years of high school	10,551,680	14.1
One to 3 years of high school	11,181,995	15.0
Seven and 8 years	25,897,953	34.6
Five and 6 years	8,515,111	11.4
One to 4 years	7,304,689	9.8
No schooling	2,799,923	3.7
Not reported	1,041,970	1.4
Total	74,775,836	100.0

The Meaning of Illiteracy. If one has learned to write and read but very slowly, one's practical advantage from these arts will be small, and unless the individual keeps himself in constant practice he will lose what he acquired in the schools. The distinction may, therefore, be drawn between the ability to write and the ability to read fluently, or with such fluency that the art is of practical value in ordinary life. When the term illiteracy is thus interpreted, it is undoubtedly true that the common people of the United States read a great deal more fluently and a great deal more intelligently than do others.

SCHOOL BUILDINGS

When American educational organization was relatively simple, the school buildings reflected the simplicity of the course of study and of the organization of the classes. The buildings were one-room structures supplied with simple desks and with very little equipment in the way of books, maps, or other apparatus. As the ideals of education have enlarged, the one-room school has been replaced by a much more elaborate structure with fuller equipment. Some of the typical enlargements may be

mentioned as follows: Additional rooms have been provided for laboratory and shop activities; playgrounds have been enlarged and equipped with apparatus; the heating and ventilating apparatus and the sanitary equipment of the school have been perfected; desks have been provided which fit the pupils and furnish better conditions for school work. Especially has enlargement taken place in the school buildings since communities grew to the size where they require buildings made up of a number of different rooms.

At this stage in school construction many problems arise. In cities where land values are high, it is sometimes necessary to erect a school building of several stories. It becomes difficult also to secure outdoor space in which a school playground can be opened up for children. The larger buildings must of necessity be equipped with fire protection devices, and must have corridors, stairways, and other means of communication between rooms. The evolution of the modern school building has thus been in the direction of an increasingly commodious housing for complex educational activities.

Standard Buildings. In recent years a number of devices have been developed for scoring school buildings, so that communities may have a basis for judging the efficiency of any particular building. A recent example of such a building score card is presented in the work of the New York rural school survey, which canvassed on an extensive scale the school buildings of the state of New York and prepared a report on this matter for the information of citizens of that state. It is not possible here to reproduce fully the New York survey score card prepared by Professor Butterworth of Cornell university. One portion of it, however, may be reproduced to show the general type of requirements laid down for school buildings. This score card was designed for application to one-room buildings, and requires elaboration if used for larger structures. The fundamental standards, however, for lighting, floor space, etc., are the same for one-room buildings and for buildings with numerous rooms. The various points on the cards are scored with numbers which indicate the relative importance of each item in making up an estimate of the building as a whole. These numbers indicate also the maximum scores which would be given to a school building properly equipped in respect to the various items.

THE STANDARDS (*a*)

1. ESSENTIAL STANDARDS:

These standards represent the least that may be expected of an effective one-teacher school building and its grounds.

1. Size Score: 40
- (a) 15 square feet of floor space per pupil of room capacity (number of sittings).
- (b) 200 cubic feet of air space per pupil of room capacity (number of sittings).

2. Shape of Room Score: 20
- (a) Rectangular: width 4 to length 5; or width 2 to length 3 (approximately).

3. Window Placement Score: 35
- (a) Windows grouped on left of pupils. Ventilation windows may be permitted if they are placed well toward the top of the rear or right walls, are small, and are covered with opaque curtains.
- (b) Any large area without windows to be at front end of side wall. Windows should not extend beyond front row of seats.
- (c) Not over ten inches between windows.
- (d) Windows between 3 and 4 feet from floor, with distance from floor to top of window equal to one-half width of room.

4. Glass Area Score: 30
- (a) Ratio to floor space 1:5 (1:4 if light comes from north or side that is considerably shaded).

5. Shades Score: 15
- (a) Translucent.
- (b) Fastened so as to protect from sun without shutting off light unnecessarily; movable or double mounted with one curtain at top of window and one at bottom.

6. Floor Score: 15
- (a) Rift-sawed, hard pine relatively free from knots, closely laid (or equivalent material).
- (b) Double floor.

7. Walls Score: 15
- (a) Ordinary plaster or commonly accepted substitutes, such as beaver board or plaster board.

8. Color Scheme Score: 20
- (a) Walls and ceiling in some light reflecting color pleasing in its general effect.

9. Inside Finish Score: 15
- (a) Good quality material, local or otherwise.
- (b) Tastefully painted or varnished.
- (c) Good workmanship.
- (d) Without unnecessary carving or fluting.

10. Blackboard Score: 30
- (a) Slate.
- (b) Minimum of about 20 linear feet for school with 15 or more pupils, or about 10 linear feet for school with fewer than 15 pupils; none on window wall.
- (c) Chalk and eraser tray.
- (d) Two heights from floor; 26 inches and 32 inches. One height will be acceptable if not over 28 inches from floor and if board is at least 3½ feet wide.

11. Bulletin Board Score: 10
- (a) Soft wood covered with burlap or beaver board.
- (b) Minimum size 500 square inches.
- (c) Within reach of children so they may read material on it readily.

12. (a) Desks Score: 40
- (1) Single desks.
- (2) 5 sizes except in small schools. Judge this factor by whether there are enough sizes to provide adequately for proper seating of all children. (*b*)
- (b) *Teacher's Desk*
  - (1) Well constructed, attractive, with two or more drawers fitted with locks.
  - (2) Substantial office chair.

13. Seating Arrangements Score: 25
- (a) On long axis of room; so faced that light comes from left if the windows are on one side only.
- (b) At least 18 inches between rows with at least 30 inches between seats and walls.
- (c) So far as possible, rows should be made up of seats of same size.
- (d) Desk set at such distance from seat that pupil may work while sitting in an upright position. In general, desk should overlap seat by about two inches.

14. Closet Score: 15
- (a) Cabinet with door for various kinds of teaching supplies.

15. Clock Score: 5
- (a) Small clock on teacher's desk.

16. Fuel Room Score: 20
- (a) Outside fuel shed; well lighted; substantial structure; painted to match school building, or
- (b) Cellar under building; well lighted; thoroughly dry.

17. Cloakroom Score: 25
- (a) Sanitary wardrobes within the classroom or single cloakroom.
- (b) Wall space per pupil at least 8 inches with hooks adjusted to size of children.
- (c) So located as to be under direct supervision of teacher.

18. Workroom

19. Storeroom Score: 15
- (a) Compartment (e. g., in cloakroom) for broom, mop, dustpan, etc.
- (b) Sufficiently large to care for all materials (except teaching supplies) needed for building.

20. Library Score: 20
- (a) Bookcase with glass doors.

21. Teacher's Room

22. Playroom

23. Neighborhood Room

24. Heat and Ventilation Score: 30
- (a) Type:
  - (1) Jacketed stove.
- (b) Adequacy: Score: 30
  - (1) Maintain heat at 68° in every part of room and supply 30 cubic feet of air per pupil per minute. These indicated by:
    - (a) Grate area of at least 210 square inches for room containing 8000 cubic feet or less.
    - (b) Fresh air intakes of at least 175 square inches for room containing 8000 cubic feet or less.
    - (c) Foul air flue of at least 240 square inches for room containing 8000 cubic feet or less.
- (c) Heat control: Score: 10
  - (1) Thermometer.

25. Fire Extinguisher

26. Cleaning System Score: 20
(a) Sweeping with floor brush or broom and sweeping compound; or oiled floor.
(b) Dusting with oiled cloth.

27. Water Supply Score: 25
(a) Source:
(1) Well on school grounds or within 200 yards of schoolhouse.
(2) Located at least 100 feet from nearest barn, outhouse, or other possible source of contamination; slope away from well.
(3) Covered with concrete platform resting on concrete wall sunk at least two feet in ground.
(4) Analysis of water at least once each year is desirable.
(b) Drinking facilities: Score: 20
(1) Closed water jar with faucet.
(2) Individual drinking cups with closed cabinet for keeping them; or paper cups.
(c) Washing facilities: Score: 15
(1) Wash basin at proper height for children; in warm room.
(2) Soap.
(3) Mirror.
(4) Individual towels or paper towels.

28. Artificial Lighting Score: 10
(a) Oil lamps.
(b) Enough in classroom to permit reading without strain; at least one light in each cloakroom, inside toilet room, etc.

29. Toilets Score: 20
(a) Kind:
(1) Chemical system, or
(2) Septic tank system.
(b) Placement: Score: 10
(1) In rooms, conveniently located attached to the building.
(2) Boys' and girls' toilets completely separated, even as to approaches.
(c) Condition: Score: 20
(1) Lighted, and well ventilated.
(2) Walls and ceiling constructed and finished as other rooms in building.
(3) No markings.
(d) Adequacy: Score: 15
(1) One seat for each 25 pupils of each sex.

30. Telephone

31. Bell Score: 5
(a) Hand bell.

32. First Aid Outfit Score: 10
(a) Cabinet with bandages, ointment, adhesive plaster, iodine, etc.

33. Mail Box Score: 5
(a) Waterproof.
(b) Large enough for bulletins, etc., addressed to school.
(c) Located on mail route at point most convenient to school.

34. Flag and Pole Score: 10
(a) On building.
(b) Equipped with rope and pulley.
(c) Flag at least 3 x 5 feet.

35. Vestibule Score: 20
(a) Size at least 6 x 8 feet.
(b) Substantial floor; inside walls of matched lumber; outside walls same as building proper.
(c) Well lighted.
The vestibule may be dispensed with when adequate protection from storms is provided by means of a porch, use of weather strips on door, or location of building.

36. Material of Construction Score: 25
(a) First-quality lumber.

37. Foundation Score: 15
(a) Stone (or equivalent local material).
(b) Height: 18 to 30 inches.

38. Roof Score: 20
(a) Shingle roof.

39. Condition of Repair Score: 30
(a) Paint in good state of preservation.
(b) No broken windowpanes, steps, boards on siding, etc.
(c) No markings on buildings.

40. Location on Grounds Score: 20
(a) Building so located that
(1) The effectiveness of the grounds for play purposes is not interfered with. For example, unless grounds are considerably larger than the minimum given in Item 43, the building should be toward one side and the front of the grounds.
(2) It looks well; not too near the road nor yet too far back on the grounds.

41. Orientation (*c*) Score: 25
(a) Classroom placed so as to
(1) Receive direct sunlight sometime during the day (not north).
(2) Avoid direct sunlight during entire day (not south).
(b) Factors to be considered:
Whether mornings are foggy (favoring western exposure); whether high hills or trees affect lighting; whether mornings are less cloudy than afternoons (favoring eastern exposure); direction of prevailing winter winds; attractive outlook.

42. Architectural Appearance

43. Size of Grounds Score: 25
(a) About 160 square rods—sufficient to provide:
(1) Site for building.
(2) Small lawn with a few trees and some shrubbery.
(3) Playground providing for games and apparatus indicated in Item 49. Where conditions make necessary a barn or shed for horses or cars, more space must be provided.

44. Shape of Grounds Score: 10
(a) Of such shape that there is little waste space. In general a rectangular form is most desirable.

45. Slope and Drainage Score: 25
(a) Natural elevation with grounds sloping away from building.
(b) Grounds well drained.
(c) Quick-drying, fertile soil.

46. Condition Score: 20
(a) No ashes or other refuse.
(b) No weeds.

47. Fencing Score: 5
(a) Board or woven wire field fence.
(b) About 4 feet high.

48. Walks Score: 10
(a) Gravel or cinder walks, well drained, from road to building, building to well, etc., or
(b) Board walks in good condition.

49. Playground Apparatus Score: 25
(a) At least the following or equivalent apparatus: swing; sand pile; volley ball and net; baseball and bat; teeter board; horizontal bar. Where school has not over 10 pupils, less may be accepted.

50. Environment Score: 25
(a) Freedom from nuisances such as odors from barnyards, etc.
(b) Freedom from dangers such as railroads, high cliffs, dangerous bodies of water, etc.
(c) A reasonably attractive view considering the opportunities of the vicinity in this respect.

51. Accessibility Score: 25
(a) Located near main highway.
(b) As near center of district as possible but not over 1½ miles from farthest home except where transportation at public expense is provided.

Notes

(*a*) The score card is published by the World Book Company, Yonkers, N. Y. Copies of these standards may be secured without cost by asking the New York State College of Agriculture, Ithaca, N. Y., for the bulletin entitled: "Improving the School Building Facilities in One- and Two-Teacher Districts through Measurement."

(*b*) The seat should be of such height as will permit the pupil's feet to rest squarely on the floor, and the desk should be so placed that he can write easily while sitting upright.

(*c*) The orientation of a building is the direction from which light enters the classroom, not the direction which the building faces.

Community Centers. There is a widespread movement in this country in the direction of the use of school buildings for purposes other than the instruction of children. Some years ago attention was drawn to the fact that there is a great waste in public resources when school buildings are left empty during the late afternoon and evening after the children have gone home. Proper use of the buildings, it was pointed out, will make it possible for a community to carry on various lines of useful social activities at hours when the school building would otherwise be unused. It is especially true in rural districts, where there are scant accommodations for social gatherings, that the school building furnishes a natural center for community gatherings of all types. Particularly where a rural community has erected a consolidated school building it can also use this larger building for various community purposes.

As a result of the agitation for the wider use of school plants, many school buildings have been equipped with auditoriums and other accommodations for social purposes. These auditoriums serve the regular school for assemblies and the community for all kinds of gatherings. For example, in the city of Rochester, New York, the school buildings have been extensively used for political meetings, social meetings, lectures, stereopticon and moving picture exhibitions, and other similar purposes. In the schools of the city of New York a regular system of free public lectures has been carried on for years, through which people in various parts of the city have been given access to types of information which can be contributed only by specialists in various fields of science and literature.

In the consolidated schools of Colorado, extensive programs of community betterment have been centered. These large consolidated schools are in some cases used for community church services; they have equipment for motion picture exhibitions; and they are used in many cases for meetings leading to the improvement of roads and to other civic undertakings. In one of the rural districts of Wisconsin a school became the center for a dairying business which was carried on co-operatively by all of the patrons of the school. In North Dakota, the consolidated schools have been used for dramatic exhibitions, and the people have found that various forms of public entertainment can be provided economically through these institutions. School buildings have been used also as demonstration centers for the extension courses given by state universities and by the Federal department of agriculture. Physical education has been stimulated through these community meetings, and in many cases the community has been led through these social gatherings to increase the school equipment.

EDUCATIONAL FOUNDATIONS

Gifts for the endowment of educational institutions have been common in America since the earliest colonial times. Recently several large donors have preferred to give, not to particular institutions, but to a general foundation empowered to distribute the funds to various institutions as may seem wise.

Peabody Education Fund. The first of the educational foundations was established in 1867 when George Peabody, of Massachusetts, gave to a board of trustees composed of fifteen men the sum of $3,000,000 to be used in the development of education in the more destitute portions of the Southern and the Southwestern states.

John F. Slater Fund. In 1882 John Slater set up a foundation which was to help in uplifting the "lately emancipated population of the Southern states."

The Carnegie Foundation. In 1905 Andrew Carnegie gave to a board of trustees $10,000,000 to be utilized for the purpose of pensioning college professors. The original plan adopted by this foundation, known as the Carnegie Foundation for the Advancement of Teaching, contemplated the retirement of college professors after 25 years of active service. It was assumed that after such a period of service it would be better for institutions to recruit their faculties by appointing younger men. At the same time the retired men would be able to carry on productive literary work which would increase the materials of instruction and promote the intellectual life of the nation.

Closely related to the Carnegie Foundation were certain scientific organizations set up by the same donor. The Carnegie Institute was established in 1902 for the purpose of promoting scientific research and publishing the results. It was assumed that many scientific and literary workers could greatly increase their output if they were supplied with research assistance. Carnegie also established a technical school in Pittsburgh, and ultimately created what is known as the Carnegie Corporation, holding large funds to be dispensed for any educational or charitable purpose.

The Carnegie Foundation has been a highly influential body in determining educational practice in this country. It was obliged to abandon its original plan for the pensioning of college professors. In lieu of this program, it has adopted a system of insurance which is much less expensive than the pension scheme originally projected.

In the course of its operations, the Carnegie Foundation has made numerous studies which have been useful in defining the character of higher institutions. Reports have been prepared on schools of medicine, schools of law, and schools of engineering, and the regular reports have contained much information in regard to the organization of colleges and universities.

Rockefeller Boards. A great educational foundation was endowed by John D. Rockefeller in 1902, under the name of the General Education Board. This organization is closely related to the Rockefeller Institution of Medical Research and the Rockefeller Foundation, the latter being a general corporation supplied with large funds and devoting its major energies to the development of medical education. The General Education Board has used its funds in large measure for the encouragement of colleges and universities. This encouragement has been rendered through direct donation to the endowments and through gifts to maintain higher salary schedules, the latter being a special type of appropriation which was undertaken in order to meet emergencies which arose in most institutions of higher learning after World War I.

The General Education Board has also carried on a number of investigations of educational institutions. Especially notable are the investigations of state school systems in the form of surveys. The board recently organized a special division of state school surveys, and is engaged at the present time in co-operating with a number of states in carrying on this type of investigation.

The reports of the General Education Board indicate that, from 1902 to 1927, appropriations to the amount of $111,549,540 were made for various phases of educational work. More than $95,900,000 of this amount was paid to colleges and other institutions for whites, and more than $11,000,000 to institutions for Negroes.

The Russell Sage Foundation. The Russell Sage Foundation was established in 1907 by Mrs. Russell Sage after the death of her husband, and has co-operated with numerous social agencies for the improvement of the administration of charities and other social enterprises. For a period during its history, the Russell Sage Foundation conducted a division of educational investigations. This division issued numerous reports, notably certain reports comparing the activities of different states in educational matters and showing the rank of these states in educational achievements. It also published elaborate studies and scales for measuring various types of school work such as scales for the measurement of handwriting, for spelling, and for reading. The last mentioned is reproduced on page 1648 in this volume.

The Cleveland Foundation. The Cleveland Foundation is a community organization established in 1914 by Mr. F. H. Goff in the city of Cleveland. At the time of the establishment of this foundation Mr. Goff was president of the Cleveland Trust Company. His experience with many of the large estates in Cleveland showed him that there are many persons of wealth who do not know how to dispose advantageously of such funds as they are willing to give to worthy enterprises. He induced a number of these persons to turn over their estates to a corporation made up of a board of trustees,

appointed in part through public officials and in part by representative bodies of citizens. This board of trustees was constituted into a community trust, and was authorized by its charter to utilize such funds as came into its possession for any worthy social undertaking, especially in the city of Cleveland.

Acting under this charter, the Cleveland Foundation carried on an extensive survey of the public school system of the city. Reference has been made in an earlier paragraph to this survey, which is one of the most complete scientific studies of a school system that have been made in the United States. Following the school survey, came a survey of the recreational opportunities of the city, and then a survey of the administration of criminal law through the courts.

The activity of the Cleveland Foundation has been extensively imitated. The New York City Community Trust is organized on the same general plan as the Cleveland Foundation. In other parts of the country, also, bankers have seen in the example of the Cleveland Foundation the possibilities of such a proper and permanent organization of the estates of the country as will benefit the communities in which they have been accumulated. It seems probable that this type of foundation will be set up in a great many communities.

The Commonwealth Fund. The Commonwealth Fund is a relatively new foundation established in 1917 by the Harkness estate and chartered in New York. This foundation devotes itself to various philanthropic and educational enterprises. It has organized a special committee to deal with juvenile delinquency, is carrying on demonstration clinics in a number of cities, and is co-operating with juvenile courts. It has also organized a special committee to deal with the problems of educational research. This committee receives and acts upon various proposals made by students of education in different parts of the country, and subsidizes investigations which seem to be promising for the promotion of educational organization and research.

Ford Foundation. The Ford Foundation was established in 1936 by Henry Ford and his son Edsel Ford for the administration of funds "for scientific, educational, and charitable purposes, all for the public welfare." The avowed purpose of its educational program is "to strengthen, expand, and improve educational facilities, and to promote greater equality of educational opportunity." In December 1955, the Ford Foundation announced the allocation of $500,000,000 to 4157 privately supported colleges, universities, and hospitals in the United States—the largest philanthropic donation ever made.

EDUCATIONAL SOCIETIES

Professional workers, engaged in the cultivation of literary and scientific subjects, are organized into numerous national societies. The American Historical Association, for example, includes those who are professionally connected with departments of history in colleges and universities and also many of those who give instruction in secondary schools. This association meets once a year in sessions at which papers are presented by its members, reporting the lines of research in which they are engaged. It also publishes a journal, the *Historical Review*, which includes original articles and reviews of all the publications in the field of history. The association appoints from time to time committees which make reports on various professional topics connected with the development of history as a subject of instruction. Especially significant have been the reports of committees outlining programs for history courses in secondary schools.

The statements which have been made about the American Historical Association can be repeated for a long list of learned societies both in the fields of the humanities and in the domains of the natural sciences.

American Association for the Advancement of Science. The associations which bring together representatives of the natural sciences are affiliated in one general organization known as the American Association for the Advancement of Science. This larger and more comprehensive organization is patterned after the older British association and is made up of a number of sections, such as the sections for chemistry, physics, mathematics, anthropology, and so on. The American association meets once a year for a winter session, at which time there are general sessions and sessions of each of the sections. In addition, there are occasional summer meetings which bring together certain divisions of the association.

National Education Association. Besides the special professional societies, there is an organization which includes all of the teachers in all grades of schools. This is known as the National Education Association. This association, under various names, has been in existence since 1857. It is organized under a Federal charter, and has recently reconstructed its internal government so that the national meeting is now a representative body made up of delegates from the various state and local associations of teachers. The general association is subdivided for professional purposes into certain groups, such as the American Association of School Administrators, the classroom teachers, the department of higher education, and so on. These various divisions and departments organize programs at which papers are read, dealing with the special interest represented by the department. The general association, or representative assembly, deals with legislative matters and appoints committees and listens to their reports.

State Teachers' Associations. Affiliated with the national education organization are state associations. These in turn are made up in some states of sectional associations. Annual meetings are held by these associations, at which speakers present professional topics and committees report on various interests of the teaching body.

National Research Council. During the World War the National research council came into existence as a group of scientists contributing to the activities of the departments of war and navy and to the scientific inquiries which were necessary to provide the material resources of the country for the war. So significant were the contributions of the research council to the national war policies, that it was continued and has received generous endowments for its work. It now administers a series of fellowships and funds for the development of scientific research. It has its seat in Washington, and is directed by a staff of central officers, who not only administer the various divisions of the council but promote in general ways the development of science throughout the country.

The American Council and Other Bodies. Numerous other educational organizations have their seats in Washington. Notable among these are the American Academy of Science which is made up of 100 selected scientists; the American Geographical Society, which publishes a journal of geography but is otherwise only a loosely organized society; and, finally, the American Council on Education, which is one of the newest national educational organizations. The American Council is made up of representatives from various educational associations. It has a director and meets in annual session for the transaction of business. Among the constituent organizations which send delegates to the meetings of the American Council are the Association of American Universities, the Association of Land-Grant Colleges, the Association of State Universities, and other similar organizations.

Standardizing Associations. Mention has been made in an earlier paragraph of certain standardizing associations, such as the North Central Asso-

ciation of Colleges and Secondary Schools. These standardizing associations, while having no authority, prepare approved lists which designate selected colleges and secondary schools in various sections of the country as of high grade. The desire of institutions to appear on such lists is so keen that the associations have acquired very wide influence, even though they have no official public standing.

Mention may be made in this connection of certain professional organizations such as the American Medical Association. This is an organization, including all the physicians in the country, which publishes both a technical journal and a journal of a popular type intended to promote the interests of public sanitation and health. It has, through its central council, standardized medical schools. Similar professional associations exist among the lawyers, dentists, and other professional groups.

Parent-Teacher Associations. Numerous associations have been organized with a view to making the community more intelligent on school problems. Sometimes these organizations are initiated by school officers who find it desirable to get into closer communication with their patrons; sometimes they originate in the spontaneous desire of parents to improve the conditions which surround their children in the schools. They represent in a sense a revival of the town meeting, which was the original civic organization in control of the school district. While the town meeting has been replaced by representative assemblies for the enactment of ordinances and statutes, these newer forms of organization are felt by the community to be too remote from so vital an interest as the protection and schooling of children. While people are willing to leave property and public interests such as roadmaking and policing to their representatives, they want to be fully informed about the teachers who have charge of their children and about the organization of the school. The following statements are quoted from or based on bulletins published by the office of education, which describe the rise and development of these organizations:

Mothers' meetings inaugurated in 1855, in connection with the kindergarten movement in the United States, seem to have been the precursors of the parent-teacher associations. A mothers' conference was called by a kindergarten training teacher in Chicago in 1894. Three years later a national congress of mothers was called in Washington, D. C., by Alice McLellan Birney and others, in which the interests of all little children in the home and the community were discussed. A permanent organization of mothers was formed, and plans for the study of problems relating to child welfare were developed. In 1900, a formal charter was granted this organization in the District of Columbia.

National Organizations. Mothers and teachers discovered that they could accomplish more if united into a co-operative organization than was possible when each worked separately. Parent-teacher associations came into existence in response to the expressed need. Other organizations with various names but similar purposes came into existence also and united in this national organization. Among them were the parents' leagues, home and school associations, mothers' leagues, mothers' unions, preschool groups, reading circles, etc. In 1908, the National Congress of Mothers changed its name to include parent-teacher associations, and in 1915 a new charter was secured.

The movement has developed until the parent-teacher association has become the dominant national activity of parents and teachers. Membership grew from about 200,000 in 1920 to more than 1,500,000 in 1931. Summer courses for training leaders were given in colleges for the first time in 1922 at Columbia university.

The conditions under which the national organization operates may be briefly summarized as follows:

(1) The *annual convention* has all power over the conduct of the organization and is a delegate-voting body representing the state branches.

(2) The *board of managers* (composed of officers, state presidents, and the committee chairmen whom they elect) is authorized by the convention to carry on its work between the annual meetings, and must report annually to the convention.

(3) The *executive committee* is the servant of the board of managers and performs for it such duties as the board may assign to it, reporting to the board and the convention and having no independent authority.

(4) The *state branch* is the representative of the congress in the state and is pledged to carry out the objects and policies of the national organization.

(5) The *district organization* is the representative of the state branch in the district and is therefore pledged to carry out the state and national objects and policies in its territory.

(6) The *county council* represents the state branch in the county and carries the congress work to the individual members in every locality.

(7) The *local association* unites the members for carrying out the plans of the congress and for the promotion of the welfare of the children in the community.

(8) The *individual member* belongs directly to both the state and the national congress and is responsible for the attainment of its objects.

ACTIVITIES OF ORGANIZATIONS

A study of the reports of activities in parent-teacher associations in many states reveals a diversity of activities, but one general aim,—to surround children with conditions favorable to their growth. Among other things, this involves the education of parents in caring for the physical and mental health of preschool children. As one means of pursuing this object, the national organization, or congress, sponsors a so-called summer round-up of children, the purpose of which is to send to school in the first grade a class of children 100 per cent free from remediable defects. The method employed is to induce parents to secure in May a physical examination of their children who will begin school the following September, a second examination in September being held to determine the extent of corrections made.

Other objects, sponsored by special committees of the national congress, include safeguarding the health of school age children and the guidance of high school children by means of a study of social hygiene. For the latter purpose there is a committee on mental hygiene, headed by a competent psychologist.

The following list sets forth some of the concrete results of parent-teacher activities as reported by county superintendents:

1. Terms of schools lengthened.
2. School attendance improved.
3. System of uniform textbooks established.
4. Improvement in schoolhouses in sanitation and apparatus.
5. New school buildings erected.
6. Schools standardized.
7. Playground equipment purchased.
8. Instruments purchased for the schools.
9. Library books and pictures purchased for the schools.
10. School grounds beautified.
11. Warm noon lunch served.
12. Milk provided for underweight children.
13. Dental clinics established.
14. Physical examination of school children and remediable defects corrected.
15. Cases of tardiness lessened.
16. Junior banks organized.
17. Picture shows supervised.
18. Reading rooms sponsored.
19. Health crusades sponsored.
20. Scholarships created.
21. Standard of home life raised through child study.
22. Friction in community eliminated.
23. A friendly relationship between parents and teachers established, thus making discipline easier for teachers and creating a stimulus for better work among students.
24. The moral standard of the community improved.
25. Parents visit school, becoming acquainted with modern methods of education and curriculum.
26. Phases of child amusement and recreation in community improved.
27. Night schools established.
28. Work accomplished in the removal of illiteracy.
29. Community halls built.
30. More students finish eighth grades and high schools.
31. Kindergartens established.
32. Equipment for school lunches purchased.
33. As a whole, the parent-teacher association acts as a socializing and educating project in any community.

Preschool Groups. Two important activities which are the outgrowth of parent-teacher associations are the preschool study groups and reading groups. These consist of parents of little children under school age. Programs for these groups include the subjects of child care and training, proper diet for the young child, proper clothing, advice to expectant mothers.

The activities of the Co-operative Education Association of Virginia are, as indicated by the name, largely concerned with raising money in order to improve the school plant. They finance school lunches, improve the social and recreational life of the community, and co-operate with the school board in its efforts. Many libraries have been installed as a result of the efforts of these organizations.

SPECIAL TYPES OF AMERICAN SCHOOLS

It is pointed out in earlier paragraphs that European higher schools were originally organized for boys only. In America, higher schools exclusively for boys were organized in the early colonies, and all of the older institutions, such as Harvard, Yale, and Princeton, are institutions exclusively for the training of boys.

Coeducation. The common schools have always been open to girls as well as to boys, but in some cases the secondary schools in the older sections of the country have followed the example of the colleges and opened their doors to boys only. As the Western states organized higher institutions supported by public taxation, it became politically impossible to exclude women from the privileges of any public institution. All of the Western state universities are coeducational, and, in keeping with the policy of these institutions, all high schools are of the same type. In the South the practice of separating the boys and girls at the higher levels of education has been more common. The city of Louisville, Kentucky, for example, has a girls' high school which is separate from the boys' high school. The same division appears in Atlanta, Georgia, and in many other Southern cities.

Special Schools for Women. The practice of excluding girls from the older, Eastern schools led to the establishment of a group of secondary schools and colleges designed to give higher education to women. In 1820 Mrs. Emma Willard secured $4000 for the establishment of a female seminary in Troy, New York. In 1836 Miss Mary Lyon secured $27,000 in small subscriptions ranging from six cents to one thousand dollars for the establishment of Mount Holyoke seminary and college. Since that time a number of great endowments have been devoted to the education of women at Vassar, Wellesley, Smith, and other centers.

Correspondence Schools. The university extension movement in England, among other forms, took that of the giving of courses through correspondence. In this country, the enthusiasm of President Harper of the University of Chicago, and of others interested in wider education of all classes of people, led to the organization of correspondence courses under the supervision of universities and of special schools organized to administer such courses.

The story of the organization of a correspondence school in the mining region of Pennsylvania shows how the movement became influential in circles entirely untouched by university instruction. An editor of a daily paper began publishing scientific articles intended to be useful to workers and foremen in the mines. Evidently the miners of that region are engaged in an industry which is especially dependent upon scientific knowledge. The newspaper articles referred to became so popular that the editor gradually extended his efforts and ultimately established a correspondence school.

This school has grown into a great corporation which publishes numerous textbooks and gives instruction in all parts of the country to individuals who are willing to work out certain lessons and to return to the correspondence-study school such answers as they can give to test questions. The answers received from the student are systematically examined at the correspondence-study center and returned with suitable comments, encouraging the student to go ahead with his studies and correcting any errors into which he may have fallen in his private reading.

The success of the Pennsylvania institution has led to the organization of numerous other correspondence-study schools. Many of them are very successful. One of the great limitations in their work is to be found in the fact that many students start courses but do not have the persistence to carry them on. In some cases it has become a source of large profit to the organization to have students drop out and therefore make no demand upon the school for the supervision of complete courses. The better organizations are finding in recent years that it is advantageous to follow up their students much more vigorously than was formerly the case.

Numerous correspondence-study courses of higher grade have been organized for business men. Books are being prepared and are now in circulation which furnish elaborate information on all sorts of business and industrial subjects.

Experimental Schools. Many schools have been organized in different parts of the United States for the purpose of demonstrating the feasibility of some educational reform. In recent years experimental schools have been organized also in connection with teacher-training institutions, for the purpose of demonstrating the advantages of the methods of teaching advocated in these institutions. The general term "experimental school" covers, therefore, a wide range of institutions. One of the famous schools of this sort was the Dewey school, organized by John Dewey in Chicago for the purpose of correcting the formal practices which this educational leader criticized in all his writings, and for the purpose also of cultivating broader social aspects of education. This school was later merged with the School of Education of the University of Chicago.

The University of Missouri has an experimental school which has attempted to develop its course without the use of textbooks. One of the recent schools which has attracted a great deal of attention through its efforts in the reorganization of education is Mrs. Johnson's school at Fairhope, Alabama. This school is organized on the general principle that children should be allowed much greater freedom than they have been allowed in the past. In the normal school in San Francisco, President Burke, the head of that institution, has set up a school which conducts individual work and has abandoned the ordinary forms of classroom method. The General Education Board set up the Lincoln school of New York City, which was afterwards affiliated with Teachers' college of Columbia university, as an institution to demonstrate the value of newer methods in teaching.

EDUCATION OF DEFECTIVES

There are certain types of physical and mental deficiencies which debar a student from participation in the ordinary activities of school life. Thus, a child who is blind is of necessity excluded by that defect from many of the ordinary school opportunities. The larger cities and most of the states have accordingly provided special institutions for the training of the blind. It is even more necessary to provide for children who are deaf.

Schools for the Blind. Various systems of training have been provided for the blind. It has been necessary to prepare a special type of book which can be read by touch. The earlier forms of letters used in books for the blind were reproductions of the ordinary alphabet, but it was soon found that this form of letters is not especially adapted to recognition through touch, and a point system was substituted.

Schools for the Deaf. In the training of the deaf there are two systems: one attempts to make the deaf person as nearly like a normal individual as possible by teaching him to understand what other people are saying through a careful observation of lip movements; the other system resorts to communication through hand movements, where various positions of the hand and fingers reproduce either the alphabet or word-wholes. Deafness is very frequently accompanied by inability to speak, and many of the schools for the deaf attempt to train their pupils, not only to recognize language when it is used by normal individuals, but also to

participate in conversation through articulation which is acquired without the advantage of the sense of hearing. A deaf person has to learn to control his vocal cords by watching his own mouth and the vocal organs of others and by thus imitating the positions which produce sounds that he never hears.

Deficiencies in General Intelligence. Another group of defects which appear in abnormal individuals are very much more difficult to deal with. These are imbecility and feeble-mindedness. The most extreme cases in this group are of the custodial type and cannot be dealt with in the schools at all. For pupils who have some intelligence, but not a normal degree, special classes or special schools have been organized in many centers, and industrial training has been given as a substitute for ordinary school training, in the hope that the abnormal individuals may be made independent of charity. Formerly it was assumed that children of inferior intelligence should be associated with normal children in order that they might get the advantage of such association. It was also argued that normal children benefit by contact with slower children. It has become entirely evident, however, on the basis of accumulating experience, that the mixing of children of different degrees of intelligence is not an advantage, and methods have been developed of segregating children of inferior ability so that they may receive the special instruction necessary for their training.

RELIGIOUS EDUCATION

The secular character of American schools has led to an elimination of religious instruction from the public schools. It is contended by many citizens that this is a misfortune, not merely because religion is thus in a measure eliminated from the common body of knowledge dispensed through the schools, but also because there is withdrawn from the schools the opportunity for the teaching of moral maxims and principles which would be advantageous in the training of the children. There has been a constant effort on the part of certain groups to reintroduce into the system of public instruction the teaching of the Bible and other forms of moral and religious subject matter. The result is that much legislation has been proposed and enacted, and numerous court decisions have been rendered on the general matter of the use of the Bible in the public schools. In some cases this legislation restricts the use of the Bible to a reading from the text without comment of any kind whatsoever. In other cases the decisions of the courts, based on legislation, have eliminated the Bible altogether from the school, making it illegal to read from the Bible even for opening exercises.

Various experiments are being tried in the hope of finding a way of providing instruction in religion while not attempting to modify the secular character of the schools. The experiments of this type which have been most successful have arranged some form of religious teaching outside of the regular school hours. In some cases the school authorities have co-operated with this plan and have permitted the use of school buildings for these exercises. In other cases, children have been excused from the school for a period in the day when they were not engaged in regular school exercises, and have gone to some neighboring church where religious instruction of suitable type has been given.

Other plans have arranged for instruction in Sunday schools to be supervised and credited by the public schools. The so-called Colorado plan is of this type. High schools approve the work of Sunday classes and treat such work as regular courses to be counted toward high school graduation.

Religious instruction has in recent years been greatly improved in Sunday schools as well as in classes of the type mentioned above. Many Protestant churches now provide normal classes for the training of teachers and a number of commissions have been active in reorganizing and enriching the courses of study used in Sunday schools.

Parochial Schools. Throughout its history, the Roman Catholic Church has been a patron of education. During the medieval period the clergy of this Church were the only teachers of the people. This special regard for education was retained by the Lutheran and various other Protestant bodies. At the present time, not satisfied with the instruction given in secular schools, these churches conduct numerous parochial schools and colleges. In these institutions, instruction in the conventional subjects is supplemented by instruction in religion and in Church history. In the case of the Roman Catholic Church, members of the religious orders are usually in charge of these schools. In some of the larger cities, the parochial schools enroll a considerable fraction of the children of school age.

TEXTBOOKS

From the beginning, American common schools have been reading schools. In this respect they differ from the common schools of Europe, where instruction is given largely in oral form by the teacher. American schools have therefore needed from the outset a supply of reading books. As the curriculum was extended, reading material in each subject was put into the hands of the pupils, and they were required to prepare their lessons from this reading material.

The publication of textbooks, throughout American school history, has been left very largely to private initiative, and as a result there have grown up in connection with the schools of the country numerous large publishing houses which specialize in the preparation and publication of textbooks. These publishing houses have exercised an unofficial but very powerful control over schools. In recent years a number of the states have taken the position that the influence of these independent publishing houses ought in some measure to be reduced; and legislation has been passed providing for the official adoption by some authorized public body of a list of books which may be used in different grades of schools.

State Regulation. State textbook commissions are defended because they secure uniformity throughout the state, and this is regarded by some as an advantage, in that it permits children to move from center to center without being compelled to supply themselves with an entirely new equipment of school textbooks. On the other hand, state adoption is criticized because, at the time of adoptions, competition between various publishing houses frequently runs very high; and charges are sometimes made that practices of an irregular sort are employed in order to secure adoptions for a particular firm. Texas, some years ago, took drastic action against the book companies on the ground that they had set up an illegitimate monopoly.

Kansas and California, moved by considerations which seemed to the legislatures adequate, have provided for state publication of textbooks. In both of these states it is held by friends of the present system that the state can furnish textbooks more economically than independent publishing houses. It is objected, on the other hand, by those who are opposed to the plan of state publications, that the preparation of high-grade textbooks becomes increasingly difficult when the incentives of royalty and financial profit are withdrawn.

Quite apart from the discussion of the methods of publishing books, it can be asserted without any danger of contradiction that in recent years there has been an enormous improvement in the mechanical make-up of textbooks and in their type of content. No other country is supplied with textbooks as good as are to be found in the United States. The books are very full in their content, well illustrated, and well made.

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XI

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LINCOLN AND TAD

BIOGRAPHY

INTRODUCTORY

THE word biography is derived from the Greek words *bios*, meaning "life," and *grapho*, meaning "write." The term means a written account of one person's life. When the person whose life is described is also the author of the description, the work is designated by the word autobiography, which is formed by a prefix derived from the Greek *autos*, "oneself."

Biography differs from history in having its interest restricted to one person. History is concerned with movements, institutions, and social or national events in which the part of any one man is often extremely small. A biographical narrative, on the other hand, has its center of interest in the individual and in his pathway through the midst of larger events. It takes cognizance of his personal qualities, of his intimate words and thoughts, of his disappointments as well as of his achievements. Thus, from the point of view of history, the Civil War and the emancipation of the slaves are of more interest than the personal fortunes of any one man, even of Lincoln. In a biography of Lincoln, however, these great events are merely the setting, or background, of a narrative of his life.

It is the part of the more extended biographies to record all that is known regarding a person, and even the most trivial details are of value provided that they shed light upon his essential qualities. Biographical narratives of smaller compass, however, which are adapted more especially to meet the needs of the general reader, must, in order to be helpful, seize upon the central features of the larger narratives and must indicate the role which the subject of the narrative has played, or is now playing, in the drama of the world's activities.

Value. Although biography differs from history, nevertheless it is one of the most valuable aids to that study. To read history only is to see but one aspect of the drama of human life; the more intimate and, in many respects, the more interesting aspect can be seen only by acquaintance with the individual actors. It is through biography that an intimate knowledge of their lives may be obtained, and this knowledge in turn infuses a new and more personal interest into history.

To no less a degree, biography is essential to a complete understanding of literature and of art. Although great masterpieces have a universal appeal, nevertheless they are cast in a mold determined by the circumstances and experiences of the writer or artist. The pictures of women painted by Rembrandt, for example, would have been much different had he loved a different woman. The poetry of Whittier cannot be fully appreciated without a knowledge of his lifelong devotion to the abolitionist cause. Prescott's masterly *History of Peru* is invested with a certain tragic interest when we realize that it was written after the author had become blind.

It is hard to exaggerate the part played in people's lives by the example of the great. Alexander is said to have been inspired throughout his career by the recollection of the Homeric Achilles; every ambitious young scientist hopes some day to be a second Newton or Einstein; and before each schoolboy in every country are held up, for his emulation, those eminent men who are felt to be typical of the best qualities of the nation. Often a hint obtained from a biography opens a young reader's mind to previously undreamed possibilities and leads into wide usefulness a life that might otherwise have been common and uninspired.

Early Biographies. Biography is, in a sense, one of the most ancient forms of literature. In its earlier forms, it was often written to minister to the pride of the great. The Homeric poems and other early epics are chiefly accounts of heroes. Kings and warriors frequently hired poets or chroniclers to record the deeds of their lives. A Greek writer was paid by the Roman statesman and orator Cicero to write down the acts of the latter's administration, and Cicero requested him not to be sparing in the use of high colors.

Another class of biography that leaves much to be desired in the matter of veracity is that undertaken for the purpose of teaching moral lessons. Lives of famous or notorious characters are described in order to excite emulation or to arouse repulsion. The famous *Parallel Lives* of Plutarch are in part open to this criticism. The *Lives of the Emperors* by Suetonius represents the Roman rulers in a character much blacker, in all probability, than that in which they would appear to a disinterested inquirer. The numerous lives of the saints also were plainly written as much for the edification of the reader as for his enlightenment.

Modern Biography. With a few exceptions, such as Xenophon's *Memoirs* of Socrates, there was, until modern times, no work of genuinely biographical interest. Beginning with the 17th century, however, a vast literature has arisen consisting of books each of which aims to give a faithful account of the experiences and activities of one person from the cradle to the grave. Such works naturally differ greatly in value according to the abilities of the biographer. Among those of outstanding merit is Boswell's *Life of Johnson*, which, perhaps in all literature, has never been excelled in courage, picturesqueness, and mastery of portraiture.

In addition to individual biographies, a number of monumental dictionaries of biography have been written in recent times. The earliest of these was a Swedish work of 23 volumes completed in 1857 and embracing the lives of notable people of Sweden. The *Dictionary of National Biography* in 67 volumes contains biographies of more than 30,000 outstanding figures in Great Britain. The chief work of this type in America is the 21-volume *Dictionary of American Biography*.

Scope. This Department of Biography contains more than 3600 sketches of noteworthy men and women who have lived in the course of 4000 years of recorded history. The earliest lives narrated are those of the Babylonian Hammurabi and Cheops, king of Egypt, and the biographies of people still living are brought up to the date of printing.

The list of biographies will be found to contain the greatest figures in history, literature, art, science, invention, religion, commerce, discovery, and the other chief fields of human activity. A very large number also are treated who cannot be ranked among the greatest but who are remembered for some specific reason. These include Epicurus, the founder of Epicureanism; Vasco da Gama, who, in modern times, first sailed around the southern extremity of Africa; and Sholes, the inventor of the typewriter.

Among people still living or who have recently died, the leaders in every field of activity have been included. Thus biographical data will be found of those who have been elected to the American Hall of Fame and to the American Academy of Arts and Letters; many of the winners of Nobel prizes in all parts of the world; most of the rulers and chief statesmen, scientists, scholars, writers, artists, engineers, administrators, philanthropists, and religious leaders in all the principal countries.

Biblical characters have been purposely omitted, with the exception of Moses and Saint Paul. Moses was retained in order to complete the ranks of the great lawgivers, such as Lycurgus, Solon, Justinian, and Alfred. It appeared desirable, also, that a biography of Saint Paul should be included, who, as the chief founder of ecclesiastical Christianity, is ranked in the history of religion with Confucius, Mohammed, and other great leaders in that field.

Method of Treatment. The biographies in this department recount the salient facts in the life of each person, including their nativity, education, chief positions held, accomplishments, and, for those not living, the date of their death. These sketches, however, are not limited to a merely statistical record of information. While written with a rare degree of conciseness, they approach more nearly the fullness of an encyclopedia article than the skeletonic brevity of a biographical dictionary.

Wherever possible, the significance of each person's work has been briefly indicated. The relation of statesmen to the events of their time has been made clear; the nature and value of a scientist's contribution to knowledge have been estimated in accordance with the best authorities in the field; a concise outline has been given of philosophies or religions originated by leaders in these fields; and artists' works have been appraised as far as the world has arrived at a settled opinion regarding their value. In making all such statements, the utmost care has been taken to avoid partisanship of all kinds. Neither fulsome praise nor malice has any place in a work of this character.

In the case of authors, a representative list of their writings is set forth. The chief masterpieces of painters, sculptors, and architects are listed, as well as the location of many of their works. The style and other qualities of composers are briefly characterized according to the judgment of eminent critics of music. In a word, this department has gone far toward being a complete guide to the vast field of human achievement.

Reference Groups. Throughout this department, the biographies are arranged alphabetically with a view to the readiest reference. At the end of the section, a second grouping of the names will be found, which is based on the field of achievement to which the different personages belong.

The first advantage of this grouping is that the reader is thereby enabled to see at a glance who are the coworkers, associates, or opponents of any one man in whom he may be interested. Moreover, since, within each group, the names are arranged chronologically, the development in any one field may be readily followed by consulting in order the biographies of the different people in this group.

It is, of course, impossible that each group should contain all the biographies that a specialist might look for in studying the development of his own field. Nevertheless, the *representative character* of the selection is such that, for biographies of people in fields outside the specialist's own department, these groups will be found no less valuable for the specialist than for the general reader.

Another unique feature of the department is the tabulation of all Nobel Prize winners. Opposite each name are entered significant data regarding the prize-winner's life and a brief characterization of his or her accomplishment.

Up-to-dateness. Many of the large encyclopedias do not contain information regarding significant events of the immediate past. Yet it is precisely the men and women who have recently come into prominence regarding whom people interested in present events need to be informed. Many life histories in this department have been secured only by special efforts made to obtain the facts from the persons themselves. In other words, many facts in the biographies of these people were not, at the date of printing, available in any other biographical reference work.

Illustrations. No small part of a reader's impression of a notable personage is a knowledge of his appearance. For this reason, photography may be a valuable aid to biography and, in this department, it has been laid under contribution to an unusual degree. Throughout this volume will be found a number of portraits of men and women whose lives are described in the text.

In addition to the portraits, there are numerous other illustrations which add to the effectiveness of biography. These include such pictures as the homes of noted Americans and reproductions of masterpieces in painting, sculpture, or architecture.

Cross References. In order to preserve the necessary conciseness and at the same time to enable the reader to learn as much as possible about the achievements of each person described, cross references have been inserted directing attention to other passages of this volume in which will be found a more complete account of some aspect of the person's work. Thus under Einstein there is a cross reference to the *Theory of Relativity*, which is appropriately treated more fully under Physics than in the Department of Biography. Similarly, under inventors, cross references are frequently given to articles in the section entitled Inventions; under authors, cross references direct the reader to articles on books or characters treated separately in the section on Literary Plots, Characters, and Allusions or in other parts of the Department of Literature; under artists, musicians, or educators, appropriate references are appended referring to instructive articles in the departments devoted to fine arts, education, or other subjects.

The enormous amount of material in this work would permit of an extraordinarily large number of cross references of this sort. To insert all those possible, however, would be distracting to many readers. Consequently, only those have been appended which appear to be the most imperative. They will serve as examples, showing how the careful user may obtain the maximum value from this department.

Spelling of Names. Personal names that come from certain foreign languages are often spelled in many different ways in English. This is especially true of Russian and Chinese names. To them might be applied the words of H. G. Wells, who, in speaking of Egyptian names, said that few self-respecting scholars in this field would tolerate the spelling of their colleagues. The form of such names used in this department is based in each case on the preference of one or more outstanding scholars.

The spelling of geographical names, as stated in the introduction to Geography, follows, in general, the decisions of the United States Geographic Board.

Test Questions. One of the distinguishing marks of an educated person is the range of notable people, in past ages or in the present, with whom he is acquainted. For extending and testing one's acquaintance with the great a stimulating means will be found in reading the test questions at the end of this department and consulting the text wherever the questions call for information not already familiar to the reader.

Bibliography. In order to meet the needs of those who desire to read more extensively regarding the lives of eminent personages, a bibliographical list has been added at the end of the department. This list contains the names of the finest biographical works in the English language as well as the names of the chief biographical reference works.

BIOGRAPHY

REFERENCE NOTE: The letter **c.** appearing before a date is an abbreviation for the word *circa*, meaning "about."

Abbey, Edwin Austin (1852-1911), artist, was born in Philadelphia, Pa., and began his art studies at the Academy of Fine Arts in his native city. He attained foremost rank among modern painters of historical and subject pictures. His works are remarkable for correctness of detail. He acquired great fame as an illustrator of Shakespeare, whose plays also supplied him with the subjects for some of his most successful pictures. After 1881, he resided in Great Britain. His principal works include "Richard III and Lady Anne," "King Lear's Daughters," "Hamlet," "Crusaders Sighting Jerusalem," "Fiammetta's Song," the decorative panels illustrating the "Quest of the Holy Grail," in the Boston Public Library, "Coronation of King Edward VII," and "Columbus in the New World." He was a member of the American Academy of Arts and Letters. See *Painting.*

Abbott, Lyman (1835-1922), American clergyman, author, and editor, was born in Roxbury, Mass.; was graduated at the University of New York in 1853; studied and practiced law; was ordained Congregational minister in 1860; resigned his pastorate in 1869 to devote himself to literature. He edited the "Literary Record" in *Harper's Magazine*; was associate editor of *The Christian Union* with Henry Ward Beecher, whom he succeeded as pastor of Plymouth Church, Brooklyn, in 1888; resigned in 1899; became editor of *The Outlook* in 1893. He was a leading exponent of the social gospel.

Abel (*ā'bĕl*), **Niels Henrik (1802-1829),** Norwegian mathematician, was born at Findo, Norway. He completed a course at the University of Christiania and spent two years in further study in Paris and Berlin. In 1828, he was made instructor at the University and the Military School in Christiania. He made important contributions to mathematical science, particularly by his work on the theory of functions, of which he was the originator. He died near Arendal. See *Mathematics, Modern.*

Abelard (*ăb'-ĕ-lärd*), **Peter (1079-1142),** scholastic philosopher and theologian, was born at Pallet, near Nantes, France. His immensely popular lectures at the Paris cathedral school led to the founding of the University of Paris. Doctrines advanced by Abelard in a controversy with Saint Bernard reveal him as a rationalist, holding that nothing is to be believed but what has been first understood, while the more orthodox writers held that we must believe in order to understand.

When Abelard was 38 years of age, he fell in love with his pupil Héloïse, whose uncle later caused a separation of the lovers and the emasculation of Abelard. The story of this romantic attachment, preserved by extant letters, is unique among all historic love affairs.

Abercrombie, Sir (Leslie) Patrick (1879-), British architect and city planner, has spent many years in the study of civic design. In addition to teaching this subject, first at the University of Liverpool and later at the University of London, he has been consultant on projects for Dublin, Doncaster, Hull, Plymouth, and the County of London. His contribution to the master plan for rebuilding London has been described as a program for "orderly decentralization."

Abruzzi (*ä-brōōt'sē*), **Lugi Amadeo, Duke of the (1873-1933),** Italian prince, scientist, explorer, naval officer, and litterateur, was born at Madrid, Spain; traveled around the world as a youth; ascended Mount Saint Elias, Alaska, 1897; and led an Arctic Expedition in 1899, which penetrated nearest to the North Pole up to that time. In 1906, he ascended the topmost height in the Ruwenzori range, East Africa, and, in 1909, ascended some of the highest peaks of the Himalayas. His writings include *On the Polar Star in the Arctic Sea, The Ascent of Mt. St. Elias,* and *Ruwenzori.* In World War I, he was commander of the Italian fleet until 1917. After the war, he undertook a colonization scheme in Italian Somaliland. He declined an offer of the throne of Albania in 1922. See *Polar Exploration.*

Acheson, Dean (1893-), American diplomat, was born at Middletown, Conn., the son of an Episcopal clergyman. He studied at Groton, Yale University, and Harvard Law School, and was an ensign in the U. S. Navy in World War I. After graduation from law school he served briefly as secretary to Supreme Court Justice Louis D. Brandeis, then entered the Washington law firm of Covington, Burling, and Rublee. Except for six months as under-secretary of the Treasury in 1933, he continued his law practice until 1941, when he was appointed assistant secretary of state. After resigning in 1947 he engaged in other forms of public service succeeding Fiorello LaGuardia as chairman of the U. S. section of the permanent American-Canadian defense board, and serving as vice chairman of the Hoover commission on reorganization of the Federal government. He was secretary of state from 1949 to 1953.

Acheson, Edward Goodrich (1856-1931), American inventor, was born at Washington, Pa. After two years at Bellefonte Academy, he began work in an iron furnace and, at 18 joined a civil engineering corps. Becoming interested in electricity, he went to New York and secured a position in Edison's laboratories, where he constructed valuable instruments in electric lighting work. In 1884, he invented an anti-inductive telephone wire. In 1891, he made his most important discovery, carborundum, an extremely hard abrasive whose use has since become standard. In connection with this he invented a process for extracting the metal silicon from sand. In 1896, he obtained a patent for a method of making a pure graphite known as "dag" and used extensively as a lubricant. Acheson began manufacturing carborundum in 1895 at Niagara Falls, N. Y., but later lost control of the enterprise. See *Carborundum, Graphite, Silicon.*

Acton (*ăk'tŭn*), **Sir John Emerich Edward Dalberg, First Baron (1834-1902),** English historian, was born at Naples, Italy. In 1895, he was made professor of modern history at Cambridge University, and as a liberal Catholic exerted profound influence. He planned the *Cambridge Modern History,* written by eminent historical scholars after his death. He wrote *The War of 1870, Wolsey and the Divorce of Henry VIII,* and *Schools of History in Germany.*

Adamic, Louis (1899-1951), American author, was born at Balto, Yugoslavia. He attended school in Yugoslavia until 1913, when he was brought to the United States. He was naturalized in 1918. After serving in World War I, he worked at various occupations which brought him into contact with other recent immigrants, a class to which he interpreted American ideals and whose interests and worth he interpreted to the public generally. His writings include *Dynamite, The Native's Return, Cradle of Life. My America,* and *From Many Lands.*

Adams, Arthur Stanton (1896-), American educator and engineer, was born at Winchester, Mass. He was educated at the United States Naval Academy and at several technical colleges, where he specialized in metallurgy. For several years professor of mechanics and metallurgy at the Colorado School of Mines, he became assistant dean of engineering at Cornell University and then, during World War II, special assistant in the Bureau of Naval Personnel at Washington. He had been president of the University of New Hampshire for two years when, in 1950, he was elected president of the American Council on Education, succeeding Dr. George Zook. While engaged in teaching he collaborated in the writing of two books—*Fundamentals of Thermodynamics* (with George Dewey Hilding) and *The Development of Physical Thought* (with Leonard B. Loeb).

Adams, Charles Francis (1807-1886), statesman and economist, son of John Quincy Adams. He was nominated by the Free-Soil party for the office of vice president in 1848; was elected member of Congress, 1858 and 1860, by the Republicans; was minister to England, 1861–68; and was appointed one of the arbitrators of the Alabama Claims, 1871–72. His position in England during the Civil War was a most difficult one, but the duties were performed with tact and discretion. He was Democratic candidate for governor of Massachusetts in 1876.

Adams, Franklin Pierce (1881-), American journalist, was born at Chicago, Ill. Having studied at the University of Michigan, he entered newspaper work with the Chicago *Journal* in 1903. He subsequently was on the staff of several New York newspapers, including the *Herald-Tribune* from 1931 to 1937 and the New York *Post* from 1938. His work consisted of a daily column "The Conning Tower," composed of mixed prose and verse in humorous vein. More recently he was a member of the panel on the "Information, Please" radio program. He is editor of *Anthology of Light Verse* (1942) and of *The F. P. A. Book of Quotations* (1952).

Adams, Henry (1838-1918), American historian, son of Charles Francis Adams, was born in Boston; was graduated at Harvard, 1858; and became private secretary to his father, who was American minister at London, 1861–68. He was assistant professor of history at Harvard, 1870–77, and editor of the *North American Review,* 1870–76. He then located in Washington, where he made a detailed study of the administrations of Jefferson and Madison, which he embodied in a work of original research entitled

History of the United States from 1801 to 1807. His *Mont Saint Michel and Chartres*, as masterly study of medieval times, and *The Education of Henry Adams*, demonstrating the inadequacy of the contemporary generation for meeting the problems of the 20th century, won him a wide and lasting reputation. He was elected to the American Academy of Arts and Letters in 1905.

Adams, Herbert (1858-1945), American sculptor, was born at West Concord, Vt. He was educated at the Institute of Technology, Worcester, in the Normal Art School of Boston, and in Paris. He then became instructor in art at Pratt Institute, Brooklyn. While modern and original in style, his fresh and refined realism resembles that of early Renaissance sculptors. He became distinguished for his beautiful busts of women, numerous statues, and for bronze doors at Saint Bartholomew's Church, New York, and at the Congressional Library, Washington. He became a member of the American Academy of Arts and Letters in 1912.

Adams, James Truslow (1878-1949), American capitalist and historian, was born in Brooklyn, N. Y. Graduating from the Brooklyn Polytechnic Institute and Yale University, he engaged in a brokerage and investment business until 1912, when he retired from active participation to devote himself to public service and literature. He was a captain in the military intelligence service during World War I and was detailed for special duty at the peace conference in 1919. He had already begun a series of studies in American colonial history, and his *Founding of New England* won a Pulitzer prize in 1922. *The Adams Family*, *The Epic of America*, and *The March of Democracy* attained a wide popularity for their freshness, vigor, and broad grasp of historical facts. He wrote also *Building the British Empire*. He was elected to the American Academy of Arts and Letters in 1930.

Adams, John (1735-1826), second president of the United States, was born at Quincy, (formerly Braintree), Mass. He was graduated at Harvard in 1755 and was admitted to the bar in 1758. He was one of the delegates to the Continental Congress at Philadelphia, 1774; was one of the signers of the Declaration of Independence; and throughout supported the Revolution, in which, as chairman of the board of war, he took an active part. He was commissioner to the court of France, 1778, and was sent on an embassy to England, 1779. He was elected vice president of the United States in 1789; succeeded Washington as president in 1797; but, in 1801, failed to gain re-election and retired from public affairs. He died, July 4, 1826, on the 50th anniversary of the birth of the nation which he devoted his best energies to establish. Elected to American Hall of Fame, 1900. See *American History: Presidency of John Adams*.

Adams, John Couch (1819-1892), English astronomer, was born at Laneast, Cornwall. He was graduated at Saint John's College, Cambridge, in 1843. After graduation he was made mathematical tutor at Cambridge; was appointed professor of astronomy in 1858; and, in 1860, succeeded Challis as director of the Cambridge Observatory. With Leverrier of France, Adams shares the honor of discovering the planet Neptune. Working independently, each without the knowledge that the other had attacked the problem, they each computed, in 1843–46, from observed irregularities in the motions of Uranus, the mass, orbit, and location of a supposed new planet. This new member of the solar system, later named Neptune, was first recognized by Galle of Berlin from Leverrier's calculations, though it had actually been seen but not recognized a few weeks earlier by Challis from Adam's calculations.

Adams, John Quincy (1767-1848), sixth president of the United States and son of the second president, was born in Quincy, (formerly Braintree), Mass. In his boyhood, he accompanied his father on an embassy to Europe, and he passed a considerable part of his youth in Paris, at The Hague, and, lastly, in London. When his father was elected president, the younger Adams was sent on an embassy to Berlin and traveled through Silesia. On his return to America, he was engaged as professor of rhetoric at Harvard University, where he had graduated in 1787, and was later chosen United States senator for Massachusetts. By President Madison he was sent as plenipotentiary to Russia and afterward to England. On this embassy, he took part in the negotiation of peace with England and assisted with his counsel the deputies sent from America to Ghent.

When Monroe was elected president, he recalled Adams from Europe and made him secretary of state. On the retirement of Monroe from office, Adams gained the presidency after a hard contest against Jackson in 1825. On the expiration of his term of office, he retired to Quincy, near Boston, but, in 1830, was chosen as representative of his Congressional district. He now joined the party of the Abolitionists, and frequently raised the whole House of Representatives against himself by his incessant petitions on the slavery question. On one occasion, in 1842, in order to assert strongly in the abstract the right to petition, he went so far as to present a petition for the dissolution of the Union. Elected to the American Hall of Fame in 1905.

Adams, Maude (1872-1953), American actress, was born at Salt Lake City; her family name was Kiskadden, but she adopted her mother's maiden name, Adams. She appeared on the stage in child's parts; joined E. H. Sothern's company, New York, at 16; played an ingénue role in the *Midnight Bell;* afterward joined Charles Frohman's stock company. She later was leading lady with John Drew for five years; achieved notable distinction and popularity as Lady Babbie in *The Little Minister*; as Juliet in *Romeo and Juliet*; also in *Peter Pan*, *Joan of Arc*, *Chantecler*, and many other plays. She retired from the stage in 1918, and in 1937 became professor of drama at Stephens College for Women, Columbia, Mo. She also worked on perfecting a system of stage lighting using the facilities of the General Electric laboratories.

Adams, Samuel (1722-1803), one of the American Revolutionary leaders, was born in Boston, Mass. He displayed on all occasions an unflinching zeal for popular rights and was placed in the legislature by the patriotic party in 1766. Adams was a member of the First Continental Congress, and signed the Declaration of Independence in 1776; took an active part in framing the constitution of Massachusetts; and was for several years president of the senate of that state. He held the office of lieutenant governor, 1789–94, and of governor, 1794–97.

Adams, Samuel Hopkins (1871-), American writer, was born at Dunkirk, New York. After he was graduated from Hamilton College in 1891, he became a newspaper reporter and magazine writer. Of his many novels, several have been filmed, among them *It Happened One Night* (1934), *Gorgeous Hussy* (1934), and *The Harvey Girls* (1942). He also wrote *The Pony Express* (1950), *The Santa Fe Trail* (1952), and *The Erie Canal* (1953). His *Grandfather Tales* was published in 1955.

Adams, Sherman (1899-), American statesman, was born in East Dorset, Vermont. He was graduated from Dartmouth College in 1920 and for the next twenty years was engaged in the lumber industry. In 1940 he was elected to the New Hampshire legislature of which he was speaker in 1943-44. He was a member of Congress 1945-47, and then served as governor of New Hampshire from 1949 to 1953, when President Eisenhower made him his assistant and chief of the White House Staff.

Adams, William T. See *"Optic, Oliver."*

Addams, Jane (1860-1935), social reformer and head resident of Hull House, Chicago, was born at Cedarville, Ill.; was graduated at Rockford College, 1881; spent two years in Europe, 1883–85; studied in Philadelphia, 1888; and, in 1889, with Miss Ellen Gates Starr, opened the social settlement of Hull House. By her practical methods, executive gifts, and humanitarian spirit, she became one of the foremost leaders of social settlement work in America. In 1919, she was elected president of the International Congress of Women at Washington and attended the peace conventions at Zurich in 1919 and at Vienna in 1921. She received one-half the Nobel prize for peace, 1931. Her publications include *The Spirit of Youth and the City Streets* and *A New Conscience and an Ancient Evil*.

Addison, Joseph (1672-1719), English essayist, was born at Milston, England; was graduated at Oxford; and held for some years a fellowship at the University. Here some of his early writings brought him into notice and secured him a pension of $1500 a year. He traveled on the continent, observing, studying, and writing. In the winter of 1701, amid the stoppages and discomforts of a journey across Mont Cenis, he composed his *Letter from Italy*, which contains many fine touches of description and is by far the best of his poems. His poem *The Campaign*, written in celebration of the battle of Blenheim, 1704, won him, as a reward, the office of excise commissioner. He held other public offices, which kept him from writing much for the next six years. In 1710, he began writing a series of essays, upon which his fame chiefly rests. These he contributed to the *Tatler*, next to the *Spectator*, and afterward to the *Guardian*, which he published in conjunction with his friend, Richard Steele. Of these periodicals, the *Spectator* ran only a few months, but, mainly on account of Addison's essays, it still lives in the history of English literature. See *English Literature: Eighteenth Century*.

Ade (*ād*), **George (1866-1944),** American humorist and playwright, was born at Kentland, Ind.; was graduated at Purdue University, 1887; was engaged in newspaper work in Lafayette, Ind., 1887–90; and was with the Chicago *Record*, for which he wrote his widely popular *Fables in Slang*, 1890–1900. His characters are chiefly drawn from rural life, outlined faithfully and sympathetically. He was the author of *Artie*, *The Girl Proposition*, *Breaking into Society*, and *In Pastures New*. His plays, which display

cleverness and much satirical humor, include *The Sultan of Sulu, The College Widow, Father and the Boys, Marse Covington,* and *Nettie.*

Adenauer, Konrad (1876-), German statesman and lawyer, has been serving since 1949 as chancellor of the newly formed West German Republic, with headquarters at Bonn. Previously, his entire life was spent at Cologne, his birthplace, in the practice of law and in public life. He was once lord mayor of his native city, and he founded the University of Cologne. He was arrested by the Nazi regime, and was not active in politics until after the surrender. As chairman of the Christian Democratic Party and president of the Bonn Assembly, he was influential in shaping the constitution for the new German republic.

In 1949 he was elected chancellor of the Federal Republic of Western Germany. He was successful again, notwithstanding bitter opposition, in the election of 1953. This signified approval of his support for E.D.C. (the European Defense Community) and his policy of seeking an understanding with France concerning the Saar issue and other thorny problems. Disappointed in Russian refusal to discuss German unity at the Big Four Conference at Geneva in 1955, he went to Moscow to present Germany's claims. He obtained small concessions on the return of German war prisoners held in Russia but received no encouragement regarding unification of East and West Germany.

Adler, Alfred (1870-1937), Austrian psychologist, was born at Vienna. He studied with Freud, with whom he came to differ, holding that Freud overestimated sex as a factor in conduct and underestimating the drive for power and the sense of inferiority. Adler coined the term "inferiority complex," which concept became widely current as a result of his lectures and books, including *The Practice of Individual Psychology, Pattern of Life,* and *What Life Should Mean to You.*

Adler, Felix (1851-1933), educator and lecturer, was born in Alzey, Germany; came to America in 1857; was graduated at Columbia University, 1870; studied at Berlin and Heidelberg; and was professor of Hebrew and Oriental literature at Cornell University, 1874-76. In 1876, he established the New York Society for Ethical Culture, to which he continued to give regular Sunday discourses. He became professor of political and social ethics, Columbia University, in 1902 and, in 1908-09, was exchange professor at the University of Berlin. His publications include *Life and Destiny, An Ethical Philosophy of Life,* and *The Reconstruction of the Spiritual Ideal.*

Adrian IV (*ā'drĭ-ən*) **(c. 1100-1159)**, named Nicholas Breakspeare, was the only English pope. He left England a poor man, went to Paris, became an ardent student, and was soon known for his learning and zeal. He was chosen abbot, then cardinal, and lastly pope in 1154. He was vigorous in maintaining his authority at Rome and throughout Europe. He died in Italy.

Æschines (*ĕs'kĭ-nēz*) **(389 B. C.-314 B. C.)**, Athenian orator, who vied with Demosthenes in eloquence. As head of the peace party, at Athens, Æschines was the chief opponent of Demosthenes, who advocated strenuous opposition to Philip of Macedon, then pursuing his designs for the subjugation of the Greek states. Events justified the sagacious fears of Demosthenes. When, however, it was proposed by Ctesiphon to reward Demosthenes with a golden crown Æschines indicted Ctesiphon for bringing forward an illegal proposal. Demosthenes replied in perhaps the greatest of his speeches,—*On the Crown,*—and Æschines, defeated, had to leave Athens. He went into exile at Rhodes where, tradition says, he established a school of eloquence. Died at Samos.

Æschylus (*ĕs'kĭ-lŭs*) **(525 B. C.-456 B. C.)**, Greek tragedian, was born at Eleusis in Attica. His father, Euphorion, brought Æschylus as a youth under religious influences which distinctly affected the tone of his dramatic works.

In 499 B. C., Æschylus made his first appearance as competitor for the prize offered annually at Athens to the poet producing the best tragedy, but it was not until 484 B. C. that he achieved his first victory. In the course of 40 years, he competed nearly 20 times, each time with a trilogy of three related tragedies followed by a so-called satyr play, having a comic character. He won the first prize on 13 occasions.

Æschylus took part in three famous battles against the Persians—Marathon, Salamis, and Platæa. He undertook three journeys to Syracuse—in 476, 471, and 456 B. C.—visiting the court of Hiero, the tyrant of the city. His absence from Athens has been attributed to political expediency, for Æschylus belonged to the conservative, aristocratic party, which was then on the decline in the growing democracy of Athens.

Before the days of Æschylus, Greek tragedy consisted of dramas acted by a chorus, a chorus leader, and one actor. There was little plot and no scenery or other accessories. Æschylus added a second actor; invented costumes, including mask, mantle, and the so-called tragic boot; had the plays produced on a regular stage; and used the services of the scene painter. He also gave to Greek tragedy its characteristic literary form. Such innovations entitled him to be called "the father of tragedy."

Æschylus was serious, bold, and often sublime in his style and originality of phrase. He stoutly upheld reverence for the gods, the sanctity of oaths, the duties of hospitality, and the inviolability of marriage. His plays have simple plots, for he does not represent the complex subtleties of human character; he rather depicts his heroes as victims of destiny, their struggles against which involve them in situations of great tragic intensity.

Only 7 of his 70 tragedies are extant. These are *The Seven against Thebes, The Suppliants, The Persians, Prometheus Bound, The Choëphori, The Eumenides,* and *Agamemnon.* See *Tragedy, Greek.*

Æsop (*ē'sŏp*) **(c. 620 B. C.-c. 560 B. C.)**, celebrated fabulist, is said to have been born at Phrygia. He was as deformed in body as he was accomplished in mind. Originally a slave at Athens and at Samos, he gained freedom by his wit, traveled through Asia Minor and Egypt, and later attached himself to the court of Crœsus, king of Lydia. Sent by that monarch upon an embassy to Delphi, he so offended the inhabitants by the keenness of his sarcasms that they are said to have hurled him from a rock into the sea.

Agassiz, Louis Johann Rudolph (1807-1873), naturalist, was born in Switzerland, the son of a Swiss Protestant clergyman. He studied medicine and was graduated at Munich, but devoted himself principally to ichthyology, and was employed to classify and arrange the collection brought from Brazil by Martius and Spix. In 1846, he came to America, where he was well received, and, in 1848, accepted the chair of zoology and geology at Harvard College. In 1865, he visited Brazil and, on his return, placed in the museum of Cambridge the large collection he had made. He wrote *Glaciers, Outlines of Comparative Physiology, An Essay on Classification,* and numerous other valuable works. He was to the last a disbeliever in the Darwinian theory of evolution. He was one of the most gifted teachers of his time, and the list of his pupils includes many distinguished names in American biological science. Elected to American Hall of Fame, 1915.

Agesilaus (*ă-jĕs'ĭ-lā'ŭs*) **(c. 444 B. C.-c. 360 B. C.)**, king of Sparta about 401-360 B. C. and one of the most notable soldiers of antiquity. Called on by the Greeks of Asia Minor to assist them against Artaxerxes, he commenced a splendid campaign in Asia; but the Corinthian War recalled him to Greece. At Coronea, he defeated the forces allied against his native city, and peace was concluded in favor of Sparta. Afterward, in the Theban War, he successfully defended his city against Epaminondas. Died when on an expedition to Egypt.

Agricola (*ă-grĭk'ō-lă*), **Cnæus Julius (37 A. D.-93)**, a Roman of the imperial times, distinguished not less by his great abilities as a statesman and a soldier than by the beauty of his private character; born at Forum Julii (now Frejus, in Provence, France). Having served with distinction in Britain, Asia, and Aquitania, and gone through the round of civil offices, he was elected consul in 77 A. D., and, in the following year, proceeded as governor to Britain—the scene of his military and civil administration during the next seven years. He was the first Roman general who effectually subdued the island and the only one who displayed as much genius and success in training the inhabitants to the amenities of civilization as in breaking their rude force in war.

Agrippa (*ă-grĭp'ă*), **Marcus Vipsanius (63 B. C.-12 B. C.)**, Roman statesman and soldier. He was the chief instrument of Octavius in establishing the Roman Empire. In 40, he took Perusia from Lucius Antonius and Sipontum from Mark Antony. In 36, he defeated Sextus Pompey at Mylæ and Naulochus and, in 31, contributed decisively to the great victory at Actium over Mark Antony. Agrippa was prætor in 41; consul in 37, 28, and 27, when he built the Pantheon; ædile in 33; and tribune in 18-12. Rome owed to him the restoration or construction of several aqueducts and the erection of the Pantheon, besides other public works of ornament and utility.

Agronsky, Martin (1915-), American newspaper correspondent and radio news analyst, was born in Philadelphia. After he was graduated from Rutgers University in 1936, he became a foreign correspondent. With the outbreak of World War II, he began covering the battle fronts. His broadcasts from all quarters of the globe became familiar to American listeners. He was with the British army in Libya, and when the Japanese attacked Singapore Agronsky was there. He joined the American Broadcasting Company in 1943 as Washington correspondent. In 1953 he was made president of the Radio and Television Correspondents Association, which is the regulatory body of the Senate and House radio galleries of Congress.

Aguinaldo (*ä'gē-näl'dō*), **Emilio (1869-)**, Filipino general, was born near Cavite, Luzon, and was educated at Saint Thomas University Manila. During the rebellion of

the Filipinos against Spain, he was the chief of the insurgents, over whom he assumed dictatorial powers. In the Spanish-American War, he turned his arms against the Americans, but, in 1901, he was captured by General Frederick Funston. Aguinaldo then pledged allegiance to the United States and lent his influence to strengthening the American administration. When the Japanese invaded the Islands he became a member of the puppet government set up under their protection. See *Philippine Insurrection.*

Aiken, Conrad Potter (1889-), American poet, novelist, short-story writer, and critic, was born at Savannah, Georgia. He was graduated from Harvard in 1911, and the first of his many books of poems appeared in 1914. His *Selected Poems,* published in 1929, won the Pulitzer prize. His *Collected Poems* appeared in 1955. Meanwhile, in 1950, *The Short Stories of Conrad Aiken* was published. His novels include *Blue Voyage* (1927), *Great Circle* (1933), *King Coffin* (1935), and *The Conversation* (1940). A leader of the younger poets following World War I, Aiken lived for some time in England. He was elected to the American Academy of Arts and Letters in December 1956.

Airy (*âr'ĭ*), **George Biddell (1801-1892)**, English mathematician, astronomer, physicist, and engineer, was born at Alnwick, England; was graduated at Trinity College, Cambridge, in 1823; and, soon after, published his *Mathematical Tracts on the Lunar and Planetary Theories,* the *Figures of the Earth,* and the *Undulatory Theory of Optics.* In 1825, he discovered astigmatism; in 1826, was appointed Lucasian professor of mathematics; and, in 1828, became Plumian professor of astronomy at Cambridge and director of the observatory. In 1863, he succeeded Pond as astronomer-royal at the Greenwich Observatory, a post which he held for 46 years, equipping the observatory with an entirely new outfit of instruments, which were mostly of his own design and were for a long time the most accurate in use. Here he introduced the systematic observation of the magnetic elements and investigated the lunar theory, the magnetism of iron ships, the density of the earth, the length of the seconds pendulum, and a great variety of other subjects.

Aitken, Robert Ingersoll (1878-1949), American sculptor, was born in San Francisco; received high school education and studied under Douglas Tilden at Mark Hopkins Institute of Art in his native city, where he afterward became professor of sculpture. Later he devoted several years to study in Paris and upon his return established a studio in New York. In originality, virility, and technique he ranks high among American sculptors. His more important works include the Dewey, Bret Harte, and McKinley monuments, San Francisco; the Liberty memorial, Kansas City; the monument to Robert Burns, St. Louis; the west pediment of the United States Supreme Court and figures at the Pennsylvania Avenue entrance to the Archives Building, Washington, D. C.

Akbar (*ăk'bär*) **(1542-1605)**, Mogul emperor, was born at Amarkote in Sind. When he ascended the throne, only a small part of what had formerly belonged to the Mogul Empire acknowledged his authority, and he devoted himself with great success to the recovery of the revolted provinces. He encouraged commerce and had the land carefully measured so that the taxes should be fair. His people were of different races and religions, but he was just and tolerant to all. He founded schools and encouraged learning. Such measures gained for him the title of "guardian of mankind," and caused him to be held up as a model to Indian princes of later times.

Akeley, Carl Ethan (1864-1926), American animal sculptor and naturalist, was born in Orleans County, N. Y. He was employed in the Milwaukee Museum from 1887 to 1895, and then went to the Field Museum, Chicago. There he developed a method of mounting habitat groups which has been widely adopted, a method which relies in part on animal sculpture. He created a large number of small animal figures or groups of figures in bronze, which depict vividly dramatic moments in the lives of the animals. Among them are the elephant group of "Wounded Comrade" and the "Lion and Cape Buffalo." From five expeditions for museums he brought back impressive specimens of elephants and gorillas. He wrote *In Brightest Africa.*

Akenside (*ă'kĕn-sĭd*), **Mark (1721-1770)**, English poet and physician, was born at Newcastle on Tyne. He studied theology and then medicine at the University of Edinburgh. Later, he completed his medical education at Leiden. He owes his rank among poets chiefly to his *Pleasures of the Imagination,* published in 1744, which at once became famous. In 1745, he settled in London, and, in 1761, he became physician to the queen.

Alarcóny Mendoza (*ä'lär-kōn' ē mĕn-dō'sä*), **Don Juan Ruiz de (?-1639)**, Spanish dramatic poet, was born in Mexico toward the end of the 16th century and, in 1600, went to Spain. In 1628, he published a volume containing eight comedies and, in 1634, another containing twelve. One of them, called *La Verdad Sospechosa,* "The Truth Suspected," furnished Corneille with the groundwork and greater part of the substance of his *men eur.* His *Tejedor de Segovia,* "Weaver of Segovia," and *Las Paredes Oyen,* "Walls Have Ears," have been very popular in Spain.

Alaric I (*ăl'ä-rĭk*) **(?-410)**, king of the Visigoths, was born about the middle of the 4th century. He is first mentioned in history in 394, when Theodosius the Great gave him the command of his Gothic auxiliaries. The dissensions between Arcadius and Honorius, the sons of Theodosius, inspired Alaric with the intention of attacking the Roman Empire. In 396, he ravaged Greece, from which he was driven by the Roman general Stilicho, but made a masterly retreat to Illyria, of which Arcadius, frightened at his successes, appointed him governor.

In 400, Alaric invaded Italy, but was defeated by Stilicho at Pollentia, in 403, and induced to transfer his services from Arcadius to Honorius on condition of receiving 4000 pounds of gold. Honorius having failed to fulfill this condition, Alaric made a second invasion of Italy, during which he besieged Rome thrice. The first time, in 408, the city was saved by paying a heavy ransom; the second, in 409, it capitulated, and Honorius was deposed, but was shortly afterward restored. His sanction of a treacherous attack on the forces of Alaric brought about the third siege, and the city was taken in 410 and sacked for six days. Alaric, however, did everything in his power to restrain the violence of his followers. He quitted Rome with the intention of reducing Sicily and Africa, but died at Cosenza. See *Rome: German Invasions; Visigoths.*

Albert (1819-1861), prince of Saxe Coburg Gotha and husband of Queen Victoria of England, was born near Coburg, Germany. He married Queen Victoria in 1840; soon after, he was made field marshal in the British army and, in 1857, received the title of prince consort. As the prudent adviser of the queen, he acquired great influence in public affairs and became popular throughout England.

Albert I (1875-1934), Belgian king. He was carefully educated, traveled widely, and became well versed in politics and economics. In 1898, during a visit to the United States, he made a study of American railroads. Later he investigated conditions in the Belgian Congo and urged many improvements and reforms. In 1900, he married the Duchess Elizabeth of Bavaria. Upon the death of his uncle Leopold II in 1909, he was made king. By reason of his democratic tastes, he became one of the most popular of sovereigns. His heroic leadership in resisting the German invasion of 1914 made him the idol of the Belgian people. With his equally devoted queen, he shared throughout the ensuing struggle the perils and hardships of his soldiers, re-entering Brussels on November 22, 1918, after the expulsion of the invaders. The continued confidence reposed in the king was evidenced in 1926, when dictatorial powers were conferred upon him to be used in stabilizing the Belgian currency. He fell off a cliff at Marche des Dames and was killed.

Albert, Eugen Francis Charles d' (1864-1932), pianist and composer, son of a French musician, was born in Glasgow, Scotland. He studied first in London under Sullivan, Prout, and Pauer, winning the Mendelssohn scholarship in 1881. Later, he studied under Richter in Vienna and also under Liszt at Weimar, where he was soon made court pianist. He appeared in concert with great success in Berlin, 1883, and afterward traveled in Russia, Italy, France, Germany, England, and the United States, giving concerts. By his masterful technique and intellectual grasp, he won foremost rank among the world's pianists and was especially distinguished for his interpretations of Bach and Beethoven. His compositions include the operas, *The Ruby, Ghismonda, The Departure, Im Tiefland,* and *Liebesketten;* also string-quartets, concertos, a symphony, and many songs and smaller works.

Albert, Joseph (1825-1886), German photographer, born at Munich. He established a photographic studio in Augsburg in 1850 but, in 1858, returned to Munich where he became interested in the application of photography to printing. About 1867, he discovered and introduced an improvement of great importance in photomechanical printing. Albert found that gelatin, by exposure to the action of light, could be hardened and rendered sufficiently durable for photomechanical printing. In place of the old metallic plates he substituted transparent gelatin plates. Prints made by this process were called "albertypes." After this process was perfected, it was possible to obtain more than a thousand albertype copies from one plate.

Alberti (*ăl-bâr'tē*), **Leon Battista (1404-1472)**, Italian architect and writer on art and poetry, was born at Florence. He was much employed by Pope Nicholas V. He completed the Pitti palace at Florence and designed the church of Saint Francis at Rimini. His chief book, *De Re Ædificatoria,* is highly valued. He died at Rome.

Albertus Magnus (*ăl-bĕr'tŭs măg'nŭs*) **(c. 1193-1280)**, the *Doctor Universalis* of the schoolmen, was born at Lau-

ingen, in Swabia. He studied at Padua, and, entering the newly founded Dominican order, taught in the schools of Hildesheim, Ratisbon, and Cologne. In 1245-54, he lectured at Paris; in 1254, he became provincial of the Dominicans in Germany; and, in 1260, was named bishop of Ratisbon. But, in 1262, he retired to his convent at Cologne to devote himself to literary pursuits. Of his works the most notable are the *Summa Theologiæ* and the *Summa de Creaturis*. Albertus excelled all his contemporaries in the wideness of his learning; in medieval legend, he appears as a magician. He died at Cologne.

Albright, William F. (**1891-**), American orientalist and archaeologist, was born at Coquimbo, Chile. The son of American missionary parents, he was educated in the United States. For twelve years he was head of the American School of Oriental Research at Jerusalem and was leader of several archaeological expeditions in that area. In his present position as professor of Semitic Languages and chairman of the Oriental Seminary at Johns Hopkins University, he has been particularly active in interpreting the meaning of recently discovered manuscripts and other religious relics from the Palestine region. In addition to numerous magazine articles on "The Dead Sea Scrolls" and related subjects, he has written several books, the best known of which are *The Archaeology of Palestine* and *From the Stone Age to Christianity*.

Alcæus (*ăl-sē'ŭs*), of Mytilene, one of the greatest lyric poets of Greece, flourished about the end of the 7th or the beginning of the 6th century B. C. He was the inventor of the form of verse which after him is called the Alcaic, and which Horace, the happiest of his imitators, adapted to the Latin language.

Alcibiades (*ăl'sĭ-bī'ă-dēz*) (**450 B .C.-404 B. C.**), Athenian general, was born at Athens. He was educated in the house of Pericles, his uncle. His handsome person, his distinguished parentage, and the high position of Pericles procured him a multitude of friends and admirers. Socrates was one of the former, and gained considerable influence over him. He was the ablest and most unscrupulous leader of the Athenians in the Peloponnesian War. He suppressed a revolt of the allied states by the capture of Melos and massacre of its male inhabitants. He promoted and was chief leader in an expedition against Syracuse. Being summoned back to stand trial for an alleged act of sacrilege, he deserted to Sparta and gave advice which eventually led to the capture of Athens by Sparta. The Athenian democracy again winning power, Alcibiades was recalled, having left Sparta after an affair with the queen became known. He commanded the fleet but was banished after some ships had been defeated in a battle undertaken contrary to his orders. He took refuge in Phrygia, where he was assassinated by Spartan order. See *Periclean Age*.

Alcott, Louisa May (**1832-1888**), American juvenile writer, daughter of Amos Bronson Alcott, was born in Germantown, Pa. Her first volume was *Flower Fables*, published in 1855. During the Civil War, she was a volunteer nurse in the South and, in 1863, wrote *Hospital Sketches*. *Little Women*, published in 1868, was one of the most popular books for girls ever written. It was followed at short intervals by *An Old-Fashioned Girl*, *Eight Cousins*, *Silver Pitchers*, *Under the Lilacs*, *Little Men*, *Rose in Bloom*, *Jo's Boys*, and other stories. She died at Boston, Mass.

Alcuin (*ăl'kwĭn*), or **Flaccus Albinus** (**c. 735-804**), a scholar of the 8th century and the confidant and adviser of Charlemagne, was born at York. He reorganized the palace school and established others throughout the kingdom, himself serving as abbot of that in Tours, which became the most famous in Europe. His handwriting is said to have become the model for that in western Europe. Besides numerous theological writings, he left a number of elementary works on philosophy, mathematics, rhetoric, and philology; also poems and numerous letters.

Alden, John (**1599-1687**), one of the Pilgrims to Plymouth, Mass., was born in England. He was one of the 41 signers of the compact for the government of the colony drawn up in the cabin of the *Mayflower* before the landing at Plymouth. Alden married Priscilla Mullens, to whom, according to popular legend, he first proposed in behalf of Miles Standish, but she indicated her preference for Alden over the soldier. A poem by Longfellow, entitled *The Courtship of Miles Standish*, has this incident for its theme. Alden was a magistrate for more than 50 years, and greatly assisted in the government of the infant colony. He died at Duxbury, Mass. See *Priscilla*.

Aldington, Richard (**1892-**), English novelist and poet, was born in Hampshire. He began writing poetry at 15 and was literary editor of the left-wing publication *Egoist* before 1916 becoming the recognized leader of the imagist school of poetry. While serving as infantryman in World War I, he suffered shell shock, from which he did not entirely recover until 1927. His poetry includes *Images of Desire*, *Exile*, and *A Fool i' the Forest*. Among his novels, over which hang a spirit of disillusionment, exquisitely expressed, are *Death of a Hero*, *Women Must Work*, and *Life for Life's Sake*. Biographical works written by him are *D. H. Lawrence*, *Portrait of a Genius . . . but* (1950), and *Lawrence of Arabia* (1955).

Aldrich, Thomas Bailey (**1836-1907**), poet and editor, was born in Portsmouth, N. H. While engaged in the office of a New York merchant, he began to write verses, the success of which soon induced him to enter on a literary career. His first volume, consisting of miscellaneous poems and called *The Bells*, was published in 1855. Later, he published several other volumes of poems, *The Story of a Bad Boy*, *Marjorie Daw*, and other stories. Aldrich was an industrious contributor to the best periodicals. From 1881 to 1890, he served as editor of the *Atlantic Monthly*. He was a member of the American Academy of Arts and Letters. Died at Boston, Mass.

Aldrich, Winthrop William (**1885-**), banker and diplomat, was born at Providence, R. I. He was graduated from Harvard University in 1907 and from Harvard Law School in 1910. He was admitted to the New York bar in 1912. During World War I he was an officer in the U. S. Naval Reserve. He was president of the Equitable Trust Company of New York; later chairman of the board of the Chase National Bank. He was ambassador to Great Britain from 1953 to 1957.

Alembert (*ă'lăN'bâr'*), **Jean le Rond d'** (**1717-1783**), French mathematician and philosopher, the natural son of Madame de Tencin and the poet Destouches, was born in Paris. He was the friend of Voltaire and of Diderot, and acquired high esteem by his scientific works, which fill many volumes.

Alexander the Great (**356 B. C.-323 B. C.**), Macedonian king, military commander, and conqueror, was born at Pella, the capital of Macedonia. His education was committed first to Leonidas, then to Lysimachus, and, about 342 B. C., to Aristotle. Alexander was 16 years old when his father, Philip, marched against Byzantium and, during his absence, left the government in his son's hands. In 338 B. C., Alexander displayed conspicuous courage at the battle of Chæronea, whereby Macedonian supremacy was established in the Hellenic world. Philip was about to conduct an expedition of all the Greeks against the despotism of Iran, when he was assassinated, leaving Alexander as his heir.

Conquests. Alexander ascended the throne in 336 B. C. and immediately punished his father's murderers. In 335 B. C., he destroyed Thebes and brought the Grecian states under his command. He crossed the Hellespont in 334 B. C. and, as a result of the battle of Granicus, liberated all the Greek cities of Asia Minor from the Iranian yoke. Proceeding on his way of conquest, he cut, at Gordium, the so-called Gordian knot, of which an oracle had said that he who untied it would be the lord of all Asia. In 333 B. C., in the neighborhood of Issus, he defeated Darius, king of the Iranians.

Alexander now turned toward Syria and Phœnicia, in order to cut off Darius' escape by sea. The next year witnessed Alexander's capture of Tyre, his victorious march through Palestine, and his conquest of Egypt. In Egypt, he restored the old customs and religious institutions of the country and, in 332 B. C., founded Alexandria.

Meanwhile, Darius had collected another army, and, in the spring of 331 B. C., Alexander advanced against him in Assyria. In October 331 B. C., Alexander conquered the forces of the Iranians, notwithstanding the great numerical superiority of his adversaries. In the following two years, Media, Parthia, and Bactria fell before him. As the conqueror of Asia, he now proceeded to Babylon, Susa, and Persepolis, where he was received by the inhabitants as their sovereign.

In 329 B. C., Alexander penetrated to the farthest known limits of northern Asia and overthrew the Scythians on the banks of the Jaxartes. Two years later, he proceeded to the conquest of India, then known only by name. He crossed the Indus and marched as lord through that part of India which is now called the Punjab. He wished to advance to the Ganges and conquer the whole of India, but, when he reached the Hyphasis River, the murmuring of his troops induced him to retreat. Meanwhile his friend Nearchus, who was made admiral of the fleet, had successfully accomplished the hazardous voyage from the Indus up the Persian Gulf to the Euphrates River. This campaign marked the extreme limit of his conquests.

Results. Both by arms and by policy, Alexander, for the first time, brought the East and the West into close contact with each other. Aiming at the fusion of Greek and Oriental by intermarriage and by exchange of customs, he set an example himself by marrying an Iranian princess and by encouraging the payment of divine honors to himself as to an Oriental despot. On the other hand, he lost no opportunity to spread the Greek language and the Greek civilization. His empire, it is true, was broken up, but Greek cities and colonies were founded everywhere, and

the Greek tongue became the universal speech of government and of literature. His impress on Greece itself was no less important. His conquests marked definitely the passing of the Hellenic city-states and heralded the period of rule by empires. Through him, also, a road was opened to India, and Europeans became acquainted with the knowledge and economic products of the remote East.

CHARACTER. More perhaps than any other commander, Alexander combined the chivalry of the heroic age and the more careful strategics of later times. His career not only excited romantic enthusiasm in his contemporaries, but later became the subject of legends propagated in most of the languages of medieval Europe. His genius and policy are variously estimated by historians, but there is no disagreement as to the magnitude of his designs. He is said to have planned the subjugation of Italy and of Carthage when his ambitious projects were cut short by his death in Babylon. See *Greece: History.*

Alexander I (1777-1825), emperor of Russia, 1801-25, was born at Leningrad. Possessing a humane and benevolent disposition, he was imbued by Laharpe with the enlightened principles of the age. Professor Kreft instructed him in experimental physics, and Pallas, in botany. In 1793, he married Elizabeth, daughter of Karl Ludwig, crown prince of Baden, and, on the assassination of his father, Paul, in 1801, succeeded him upon the throne, Alexander encouraged education and science and carried out many reforms. In 1805, he joined the coalition against Napoleon, and was present at the battle of Austerlitz. In 1808, he conquered Finland and, in 1806-12, waged a successful war against Turkey.

Alexander II (1818-1881), emperor of Russia, 1855-81. He was carefully educated; in 1851 he married the daughter of the grand duke of Hesse. The principal achievement of his reign, in large measure his own work, was the emancipation of the serfs—23 million souls—in 1861. This was followed by legal and municipal reforms, and the establishment of provincial assemblies. In foreign policy he was friendly to Germany and Austria. Russia made great territorial gains in the Caucasus and Central Asia, and by the war with Turkey in 1877-78 increased her strength in the south. No czar since Peter the Great had built up Russia more. He was assassinated at Leningrad. See *Russia: History.*

Alexander of Tunis, Field Marshal Harold Rupert Leofric George Alexander, Viscount (1891-), British general, was born in County Tyrone, Northern Ireland. He was educated at Harrow and Sandhurst and served in World War I. In World War II he commanded a division in France, and organized the final evacuation at Dunkirk, being among the last to leave the beaches. After commands at home and in Burma, he was sent to the Middle East as commander in chief. Later, as General Eisenhower's deputy commander, he completed the Allied victory in Tunisia. He commanded the invasion of Sicily and Italy in 1943. Promoted to field marshal in June 1944, and named supreme commander in the Mediterranean theater, he received the surrender of the German armies in May 1945. From 1946 to 1952 he was governor general of Canada.

Alexander, John White (1856-1915), American painter, was born in Allegheny City, now Pittsburgh, Pa. A telegraph boy in Pittsburgh, his marked talent for drawing attracted the attention of an employer, who assisted him to study art. At eighteen, he was an artist's apprentice on *Harper's Weekly,* where he worked with Abbey, Pennell, and Pyle. In 1877 he went to Europe for study in Germany, Italy, and Paris. Returning to New York in 1881, he achieved marked success with portraits of Oliver Wendell Holmes, John Burroughs, and others. Among his best known paintings are: "Isabella and the Pot of Basil," in the Boston Museum; "The Engagement Ring," in the Metropolitan Museum, New York; "Pandora," in the Philadelphia Academy; and his portrait of President Loubet in the Elysee palace, Paris. A mural, "The Evolution of the Book," is in the Library of Congress. He excels in portraits of women. He was a member of the American Academy of Arts and Letters.

Alexander Nevsky (*nyĕf'skĕ*), **(1219-1263),** Russian hero and saint, was born at Vladimir. He received the surname of Nevsky on account of the victory over the Swedes which he achieved in 1240 on the Neva, in the province where Leningrad now stands. In 1242, on the ice of Lake Peipus, he defeated the Livonian knights of the sword. At the death of his father, in 1247, he became grand duke of Vladimir. To the end of his life he remained a vassal of the Tartars, or Mongols.

Alexander Severus (c. 202-235), Roman emperor, 222-235 A. D., was the cousin, adopted son, and successor of Heliogabalus. Although a pagan, he reverenced the doctrines of Christianity and often quoted the "golden rule." His expedition against Artaxerxes, king of Iran, was terminated by a speedy overthrow of the enemy. But during a campaign against the Germans on the Rhine, to defend the frontiers of the empire from their incursions, an insurrection broke out among his troops, headed by Maximin, in which Alexander Severus was slain.

Alexanderson, Ernst Frederik Werner (1878-), American electrical engineer and inventor, was born at Upsala, Sweden, and educated mainly in Europe. He emigrated to America, where he became a friend and protege of the great Charles Steinmetz and co-worker with him in the laboratories of the General Electric Company at Schenectady, New York. Although Alexanderson's more than 300 patents include extensive contributions to the application of electricity in railway transportation, ship propulsion, and telephone communication, he is best known for his pioneer work in connection with radio and television. When the Radio Corporation of America was organized in 1919, he was appointed its chief engineer, a position which he held until 1924. Since that time he has been engaged chiefly in consulting work. One of his radio patents made possible selective tuning. Another, the magnetic amplifier, was the basis for transatlantic telephony. Then came the transmission of pictures by radio and later (in 1927) a process which made possible the first home reception of television, using neon lamps and a perforated scanning disk. His latest invention is a color television receiver.

Alexius I Comnenus (*ă-lĕk'sĭ-ŭs kŏm-nē'nŭs*) **(1048-1118),** Byzantine emperor, was born at Istanbul. He was the nephew of the emperor Isaac Comnenus. In 1801, he was elevated to the throne by his soldiers. At the beginning of his reign, he was encompassed by many foes. The Scythians and Turks were pouring down from the north and northeast and the Normans were menacing his western provinces. His appeals for aid were the occasion for the First Crusade, 1096, whose leaders turned over to him their conquests in Asia Minor, thus greatly enlarging his empire.

Alfieri (*ăl-fyā'rē*), **Vittorio, Count (1749-1803),** Italian dramatic poet, was born in Piedmont. At Turin, in 1772, he left military service and devoted himself to literary pursuits. He became one of the foremost writers of Italian 18th-century literature. Among his most important tragedies are: *Virginia; Agamemnone; Oreste; Timoleone;* and *Saul,* his masterpiece. His literary ideal was to unite "artistic truth with moral truth, beauty with morality." He is honored in Italy, not only as a great dramatist, but as the reviver of a national spirit. He left 21 tragedies and six comedies, besides various odes and sonnets. See *Italian Literature; The Regeneration.*

Alfonso X (1226-1284), surnamed "the astronomer," "the philosopher," or "the wise," king of Leon and Castile, succeeded his father, Ferdinand III, in 1252. Alfonso was one of the most learned princes of his time, and acquired lasting fame through the completion of the code of laws commenced by his father and called *Leyes de las Partidas.* He improved the Ptolemaic planetary tables, is credited with a history of the Church and of the Crusades, and is said to have ordered a translation of the Bible into Spanish. Died at Seville.

Alfonso XIII (1886-1941), last king of Spain, was born after the death of his father, Alfonso XII. His childhood was spent at Madrid and at the palace of Miramar in San Sebastian. During the king's minority his mother reigned as queen regent. On May 17, 1902, Alfonso XIII assumed his full powers. In 1906, he married Princess Ena of Battenberg. The king proved a courageous and liberal monarch. He maintained an anticlerical policy and used his pardoning power with marked independence. With his tacit support the country was ruled by a military dictator from 1923 to 1931, when a revolt forced him to flee from the country. A republic was declared, and Alfonso took up his residence in Paris. He later went to Rome, where he died.

Alfred the Great (849-901), king of the West Saxons, was born at Wantage, Berkshire, England. With his father, Ethelwulf, the young Alfred spent much time in Rome. Later, through his stepmother, Judith, he became imbued with the culture, knowledge, and traditions of the great Frankish courts. In his 20th year, he married, and assisted his brother Ethelred in repelling the Danes.

VICTORIES. In 871, Alfred succeeded to the crown. Four years later, he defeated the Danes at sea, and, in 876, he made peace with them at Wareham. They broke the peace by capturing Exeter. The city was retaken by Alfred in 877; but, soon afterward, the invaders, under Guthrum, completely overran the whole kingdom of the West Saxons. Alfred was for a time obliged to seek refuge in a cowherd's hut. He kept up communication with his friends, however, and, as soon as the people began to arm themselves against the Danes, he built a stronghold at Athelney. From this base, he attacked and defeated the invaders, who at length capitulated. By the peace of Wedmore in 878, Alfred accepted hostages and exacted a solemn oath from the Danes that they would quit the territory of Wessex and receive baptism.

Alfred's power now steadily increased by land and also by sea. He is credited with the construction of England's first fleet. The weakness of the other kingdoms in England, which had been likewise attacked by the Danes, left Alfred as the strongest ruler in the island. By 886, he was recognized, without formal installation, as the sovereign of all England. His position was maintained, however, only at the cost of further struggles. These engaged much of his energies from 893, when a large body of Danes under Hastings landed in Kent, until the complete dispersal of the aggressors in 897.

CONSTRUCTIVE ACHIEVEMENTS. Alfred made a compilation of laws, in which, for the first time, no discrimination was made against the Welsh people. The laws were characterized by an intensely religious tone.

One of the most noteworthy features of Alfred's character was his zeal for learning. He caused a collection of the old Saxon poems to be made. Asser, Erigena, and other scholars were invited to his court. He established and directed a school for young nobles and founded abbeys for those of lower rank. He labored also himself as a scholar and a teacher. About 888, he began the adaptation and translation into Saxon of four important Latin works —The *Compilation* of Orosius, the *History* of Bede, the *Consolation* of Boethius, and the *Pastoral* of Pope Gregory. With these translations, English prose literature begins. English history also may be said to have originated when, in his reign, the *English Chronicle* received its final form. See *England: History, Danish Incursions.*

Algardi (*ăl-gär'dē*), **Alessandro (1602-1654),** Italian sculptor, was born at Bologna, Italy. His chief work is a colossal relievo, one of the largest in the world, in Saint Peter's, entitled the "Retreat of Attila from Rome."

Alger, Horatio (1834-1899), was the author of more than one hundred books for boys. Born in Revere, Mass., he was the son of a Unitarian minister and was himself educated for the ministry, but in 1866 gave up that calling to write. His first story, *Ragged Dick,* was published in 1867. A resident of New York City for many years, he was a devoted visitor to and patron of the Newsboys' Lodging House, where he gained much of the inspiration and color for his stories. Alger's heroes always succeed in gaining honor and riches by their courage and virtue in struggling heroically against heavy odds. Enormously popular, the books, with their elevated moral tone, exercised a strong influence on countless young Americans.

Allen, Ethan (c. 1737-1789), American soldier, was born at Litchfield, Conn. He distinguished himself early in the Revolutionary War by the surprise and capture of Fort Ticonderoga in 1775. While participating in Montgomery's expedition to Canada the same year, he was taken prisoner and was not exchanged until 1778. Allen was afterward a member of the Vermont legislature. He was author of *Reason the Only Oracle of Man* and other works.

Allen, Florence Ellinwood (1884-), American jurist, was born in Salt Lake City, Utah. After being graduated at Western Reserve University, she also at intervals studied law at Chicago and New York universities, meanwhile acting also as musical editor for the New York *Musical Courier* and the Cleveland *Plain Dealer.* She lectured on music for the New York Board of Education, 1910-13, and began the practice of law in 1914 at Cleveland, Ohio. After serving as judge of the local court of common pleas for one year, she was elected in 1922 to the Ohio Supreme Court, where she sat until 1934. In that year President Roosevelt named her to the United States Circuit Court of Appeals, the first woman to reach such a position in the judiciary.

Allen, James Edward, Jr. (1911-), American educator, was born at Elkins, W. Va., where his father was president of Davis and Elkins College. Allen worked his way through that institution, and after he was graduated in 1932 held a variety of jobs during the depression years. In 1939 he was offered a research position at Princeton University, with an opportunity to do postgraduate work. Two years later he was granted a fellowship at Harvard, where he earned his Ph.D. degree. He became president of the Graduate Students' Association, secretary to the faculty, and director of placement. He then went to Syracuse University as assistant professor of administration, and in 1947 joined the staff of the New York State Commissioner of Education. In 1955, he was chosen commissioner, becoming at the age of 44 the youngest man ever to hold that important post. His sphere of authority covers 5240 public and private schools, 126 colleges and universities, and 261 museums and art galleries.

Allen, James Lane (1849-1925), American novelist, was born near Lexington, Ky. He was educated at Transylvania University; taught in Kentucky University; and later was professor of Latin and higher English, Bethany College, W. Va. Beginning in 1886, he devoted his entire attention to literature, using Kentucky scenery and its vanishing pioneer, ante bellum, and social types as a background for his fiction. In his novels he portrays various struggles and problems of the human soul in a refined prose style somewhat in the manner of Hawthorne.

His works include *Flute and Violin, The Blue Grass Region and Other Sketches of Kentucky, A Summer in Arcady, The Sword of Youth, A Cathedral Singer,* and *The Landmark.*

Allen, Zachariah (1795-1882), American inventor and manufacturer was born in Providence, R. I. After being graduated from Brown University, he studied law and practiced from 1817 to 1822, when he became engaged in manufacturing enterprises. His ingenuity applied in this early stage of the machine age bore fruit in the use of belts instead of cogs for transmission of power and the automatic cut-off valve for steam engines. In 1821 he built the first hot-air furnace for the heating of dwellings. He was the first to calculate the motive power of Niagara Falls.

Allenby, Sir Edmund (1861-1936), English general, was educated at Haileybury. Entering the Inniskilling dragoons, he served in the Bechuanaland expedition, 1884-85; in the Zulu War, 1888; in the South African War, 1899-1902, and, on the outbreak of World War I, was placed in command of cavalry. In 1917, he was made commander of the Egyptian expeditionary force. Under his direction, British armies invaded Palestine and captured Jerusalem from the Turks, Dec. 9, 1917. At the battle of Samaria, Sept. 18-22, 1918, Allenby, by skillful use of his cavalry, utterly crushed a Turkish army of 100,000 under command of the German field marshal Liman von Sanders, capturing more than 75,000 prisoners and 350 guns. This notable victory virtually destroyed the military power of Turkey and hastened the collapse of the Teutonic nations and their allies in World War I. He served as British high commissioner for Egypt, 1919-25. He was buried in Westminster Abbey. See *World War.*

Allibone (*ăl'ĭ-bōn*), **Samuel Austin (1816-1889),** American author was born at Philadelphia. He was the compiler of *A Critical Dictionary of English Literature and British and American Authors* and other valuable works of reference. He was also a contributor to periodical literature and, from 1879 to 1888, was librarian of the Lenox Library, New York. Died at Lucerne, Switzerland.

Allward, Walter Seymour (1875-), Canadian sculptor was born at Toronto. He was educated in the public schools, became an architect's apprentice in 1889, and developed talent for architectural figure-work. His first sculpture was the figure of "Peace" for the Northwest rebellion monument in Toronto. He executed busts of noted Canadians for the Provincial Art Gallery, Toronto, and increased his reputation as an artist by statues in various Canadian cities, including an allegorical memorial to Alexander Bell, inventor of the telephone, in Brantford. His greatest work was the Vimy Ridge memorial in France, on which he was engaged for 14 years. Among his other works are the Boer war commemoration monument in Toronto, memorials of World War I, erected in various cities throughout Canada, and monuments to King Edward VII and William Lyon Mackenzie.

Al-Mansur (*ăl'măn-sōōr'*) **(712-775),** second caliph of the house of the Abbasides. Upon his accession to the caliphate in 754, he carried on successful wars against the peoples of Asia Minor, placed the finances of his kingdom on a sound basis, regulated the post, and patronized learning. His greatest achievement was the founding of the city of Baghdad, to which he transferred his seat of government. He died on a pilgrimage to Mecca.

Alma-Tadéma (*ăl'-mä-tăd'ĕ-mä*), **Sir Laurence (1836-1912),** British painter of classical subjects, was born in Dronrijp, Friesland. He studied at the Royal Academy of Antwerp, and was afterward pupil and assistant of Baron Henry Leys. In 1873, he settled in England, where he achieved great distinction for his exquisitely executed pictures portraying the life of the ancient Greeks and Romans and other historical subjects. Among his numerous works are "Phidias and the Elgin Marbles," "The Roses of Heliogabalus," "Hadrian in Britain," "The Way to the Temple," "The Shrine of Venus," "Caracalla," "Egyptians 3000 Years Ago," "Reading from Homer," "Pyrrhic Dance," "The Vintage," and "The Conversion of Paula."

Almqvist (*ălm'kvĭst*), **Karl Jonas Ludvig (1793-1866),** Swedish author, was born at Stockholm. He had an erratic career; was once convicted of forgery and charged with murder; he fled from Sweden to the United States and, for a time, was private secretary to Abraham Lincoln. His novels are romantic in type and display notable power of language, while his dramas are marked by masterly dialogue and great tragic force. Among the best of his writings are *The Book of the Thorn-Rose, Araminta May, The Palace,* and *It's All Right.* He went to Bremen in 1865, where he assumed the name of Professor Westermann.

Alsop, Stewart J. O. (1914-), American newspaperman, was born in New York City. He was educated at Groton and Yale (1936), and started as an editor

with the book publishing firm of Doubleday Doran in New York. In 1942 he enlisted in the Kings Royal Rifle Corps of the British army, and rose to the rank of captain before transferring to the American army in 1944. Soon after the Normandy invasion he was parachuted into France to help the Maquis. After the war he formed a partnership with his brother Joseph to write a column called "Matter of Fact" which has been widely syndicated by the New York *Herald Tribune*. He is a contributor to many magazines.

Alströmer (*ôl'strĕ-mĕr*), **Jonas (1685-1761),** Swedish industrial reformer, was born at Alingsas, Vestergotland. Taken as a clerk to England by a Swedish merchant, who later failed, Alströmer amassed a fortune as ship broker. Returning to his birthplace in 1724, he introduced into Sweden many new and successful enterprises, including a wool factory, sugar refinery, and the importation of sheep. He was honored by a patent of nobility and a statue on the Stockholm exchange.

Altman, Benjamin (1840-1913), American merchant, art collector, and philanthropist, was born in New York City. Beginning in his father's dry-goods store and later trading in a small way for himself, he developed an immense retail mercantile business. Early in life he became interested in European paintings and in Oriental art, making collections of Chinese porcelains and of Oriental rugs. Of Rembrandt's paintings he possessed probably the largest private collection ever assembled. His collections embraced also many choice works of Velasquez, Van Dyck, Cuyp, Ruysdael, Vermeer, and other masters. He bequeathed this magnificent collection, the value of which was estimated at 15 million dollars, to the Metropolitan Museum of Art, New York. Shortly before his death, he established the Altman Foundation for the benefit of the employees of the department store of which he was the head.

Alva (or **Alba**), **Fernando Alvarez de Toledo, Duke of (1508-1582),** Spanish military governor. Assigned in 1567 by Philip II of Spain to repress Protestantism in the Netherlands, he set up a "Council of Blood," which pronounced sentence on the basis of charges assembled through a network of espionage. Alva boasted 18,000 persons had been executed at the Council's behest. Imposition of a heavy tax united Catholic with Protestant in a revolt, which was in large part crushed with bloody reprisals. Recalled in 1573, he was put in charge of a campaign against Portugal in 1581, which country was quickly subjugated. See *Netherlands: Spanish Rule.*

Alvarado, Pedro de (c. 1486-1541), Spanish conquistador, was born in Badajoz. He took part in the expedition and victories of Cortez, was intrusted with the command of the city of Mexico and distinguished himself in the rearguard action after the celebrated *Noche Triste* in 1520. He was afterward made governor of Guatemala and Honduras, a post which was maintained by continual expeditions of exploration and conquest.

Alverstone, Sir Richard Everard Webster, First Viscount (1842-1915), English jurist. Educated at Trinity College, Cambridge, he was a member of Parliament, 1885-1900, and attorney general, 1886-92 and 1895-1900. He was knighted in 1885 and was created baron in 1900, in which year he became lord chief justice of England, serving until 1913, when he was created viscount. Lord Alverstone was the English representative on the Alaskan boundrary commission. He voted in support of the claims of the United States, resulting in a decision in favor of the United States. See *Alaska Boundary Commission.*

Alzog (*äl'tsôĸ*), **Johann Baptist (1808-1878),** Roman Catholic historian, was born at Ohlau, Silesia. He was professor of church history in the Universary of Freiburg, and wrote a *Manual of Church History,* which was translated into many languages. He was also the author of *Outline of Patrology,* and in 1869 was a member of the commission on dogma which prepared the work for the Vatican council. Died at Freiburg, Baden.

Ambrose, Saint (c. 374-397), Church father, was born at Treves. Consecrated bishop of Milan in 374, Ambrose was the leading figure in having Arianism declared heresy. He assisted in its extirpation and resisted attempted revivals of paganism. When Maximus usurped power and took Rome, Ambrose refused to flee with the supplanted emperor. He melted the most sacred vessels of the Church to obtain money to save the populace from starvation. Courageous toward the powerful and solicitous for the weak, Ambrose denied Christian communion to the Emperor Theodosius until he had done penance for a massacre. His preaching and theology exerted great influence on his younger contemporary, Augustine. Several hymns from his pen served as models for the hymnology of later ages.

Amerigo Vespucci (*ä'mä-rē'gō vĕs-pōōt'chē*). See *Vespucci, Amerigo.*

Ames, James Barr (1846-1910), American educator and legal scholar, was born in Boston. He was graduated at Harvard College in 1868 and at Harvard Law School in 1872. In the latter, he became associate professor of law, 1873; professor of law, 1877; and dean, 1895. He exerted a profound influence in the development of the study of American law, emphasizing the bond between custom and law when most contemporary jurists tended to contrast or divorce them.

Amherst, Jeffery, Lord (1717-1797), British general, was born at Riverhead, England. As major general, he was sent to capture the fortress of Louisburg in Canada from the French. His success there in 1758 and his capture of Ticonderoga and Crown Point led up to the taking of Montreal and the definite ascendancy of the British in Canada. He was raised to the peerage, 1776, and was appointed field marshal, 1796.

Ampère (*äN'pâr'*), **André Marie (1775-1836),** French mathematician and naturalist, was born at Lyons. In 1805, he was called to Paris, where he distinguished himself as a teacher in the Polytechnic School, and began his career as an author by his essay on the *Mathematical Theory of Chances.* In 1814, he was elected a member of the Academy of Sciences; in 1824, he was appointed professor of experimental physics in the Collège de France. He invented the astatic needle, which made the astatic galvanometer possible. The ampere, a unit of electrical current, is named for him.

Amundsen (*ä'mŭn-sĕn*), **Roald (1872-1928),** Norwegian explorer, was born in Borge, Norway. In June 1903, he sailed in the *Gjöa* and, after two years of exploration, located the north magnetic pole and the northwest passage. Sailing in June 1910, in Nansen's famous ship, the *Fram,* he led the Norwegian antarctic expedition which resulted in the discovery of the south pole, December 14, 1911. After an unsuccessful attempt to fly to the north pole by airplane in 1925, he succeeded, 1926, in passing over the pole in the dirigible *Norge,* traveling from Spitzbergen to Alaska. With Nobile, one of his associates in this trip, Amundsen was later involved in a bitter controversy. When Nobile in 1928 was lost in an attempt to repeat the feat, Amundsen flew by airplane to his rescue, but perished in the Arctic Ocean.

Anacreon (*ȧ-năk'rē-ŏn*) **(c. 563 B.C.-c. 478 B.C.),** Greek lyric poet, was born at Teos in Ionia. He was patronized by Polycrates, the tyrant of Samos, and by Hipparchus, the tyrant of Athens. His poems, chiefly devoted to the praises of love, pleasure, and wine, are characterized by marked simplicity and sweetness of style. The authentic fragments of his verse have been paraphrased in English by Thomas Moore. He died at Abdera.

Anaxagoras (*ăn'ăk-săg'ô-răs*) **(c. 500 B. C.-c. 428 B. C.),** Greek philosopher, was born at Clazomenæ. He studied under Anaximenes, and, after traveling through all the known parts of the world in search of knowledge, established himself at Athens, where he opened the first school of philosophy. He taught that mind rules the universe. Pericles, Socrates, and Euripides are said to have been among his pupils. He was condemned to die for alleged impiety. The sentence was changed to exile, however, at the pleading of Pericles, and he retired to Lampsacus, where he continued to teach philosophy until his death.

Anaximander (*ăn-ăk'sĭ-măn'dĕr*) **(611 B.C.-c. 547 B.C.)** Greek mathematician, astronomer, and philosopher, was born at Miletus. He was a pupil and friend of Thales, whom he succeeded as head of the Ionian school. He taught the obliquity of the ecliptic, which he is reputed to have discovered. He introduced the gnomon for determining solstices, and the sundial. He is also given credit for the invention of geographical maps. By some ancient writers he is said to have determined approximately the size and the distance of the planets and to have constructed astronomical globes. He imagined the universe as a number of concentric cylinders with the earth at the center. As a philosopher, he speculated upon the origin of the material universe, which he found to be an infinite, indeterminate substance, from which all material objects arise.

Andersen, Hans Christian (1805-1875), novelist, children's poet, and writer of fairy tales, was born at Odense, in Denmark. He early displayed a talent for poetry and was known in his native place as "the comedy-writer." He was placed in an advanced school at the public expense and began his academic education in 1828. He completed his *Agnes and the Merman* in Switzerland; one of his best works, *The Improvisatore,* a series of scenes depicted in a glowing style and full of poetic interest, was the fruit of a visit to Italy. In 1840, he commenced a somewhat protracted tour through Italy and the East, an account of which he gave in *A Poet's Bazaar,* 1842. In 1844, he visited the court of Denmark by special invitation, and, in the following year, he received an annuity which placed him in comfortable circumstances. In 1900, the Danish government stood sponsor as patron to a fine edition of his *Tales* in six languages. See *Danish Literature.*

Anderson, Carl David (1905-), American physicist, was born in New York City. He was associated with the California Institute of Technology as student; then, as fellow, 1927-33; and later as assistant professor of physics. Studying there under Robert A. Millikan, he investigated problems related to atoms and cosmic rays. His most notable discovery, for which he received the Nobel prize in physics for 1936, was evidence of the existence of the positive electron, or positron, one of the fundamental particles of matter. The existence of this particle had previously been foreshadowed by mathematical theory. Anderson's subsequent discovery served as a striking confirmation of the basic presuppositions of atomic physics.

Anderson, Marian (c. 1905-), American Negro singer, was born in Philadelphia, Pa. As a child she sang in the Union Baptist church choir in Philadelphia, where the unusual quality of her voice attracted attention. Money raised by a church concert enabled her to take lessons from an Italian instructor and she subsequently studied in New York, Chicago, and abroad. She began her singing career in 1924. In concert tours throughout the United States and Europe, she quickly won acclaim as one of the world's leading contraltos. Her repertoire included classic, operatic, and popular songs, including Negro spirituals, which have seldom received such moving interpretations. In 1941, she received the Bok award of $10,000. In 1955 she made her debut with the Metropolitan Opera Company, the first Negro to sing with that company.

Anderson, Maxwell (1888-), American playwright, was born at Atlantic, Pennsylvania. He was graduated from the University of North Dakota (1911), and, after a number of years spent in newspaper work began to write plays. His first great success was *What Price Glory*, written in collaboration with Laurence Stallings. He has since written many other successful plays of outstanding merit, including *Saturday's Children* (1927); *Elizabeth the Queen* (1930); *Both Your Houses* (1933); *Winterset* (1935); *High Tor* (1937); and *Joan of Lorraine* (1946). He has won both the Pulitzer and the Critics' prize. Later plays written by him are *Barefoot in Athens* (1951) and *The Bad Seed* (1954), a dramatization of William March's novel.

Anderson, Robert (1805-1871), American soldier, was born near Louisville, Ky. He was graduated at West Point in 1825, and was colonel of the Illinois volunteers in the Black Hawk War of 1832. He became instructor of artillery practice at West Point in 1835 and fought in the Seminole War in 1837-38. He served in the Mexican War, being severely wounded at Molino del Rey. In November 1860, he took command of Charleston harbor, where he was confined to Fort Sumter by the Confederates, and, on April 14, 1861, after a bombardment of 36 hours, he was compelled to evacuate the fort. This was the opening action of the Civil War. In 1865, he was brevetted major general. He wrote *Reminiscences of the Black Hawk War.*

Anderson, Sherwood (1876-1941), American author, was born at Camden, Ohio, and was educated in the public schools. His works, which belong to the more radical wing of modern American literature, reveal a high degree of originality and force. They include *The Triumph of the Egg, Dark Laughter, Perhaps Women,* and *Puzzled America.* In 1927 he purchased and became editor of two weekly newspapers in Marion, Va. Characteristic editorials and news stories from these papers were collected and published under the title of *Hello Towns.*

André (*ăn'drâ* or *ăn'drĭ*), **John (1751-1780),** British soldier, was born in London, England; served in the war with America, and rose to the rank of major. He conducted the negotiations with Benedict Arnold for the betrayal of West Point, but, being discovered in disguise, was arrested and put to death as a spy. His remains lie in Westminster Abbey.

Andrêiev (*ăn-drâ'yĕf*), **Leonid Nikolaevitch (1871-1919),** Russian writer, was born at Orel. He studied law in Leningrad and Moscow and, while struggling to establish practice, became a police court reporter for a Moscow newspaper. About 1900, he began writing stories, sketches, and dramas with notable success. The sales of his first volume of stories, appearing in 1901, soon exceeded a quarter of a million copies. He achieved great popularity throughout Russia, and his work is perhaps better known outside his own country than that of any recent Russian writer, translations having been made into all European languages. He was a mystic possessed of unusually searching powers of analysis, who regarded life with horror and pity. He attempted suicide three times. Among his best-known stories are *The Red Laugh, The Burglar, The Seven Who Were Hanged, Judas Iscariot and the Others, Silence,* and *S. O. S.* The last is an appeal against the Bolshevik regime in Russia, from which he fled to Finland. See *Russian Literature.*

Andrews, Charles McLean (1863-1943), American historian, was born at Weathersfield, Conn. A graduate of Johns Hopkins University, he taught there from 1907 to 1910 and then became professor of history at Yale University. An authority on early stages of American history, he wrote *Colonial Period of American History,* the first volume of which was awarded a Pulitzer prize in 1935. In 1937 he was elected to the American Academy of Arts and Letters.

Andrews, Roy Chapman (1884-), American naturalist and explorer, was born at Beloit, Wis. He was graduated at Beloit College in 1906 and later received a master's degree at Columbia University. In 1908, he made explorations in Alaska. He was attached as naturalist to the U. S. S. *Albatross* on a voyage to the Dutch East Indies, Borneo, and Celebes in 1909-10.

For the American Museum of Natural History, New York, of which he was director, he conducted important scientific expeditions to Asia. These included an expedition in 1916-17 to Tibet, southwestern China, and Burma; an expedition in 1919 to north China and outer Mongolia; and expeditions in 1921-29 to central Asia and Mongolia. Among the most striking results of these highly fruitful expeditions was the finding of fossil dinosaur eggs and of skeletal remains of the baluchitherium, the largest known land mammal.

His writings include *Whale Hunting with Gun and Camera, The California Gray Whale, Camps and Trails in China,* and *This Business of Exploring.*

Andros (*ăn'drŏs*), **Sir Edmund (1637-1714),** was born at London, England. He was governor of the colony of New York for eight years, beginning in 1674. In 1686, James II made him governor of the New England colonies with instructions to consolidate them into one dominion with unified defense against the French. The colonists resisted Andros's attempted suppression of their assemblies and the recall of their charters, and, after James was deposed in 1688, Andros was seized and sent to England as a prisoner. Later released, he served as governor of Virginia from 1692 to 1697, in which period he founded William and Mary College.

Resistance to his rule in New England is illustrated by a ruse which saved the Connecticut charter. Going to Hartford for it, Andros was kept talking until night, when it was produced in candle light. The lights were blown out, and, when they were relit, the charter had disappeared. After Andros's departure for England, the charter was taken by the colonists from the hollow of an oak tree where it had been hidden. The tree was later known as the "charter oak."

Angelico (*ăn-jĕl'ê-kô*), **Fra (1387-1455),** is the commonly used name of the friar-painter, Guido di Pietri, whose monastic name was Giovanni. He was born at Vecchio in Tuscany. In 1407, he entered the Dominican monastery at Fiesole; in 1436, was transferred to Florence; and, in 1445, was summoned by the pope to Rome, where he resided during most of his remaining years. His most important frescoes are those in the Florentine convent of San Marco (now a museum), at Orvieto, and in the Nicholas chapel of the Vatican. Others were painted at Cortona and Fiesole. Of his easel pictures, the Louvre possesses "The Coronation of the Virgin."

Angell, (*ān'jĕl*), **James Burrill (1829-1916),** American educator and diplomat, was born at Scituate, R. I., and was graduated at Brown University, 1849. He became professor of modern languages and literature, Brown, 1853; editor of the Providence *Journal,* 1866; president of the University of Vermont, 1866; and president of the University of Michigan, 1871. He was United States minister to China, 1880-81; a member of the Anglo-American international commission on Canadian fisheries, 1887; and minister to Turkey, 1897-98. During his long and able administration, the University of Michigan was brought to high rank among American institutions of learning. His writings include *Progress in International Law, The Higher Education,* and *Selected Addresses.*

Angell, James Rowland (1869-1949), American educator, was born at Burlington, Vt., son of James Burrill Angell. He was graduated at the University of Michigan and at Harvard; studied also at Berlin, Halle, Leipzig, and Paris. Beginning as assistant professor of psychology, University of Chicago, 1894, he became professor and head of the department, 1905. In 1911, he was made dean of the faculties, and, during 1918-19, was acting president of the University of Chicago. From 1921 to 1937 he was president of Yale University. In 1937, he joined the National Broadcasting Company as educational counselor.

Angle, Paul McClelland (1900-), American historian and authority on Lincoln, was born at Mansfield, Ohio. He has spent most of his active life in Illinois. As executive secretary of the Abraham Lincoln Association of Springfield, then historian of the Illinois State Historical Library, and, more recently, director of the Chicago Historical Society, he has spent many years exploring original sources of information concerning Lin-

coln's day-to-day activities and personal contacts. The results of this wide-ranging investigation have been made available to the general public through vividly written accounts which re-create the time and place settings for incidents in Lincoln's life. One of his books, *Here I Have Lived*, gives a history of Lincoln's Springfield in the years between 1821 and 1865. Another, written in collaboration with Carl Sandburg, is entitled *Mary Lincoln, Wife and Widow*. Best known among his works are *A Shelf of Lincoln Books* and *The Lincoln Reader*, a skillfully edited collection of writings from many authors, which has been called "a new form of biography."

Anglin (*ăng'glĭn*), **Margaret Mary** (**1876-**), Canadian actress, daughter of T. W. Anglin, former speaker of the Canadian House of Commons, was born at Ottawa, Canada; was educated at Loretto Abbey, Toronto, and the Convent of the Sacred Heart, Montreal; was graduated from the Empire School of Dramatic Acting, New York, and made her professional debut in *Shenandoah*, New York, 1894. She was leading lady with James O'Neil in *Virginius*, *Hamlet*, *Monte Cristo*, 1896-97; leading woman with E. H. Sothern, 1897-98; with Richard Mansfield, 1898-99; and with Henry Miller in *The Great Divide*, 1906-07. She toured Australia in 1908-09; in 1911, married Howard Hull of New York; during 1913-16, appeared in a Shakespearean repertoire. She took leading parts in various Greek dramas, producing the *Elektra* of Sophocles at Metropolitan Opera House, New York, in 1927, and, in 1935-36, starred in *Fresh Fields*. In 1927 she was awarded the Laetare medal.

Anna Comnena (*kŏm-nē'nà*), **(1083-1148)**, Byzantine princess and historian, daughter of the emperor Alexius I (Comnenus). She received the best education that Byzantium could give. During the last illness of her father, she entered into a scheme, which her mother, the empress Irene, also favored, to induce him to disinherit his eldest surviving son, John, and to bestow the diadem on her husband, Nicephorus Briennius. Failing in this, she framed a conspiracy against her brother in 1118. Her brother spared her life, but punished her by confiscation of her property, which he later restored. She withdrew from the court and devoted herself to the composition of the *Alexiad*, a valuable historical work covering the period of her father's reign.

Anne of Austria (**1601-1666**), daughter of Philip III of Spain, was born at Madrid and, in 1615, became the wife of Louis XIII of France. The marriage was so far from being a happy one that the royal pair lived for 23 years in a state of virtual separation, a result due chiefly to the influence of Cardinal Richelieu, whose fixed determination to humble the house of Austria led him to spare no means for alienating the affections of Louis from his queen. On the death of the king in 1643, Anne became queen regent and evinced her discernment by choosing as her minister Cardinal Mazarin, by whose able management the young king, Louis XIV, came, on attaining his majority, into possession of a throne firmly established on the ruins of contending parties.

Anne, Queen of England (**1665-1714**), was the second daughter of King James II by his first wife, Anne Hyde, and was born in London, England. In 1683, she married Prince George, brother to the king of Denmark, by whom she had a large family of children, all of whom died young. Anne ascended the throne on March 8, 1702. She established a fund, known as "Queen Anne's bounty," for the augmentation of the livings of the poor clergy. During her reign, which was made illustrious by the military triumphs of the Duke of Marlborough, Sir George Rooke and Sir Cloudesley Shovel conquered the fortress of Gibraltar, a possession which Spain sought in vain to recover. During her reign also, the legislative union of Scotland with England was effected. The glorious galaxy of writers, in almost every branch of learning, who flourished in her time has caused it to be considered the Augustan age of English literature.

Annunzio (*ăn-nōōn'dzê-ō*), **Gabriele d'** (**1863-1938**), Italian poet, novelist, and dramatist, was born at Pescara. In his 15th year, while a student at Prato, he published his first volume of verse, *Primo vere*, followed in the ensuing 10 years by other volumes, which established his fame as a rising poet. His first novel, *Il piacere*, translated into English as "The Child of Pleasure," showed the influence of Maupassant and Bourget. Other famous novels from his pen include *L' innocente*, *Giovanni Episcopo*, *Il Trionfo della Morte*, and *Fuoco*. In the drama too, d'Annunzio attained a place in the front rank of Italian writers. His plays include *The Dream of a Spring Morning*, *The Dead City*, *Francesca da Rimini*, *Greater than Love*, *The Ship*, *Pisanella* or *The Perfumed Death*, and *The Honeysuckle*. While a "decadent," and regarded by Borgese as a product of a materialistic age, d'Annunzio was a most powerful writer and the greatest literary artist in modern Italian letters. When picturing the former glories of Italy, he rose to the level of a great classic writer.

Upon the outbreak of war with Austria in 1915, he entered the Italian army and became notable as an aviator. In 1919, he placed himself at the head of a volunteer army and seized Fiume in order to prevent its becoming a part of Yugoslavia. He established the city as an independent state and, for 15 months, refused in the face of all Europe to submit to agreements made regarding the city by the Treaty of Rapallo. Driven from the city by an Italian army in 1921, he went into retirement.

Anselm, Saint (**1033-1109**), archbishop of Canterbury, a scholastic philosopher, was born at Aosto, Piedmont. He led at first a dissipated life. He was later attracted by the reputation of Lanfranc and went in 1060 to study under him at the monastery of Bec, in Normandy. Three years later, he became prior and, in 1078, abbot of this monastery, the most famous school of the 11th century. Lanfranc, who in the meantime had gone to England and became archbishop of Canterbury, died in 1089, and, in 1093, Anselm was appointed his successor.

Anselm was in almost continual controversy with the English monarchs William II and Henry I on the question of primacy between secular and clerical prerogatives. His insistence on the primacy of the Church was unbending and led to his banishment in 1097-1100. His theological treatises were based on the theory that to understand one must believe.

Anthony of Padua, Saint (**1195-1231**), was born at Lisbon. He was at first an Augustinian monk but, in 1220, he entered the Franciscan order and became one of its most illustrious members. He preached in the south of France and in upper Italy. Numerous miracles were attributed to him, and he won great popularity by his effective preaching against the vices of luxury, avarice, and tyranny. According to legend, he preached to the fishes when men refused to hear him; hence he is the patron of the lower animals and is often represented as accompanied by a pig. He died at Vercelli and was canonized by Gregory IX in 1232.

Anthony the Great, Saint (**251-356**), the founder of Christian monasticism, was born at Coma near Heraclea in upper Egypt. In 285, having sold all his property and given the proceeds to the poor, he withdrew into the desert. While there, he was frequently tempted by the devil, who appeared in such forms as a beautiful woman or a wild animal. A number of disciples, attracted by his reputation for sanctity, gathered about him and formed the first community of monks. He afterward went to Alexandria to encourage the Christians to endure the persecutions of 311 and again, about 350, in order to preach against the Arians. He returned to the desert, where he died.

Anthony, Susan Brownell (**1820-1906**), American reformer, was born at Adams, Mass.; was educated at Bartenville, N. Y., and, 1837-38, at Friends' boarding school, West Philadelphia. She taught school from the age of 15 to 30; aided in organizing the first state Woman's Temperance Society in 1852; was active in the antislavery cause; and was organizer and secretary of the Women's National Loyal League during the Civil War. After the war, she devoted herself to the woman's suffrage movement; founded, in 1868, *The Revolution*, which she managed for several years; in 1869, organized, with Mrs. Stanton, the national woman's suffrage association. She was widely known as a lecturer and wrote a large part of the 4-volume work entitled *History of Woman Suffrage*. Elected to the American Hall of Fame in 1950.

Antiochus (*ăn-tī'ō-kŭs*) **III,** surnamed **the Great** (**c. 238 B. C.-187 B. C.**), succeeded his father, Seleucus Callinicus, as king of Syria in 223 B. C. and was the most distinguished of the Seleucidæ. He failed to recover Parthia and Bactria, but waged war with success against Ptolemy Philopator, and, though defeated at Raphia near Gaza, 217, he afterward obtained possession of all Palestine and Coele-Syria, dowering therewith his daughter Cleopatra on her betrothal to the young king, Ptolemy of Egypt. He afterward became involved in war with the Romans, who had conquered Macedonia; but he declined to invade Italy at the instigation of Hannibul, who had taken refuge at his court. He crossed into Greece, but was defeated in 191 at Thermopylæ and, in 190, by Scipio at Magnesia. Peace was granted him only on condition of his yielding all his dominions east of Mount Taurus and paying a heavy tribute. To raise the money, he proceeded to rob a rich temple in Elymais, but the people rose against him and killed him. See *Seleucidæ*.

Antoinette, Marie. See *Marie Antoinette*.

Antoninus (*ăn'tô-nī'nŭs*), **Marcus Aurelius.** See *Marcus Aurelius*.

Antoninus Pius, Titus Aurelius Fulvus (**86-161**), Roman emperor, was born of a family which came originally from Gaul. He inherited great wealth. In 120 he was made consul; afterward he was sent by Hadrian as proconsul into Asia. In 138 he was adopted by the emperor Hadrian, and he came to the throne in the same year. The reign of Antoninus was proverbially peaceful and happy.

He made legal reforms tending to greater simplicity and humanity, promoted art and science, advanced the construction of public works, and enlarged the provision for orphans.

Antony, Mark (**83 B. C.-30 B. C.**), Roman general, was born at Rome. He fought bravely as a soldier in Syria and Egypt, and in Gaul under Cæsar, whose firm friend he became. He took part in Cæsar's great victory of Pharsalia and was made consul with him in 44 B. C. After Cæsar was killed, Antony with Augustus and Lepidus formed a government called the Second Triumvirate, which defeated the republican army of Brutus and Cassius at Philippi. Some time after, Antony visited Alexandria, where he met the fascinating Cleopatra, queen of Egypt. His love for her caused him to neglect his duties of state. His rule became despotic, and he was eventually attacked by Augustus, who defeated him in the naval battle of Actium. During the battle, he was deserted by the Egyptian fleet. Soon afterward he took his own life. See *Rome: History, Rise of Octavius.*

Apelles (*ȧ-pĕl'ēz*), Greek painter, flourished in the latter part of the 4th century B. C. He was probably a native of Colophon, in Asia Minor. He united the fine coloring of the Ionian with the accurate drawing of the Sicyonic school. During the time of Philip, Apelles visited Macedon, where he became the intimate friend of Alexander the Great. It was probably at the Macedonian court that the best days of Apelles were spent. The most celebrated of his paintings were "Anadyomene," or "Venus Rising from the Sea," and similar subjects; but he cultivated the heroic as well as the graceful style. His ideal portrait of Alexander wielding a thunderbolt was highly esteemed and was long preserved in the temple of Diana at Ephesus. The date of his death is not known.

Apollodorus (*ȧ-pŏl'ō-dō'rŭs*), a Greek architect of the 2d century, was born at Damascus. He was employed at Rome by the emperor Trajan, for whom he built the forum and the column which bear that monarch's name. His greatest work was a huge bridge over the Danube at its confluence with the Alt. He was banished and put to death by Hadrian on charges generally believed to be baseless.

Apollonius (*ăp'ō-lō'nĭ-ŭs*) of Perga, in Asia Minor, called "the great geometer," lived in the second half of the 3d century B. C. He was educated at Alexandria, and wrote a treaties on *Conic Sections* in eight books. He is justly considered one of the founders of the mathematical sciences. To him are due the terms ellipse, hyperbole, and parabola.

Apollonius (**c. 295 B. C.-c. 215 B. C.**), called the Rhodian (Apollonius Rhodius), was born in Alexandria. He presided over an academy at Rhodes and was an eminent rhetorician. He wrote poems, one of which, the *Argonautica*, is an epic poem containing an account of the mythical expedition in search of the golden fleece.

Apollonius (**c. 3 B. C. -c. 100 A. D.**) of Tyana, was born in Tyana, Cappadocia. He was a zealous Neo-Pythagorean teacher, regarding whom many miraculous stories are told. He traveled widely and became acquainted with much of the religious knowledge of the Brahmans. Both in ancient and in modern times, biographical accounts of Apollonius have been written with a view to showing the superiority of his life to that of Jesus.

Appleseed, Johnny. See *Chapman, John.*

Apuleius (*ăp'ū-lē'yŭs*), **Lucius** (**c.125 A. D.-?**), Greek satirical writer, was born at Madaura, Africa, and was educated at Carthage. He went later to Athens, where he entered keenly upon the study of philosophy, displaying a special predilection for the Platonic school. He visited Italy and Asia, and was initiated into numerous religious mysteries. The knowledge of the priestly fraternities which he thus acquired served as material for his *Golden Ass*, one of the earliest romances in European literature. It narrates the adventures of a man who was temporarily transformed into an ass. The date of his death is unknown.

Aquinas (*ȧ-kwī'nȧs*), **Saint Thomas** (**1225-1274**), theologian and saint of the Roman Catholic Church, was born near Aquino, in the kingdom of Naples. He received his earliest instruction at the monastery of Monte Cassino and, about 1240, went to the University of Naples. He was without worldly ambition and longed for the seclusion and quiet of the monastic life. He made profession as a Dominican in 1243; studied at Paris; and, in 1245, became a pupil of Albert the Great at Cologne.

In 1253, Aquinas began his studies at the University of Paris and, four years later, received there his degree as doctor of theology. Thoroughly imbued with the scholastic, dialectic, and Aristotelian philosophy, he gained prominence as a teacher in Paris. In 1261, Urban called him to Rome to assist in the difficult task of reconciling the Greek and Latin churches. In 1269, he was again in Paris; three years later, he went to Naples, where he taught until shortly before his death.

The *Summa Theologica* "Compendium of Theology," is Saint Thomas's greatest work. It remains to this day the most comprehensive and complete of all expositions of the Catholic system. His commentaries on Scripture and his devotional treatises also have a high reputation. He united theology with ethics and clearly set forth the philosophy of Christian morals. All his works were written in Latin.

Saint Thomas sought, in his writings, to effect a harmony of reason and revelation by means of an orderly, consistent, and comprehensive system of theology. To this purpose, he invoked all the power and subtleties of Aristotle's logic. By nature and training, Saint Thomas was the very embodiment of the scholastic method of intricate analysis, yet his style was so clear that his writings are intelligible and interesting to the modern reader.

Aquinas died when on his way to attend the General Council that Gregory X had convoked at Lyons, France. He was canonized in 1323, and, two centuries later, Pius V named him the fifth doctor of the Church.

Arago (*ăr'ȧ-gō*), **Dominique** (**1786-1853**), French physicist, was born at Estagel, France. Becoming secretary of the Paris Observatory, he was commissioned in 1806 with Biot to measure an arc of a meridian. He became a professor in the Ecole Polytechnique at the age of 23, where he propounded the theory that light travels in waves. He devised an experimental test which, more than a decade later, was made with affirmative results. With A. J. Tresnel, he worked out the fundamental laws of the polarization of light. As minister of war in 1848, Arago abolished flogging in the navy and did away with political oaths.

Arbaces (*ăr-bā'sēz*) was one of the generals of Sardanapalus and the founder in 876 B. C. of the Median empire. In conspiracy with a Chaldean priest who commanded the troops from Babylon, he revolted, gained the assistance of several prominent officers, and defeated Sardanapalus, who then committed suicide. The dynasty of Arbaces lasted until 559 B. C., when Cyrus overthrew it.

Arc, Joan of. See *Joan of Arc.*

Archimedes (*ăr'kĭ-mē'dēz*) (**c. 287 B.C.-212 B.C.**), Greek scientist and inventor, was born in Syracuse, Sicily. He is said to have visited Egypt in early life, and to have invented there several hydraulic machines, including the Archimedean screw, which he applied to drainage and irrigation. He discovered the law of specific gravity, still called Archimedes' principle. His purely mathematical works show that he far excelled all who preceded him. The most celebrated are on the ratio of the sphere and cylinder, on the ratio of the circumference to a diameter, on spiral lines, and on the parabola. In his old age, he defended Syracuse against the Romans under Marcellus with great mechanical skill, and was killed at its capture. See *Archimedes' Principle.*

Ariosto (*ȧ'rê-ôs'tō*), **Ludovico**(**1474-1533**), Italian poet, was born at Reggio. His education was intended to fit him for law, but this study proved uncongenial, and he spent much of his time in the composition of verse. In 1503, he was introduced to the court of the cardinal Ippolito d'Este, who employed him in many negotiations. Here he produced his famous poem, *Orlando Furioso*, which was published at Ferrara in 1516. See *Italian Literature: The Renaissance.*

Ariovistus (*ă-rĭ-ō-vĭs'tŭs*), a chief of Marcomanni, a German tribe, who crossed the Rhine to aid the Sequani against the Ædui in the 1st century B. C. He occupied a considerable territory in Gaul, but was finally defeated by Cæsar at Vesontium (Besançon) in 58 B. C. Ariovistus himself escaped over the Rhine into his own country.

Aristarchus (*ăr'ĭs-tär'kŭs*) of Samos, Greek astronomer, lived in the 3d century B. C., residing in Alexandria. He is the first astronomer known to have held the view that the earth revolves around the sun. His opinion was known to Copernicus, whose influence in the 15th century A. D. led to investigations establishing the truth of the heliocentric theory. Aristarchus held also that the earth revolves on its axis, thus causing day and night, and that the axis is inclined to the plane of the earth's orbit. His only extant work is *On the Sizes and Distances of the Sun and Moon.*

Aristides (*ăr'ĭs-tī'dēz*), (**?-468 B. C.**), surnamed "the just," was the son of Lysimachus. He was one of the ten leaders of the Athenians against the Iranians at the battle of Marathon, 490 B. C. He later supported a military policy as opposed to the naval policy of Themistocles. A popular vote decided against Aristides, who retired into exile. Recalled in 480 B. C., he had a share in the victories at Salamis and Platæa. He was instrumental in organizing the Delian confederacy and was charged with assessing the contributions to be made by each state.

Aristippus (*ăr'ĭs-tĭp'ŭs*) (**c. 425 B. C.-?**), the founder of the Cyrenaic, or hedonistic, school of philosophy among the Greeks, was born at Cyrene, in Africa. He was a pupil of Socrates. His system, based on the doctrine that pleas-

ure is the highest good, was further developed by his daughter Arete and by her son Aristippus the Younger. The date of his death is unknown.

Aristophanes (*ăr'ĭs-tŏf'ā-nēz*), **(c.445 B.C.-c.385 B.C.),** Greek comedian, was born at Athens. He began writing when very young, and his first plays were brought out under another name because he was not old enough to contend for the prize. He wrote, in all, 54 comedies, but only 11 have come down to us. *The Knights* and *The Clouds* are among his most admired pieces; others are *The Wasps, The Birds,* and *The Frogs.* Aristophanes was conservative and aristocratic in sympathy, and he mercilessly ridiculed the newer movements in politics and thought. One of his finest plays, *The Clouds,* is a satire against Socrates. His plays contain passages of the most beautiful and finished poetry interspersed in dramas sparkling with wit, much of it in a lusty and ribald strain. See *Greek Literature: Comedy.*

Aristotle (384 B. C.-322 B. C.), founder of the celebrated Peripatetic school of philosophy at Athens, was born at Stagira, Macedonia, the son of Nicomachus, a court physician of Macedon. Having lost both parents while he was quite young, Aristotle was brought up under the care of Proxenus, a friend of the family. When he had completed his 17th year, Aristotle repaired to Athens, where, for three years, he pursued his studies by books and teachers as best he could. On the return of Plato from Syracuse, Aristotle placed himself under his instruction and became the most distinguished member of the Academy, as Plato's school was called.

Career. The death of Plato in 347 B. C. was the occasion of Aristotle's departure from Athens, He went to Atarneus in Asia Minor, where, at the small but interesting court of Hermeias, he spent three years, enjoying the society of intellectual friends and devoting himself with unremitting assiduity to the study of nature. Aristotle subsequently married Pythias, the sister of Hermeias. To their son, Nicomachus, he dedicated his chief work on ethics, called the *Nicomachean Ethics.*

While residing at Mytilene in Lesbos, whither he went about 344 B. C., Aristotle received from Philip, king of Macedon, the flattering invitation to superintend the education of the latter's son, who later was called Alexander the Great. In 342 B. C., Aristotle took up his residence at the Macedonian court in Pella. It was for the use of his pupil that he wrote his *Rhetoric* in 338 B. C. From the death of Philip until the time of Alexander's Asiatic expedition, Aristotle continued to live with the youthful king as his friend and counselor.

Returning to Athens in 334 B. C., Aristotle opened a school called the Lyceum. From his habit of walking up and down in the garden during his lectures arose the other name of his school, Peripatetic, derived from *peripateo,* "walk about." It was his custom to give a morning lecture on the more abstruse subjects to select pupils, and then, in the evening, one of a more popular nature to a general audience. It is probable that, at this time too, he composed his principal works. Aristotle's connection with Macedon made him unpopular in Athens. He was charged with impiety and sedition, and, wishing to avoid the fate of Socrates, he made his escape to Chalcis in 323 B. C.

Comparison With Plato. Although a student under Plato for many years, Aristotle, in his writings, frequently criticized his master's views, sometimes unfairly. Plato was an artist and poet as well as a thinker, while Aristotle had a greater interest in reducing facts or methods to a system. Most of Aristotle's systematized results are to be found in Plato's works, but in a form dictated by artistic considerations. Plato was an expert mathematician, while Aristotle was a biologist. Aristotle's studies consequently rely much more heavily on observations, not only in the field of natural science, but also in politics and economics.

Writings. The most important of Aristotle's writings are the *Organon, Rhetoric, Poetics, Ethics, Politics, History of Animals, Physics, Metaphysics, Psychology,* and *Meteorology.* It may be said with justice that there was not one subject discussed in his day which Aristotle did not touch and clarify. He laid the foundations, also, of many new biological and social sciences. In his *Organon,* or "Logic," one finds the basis and nearly the whole substance of syllogistic logic, which became, with the schoolmen, the method of Catholic theology. See *Greek Education.*

Arius (*ā-rī'ŭs; ă'rĭ-ŭs*) **(c. 256 A. D.-336),** founder of Arianism, was born in Libya; was trained in Antioch; and became a presbyter in Alexandria. Here, about 318, he maintained, against his bishop, that the Son was not coequal or co-eternal with the Father, but was only the first and highest of all finite beings, created out of nothing by an act of God's free will. He secured the adherence of clergy and laity in Egypt, Syria, and Asia Minor, but was deposed and excommunicated in 321 by a synod of bishops at Alexandria. Eusebius, bishop of Nicomedia, absolved him and, in 323, convened another synod in Bithynia, which pronounced in his favor. He defended his views before the council of Nicæa, 325, but they were condemned. He died at Istanbul.

Arkwright, Sir Richard (1732-1792), inventor of the spinning frame, was born at Preston, England, of poor parents, the youngest of thirteen children. In boyhood he was apprenticed to a barber, and his educational advantages were very limited. Settling at Bolton Willows near Manchester in 1750, he followed his trade for ten years; then, having invented a process of dyeing human hair, he became a hair merchant.

Little is known regarding the steps by which Arkwright was led to make the important invention that brought him fame and fortune. The first hint was received, however, according to his own account, from seeing a red-hot iron bar drawn through two sets of rollers, the second moving more rapidly than the first. As he lived in a district where cotton fabrics were extensively manufactured and was endowed with keen inventive genius, this process suggested to him that cotton, when cleaned and carded, might be dealt with in the same manner. In 1769, Arkwright obtained a patent for his spinning frame, by means of which a large number of threads might be spun at the same time, instead of the single thread produced on the ordinary spinning wheel.

The rise of the modern cotton manufacturing industry dates from the introduction of this labor-saving machine. At the time of its invention, however, Arkwright was too poor to buy clothing suitable for his appearance in public. Moreover, he was greatly hampered by the bitter opposition of jealous employers and hostile workmen. But, by reason of his earnestness, energy, and perseverance, which surmounted all obstacles, Arkwright won the support of able partners and built a mill at Nottingham in 1769. In 1771, he erected a much larger mill at Cromford.

Later, Arkwright established other factories and invented additional cotton-working machines, which produced for him and his associates fortunes then considered prodigious. The results of his discoveries were multiplied a hundredfold by the introduction of the steam engine. His patents were nullified by the courts in 1785, but wealth from his well managed factories continued to flow upon the inventor, who eventually amassed property valued at about $2,500,000. In 1786, he was knighted. Arkwright revolutionized the textile industry, not only by designing machines which immensely increased production, but also by organizing the system which made the modern factory possible.

Arliss, George (1868-1946), actor, was born in London, Eng. He made his first appearance on the stage in 1887 at London and his first tour of America in 1901, attaining instant success as the villain Zakkuri in *The Darling of the Gods.* His more notable later triumphs were made in the title roles of the *Devil* and *Disraeli* and in the *Green Goddess.* He repeated most of his earlier successes when he appeared in motion pictures, and added further to his laurels by his role in *Richelieu, Old English,* and *A Man of Affairs.* He wrote *Up the Years from Bloomsbury, My Ten Years in the Studios,* and *George Arliss, by Himself.*

Arminius (*ăr-mĭn'ĭ-ŭs*) **(c. 18 B. C.-21 A. D.),** a German chieftain, prince of the Cherusci. He became a Roman citizen and served as a soldier in the Roman army. Coming home, in 9 A. D., he found the whole country stirred up by the cruelties of Varus, the Roman governor. Arminius then became the head of a conspiracy and induced the Roman general to scatter his troops in small detachments. News of the conspiracy caused Varus to march into the interior; the scattered Roman troops were murdered, and the main body was surrounded and killed almost to a man, Varus taking his own life.

In 15 A. D., Germanicus marched against the Cherusci, but accomplished nothing. The next year, he marched again with 80,000 men and a fleet. Arminius artfully led him into narrow passes; then, falling upon him, cut off his cavalry, almost destroyed four legions, and forced him to retreat. The next year, the undaunted Germanicus came with 100,000 men and 1000 ships. On a plain, called "no-man's meadow," a great battle was fought. The Germans were beaten at first, but, the next morning, they compelled the Romans to retreat. From this time no Roman army ever marched beyond the Rhine, and Arminius is, therefore, justly called the "German liberator." He was assassinated. See *Germany: History.*

Arminius, Jacob (1560-1609), Dutch theologian, was born at Oudewater, a small town in the Netherlands. He studied at the University of Leiden, attended the school of theology in Geneva, and later studied at Basel. He was ordained at Amsterdam in 1588, and soon became distinguished as a preacher. In 1589, he consented to answer a book which attacked Calvin's doctrine of predestination and, while preparing to do so, embraced the doctrine of free will which he was trying to refute. His later writings developed this doctrine, which became known as Arminianism. From 1603 to 1609, he was professor in the University of Leiden. He was a gifted scholar, a preacher of great popular power, and an author of ability.

Armour, Philip Danforth (1832-1901), merchant and capitalist, was born at Stockbridge, N. Y. His fortune was made largely in the immense commission business he conducted in Chicago and elsewhere, and in railways. For many years, he was the head of the firm of Armour and Company, pork packers and dealers in dressed meats and provisions. At his death, his wealth was estimated at about forty millions. The chief objects of his benevolence were the Armour Institute of Technology in Chicago, opened in 1893, and the Armour Mission. He died at Chicago.

Armstrong, Sir William George (1810-1900), English inventor and manufacturer, was born at Newcastle, England. In 1840, he produced an improved hydraulic engine and, in 1845, the hydraulic crane. Shortly afterward, he began the erection of the Elswick engine works at Newcastle. This large establishment at first produced chiefly hydraulic cranes, engines, and bridges, but later became noted for the production of ordnance, and especially of the Armstrong gun. Armstrong offered to his government all his inventions. He was knighted in 1859 and was created Baron Armstrong in 1887. He wrote *Electric Movement.*

Arne (*ärn*), **Thomas Augustine (1710-1778),** English composer, was born in London. His father, an upholsterer, intended him for the bar, but young Arne became skillful as a violinist, forming his style chiefly after Corelli. His zeal in the study of music induced his sister, Mrs. Cibber, to cultivate her excellent voice. He wrote for her a part in his first opera, *Rosamond,* which was performed with great success in 1733. Next followed his comic operetta, *Tom Thumb,* and afterward his *Comus.* The national air, "Rule Britannia," originally given in the masque of *Alfred,* is his composition, as are also two operas, *Eliza* and *Artaxerxes.* He died in London.

Arnold, Benedict (1741-1801), American soldier and traitor, was born in Connecticut. He joined Ethan Allen's expedition against Ticonderoga, and later succeeded Montgomery after the latter's death in an unsuccessful assault on Quebec, 1775. Refused promotion by Congress, he consented to remain in the army only at Washington's request. While in command of Philadelphia, 1778-79, his actions were severely criticized, and he was court-martialed and reprimanded.

In 1780, Arnold secured command of West Point and entered into treasonable negotiations with Sir Henry Clinton for its betrayal. The capture of Major André exposed the plot, and Arnold escaped to a British war vessel. He became a brigadier general in the British army and commanded several minor attacks during the last months of the war. He was pensioned by the English government, but was despised and neglected by the English people. He was a soldier of remarkable daring and ability, but unscrupulous.

Arnold, Henry Harley (1886-1950), American general, was born at Gladwyne, Pa. After being graduated from West Point in 1907, he attended the Wright brothers' aviation school at Dayton, Ohio, in 1911. He served with the army air force at Panama and on the west coast and commanded various airfields. In 1934 he led an army flight to Alaska. He became major-general and chief of the army air corps in 1938. In 1942 he was placed in full charge of the army air forces. In 1943, as chief of air staff, he directed the American part of the great air offensive against the Axis. In 1944 he was advanced to the rank of general of the army. He retired in 1945.

Arnold, Matthew (1822-1888), English poet and critic, oldest son of Thomas Arnold, the noted head master of Rugby, was born in Middlesex, England. He was educated at Winchester, Rugby, and Oxford. In 1845, he was elected fellow of Oriel College and, in 1851, he was appointed lay inspector of schools. For ten years, 1857-67, he held the chair of poetry at Oxford. Among Arnold's productions may be noted his Newdigate prize poem *Cromwell, The Strayed Reveller,* and a volume entitled *New Poems* published in 1869.

As a critic, Arnold holds a high place and, as a poet, he is ranked by some as second only to Tennyson and Browning among Victorian writers. His later prose works were chiefly theological, being attempts to grapple with the supernatural aspects of Christianity from a rationalistic standpoint. His writings include also *St. Paul and Protestantism, Literature and Dogma,* and *God and the Bible.* See *English Literature: Victorian Age.*

Arnold, Thomas (1795-1842), English educator and historian, was born in the Isle of Wight. He was educated at Winchester, and at Corpus Christi College, Oxford. In 1815, he became fellow of Oriel, obtaining in that year the chancellor's prize for the Latin Essay. After taking holy orders, he passed nine years at Laleham, near Staines, in literary occupations, and in preparing young men for the universities. Appointed, in 1828, head master of Rugby School, he raised that institution beyond all precedent, both by the remarkable success of his pupils and by the introduction of new branches of study. He was of the Broad Church school of thought and a vigorous opponent of the tractarian movement. In 1841, he was appointed professor of modern history at Oxford. His best-known works are his edition of *Thucydides,* his *History of Rome,* and his sermons delivered in the chapel of Rugby School.

Arrhenius (*ăr-rā'nĭ-ŏŏs*), **Svante August (1859-1927),** Swedish chemist, was born at Wijk, Sweden, and was educated at the University of Upsala. In 1895, he was appointed professor of physics in Stockholm and, in 1905, he was made director of the physiochemical department of the Nobel Institute, Stockholm. His most important contribution to science is the theory of ionization, set forth in 1887. He received the Nobel prize for chemistry, 1903, and the Faraday medal, 1914. His works include *Worlds in the Making, Theories of Chemistry,* and *Immunochemistry.*

Arrian (*ăr'ĭ-ăn*), or **Flavius Arrianus (c.100 A.D.-c. 180),** Greek historian, was born in Nicomedia, Bithynia. He is best known by his history of the campaigns of Alexander the Great, which, in imitation of Xenophon, he called the *Anabasis of Alexander.* The emperor Hadrian made him a Roman citizen and governor of Cappadocia in 136. When fifty years old, he settled in his native city. Besides the *Anabasis,* he wrote an account of a voyage in the Black Sea, an account of India, and other works.

Artemisia (*ăr'tē-mĭsh'ĭ-ä*) **(?-351 B. C.),** daughter of Hecatomnos and wife of Mausolus, king of Caria, Asia Minor, whom she succeeded as ruler of Caria upon his death in 353 B. C. She defeated an attempt of the Rhodians to free themselves and surprise her capital. She immortalized her name by the honors which she paid to the memory of her husband, erecting for him in Halicarnassus a splendid tomb, called the Mausoleum. This was one of the seven wonders of the ancient world, and from it the name mausoleum was given to all tombs distinguished for their magnificence. She built also a monument in Rhodes in commemoration of her conquest of the island. There are statues of Mausolus and Artemisia in the British museum. According to tradition, her death resulted from grief for the loss of her husband.

Arthur, Chester Alan (1830-1886), twenty-first president of the United States, was born in Fairfield, Vt. He was graduated at Union College in 1848, studied law, and was admitted to the bar. In 1861, he was appointed inspector general and later quartermaster-general of New York State. From 1871 to 1878, he was United States collector of the port of New York. He was elected vice president of the United States in 1880 and, on the death of President Garfield, September 19, 1881, he became president. Reputed to be a "spoilsman," Arthur nevertheless gave effective support to the Civil Service act of 1883.

Asbury (*ăz'bĕr-ĭ*), **Francis (1745-1816),** the first bishop of the Methodist Episcopal Church ordained in America, was born in Staffordshire, England. At the age of 14, he was apprenticed to a mechanic; two years later he began work as a local preacher. Later, he joined the itinerant ministry and after three years of service was sent to America as a missionary. In 1772, he was appointed general assistant by John Wesley. He brought new life into the work, and, at the outbreak of the Revolution, when many other ministers returned to England, he kept on in his labors. At the end of the war, it was decided to found an independent Methodist Episcopal Church for America, and, in 1784, Asbury was ordained bishop by his colleagues, who had already been ordained by Wesley in England. The rapid progress of Methodism in America was due largely to his efforts and ability. He helped to lay, in 1785, the foundation of the first Methodist college in America. Died at Spottsylvania, Va.

Ascham (*ăs'kăm*), **Roger (1515-1568),** English humanist, was born at Kirby Wiske, in Yorkshire. His reputation as a classical scholar brought him numerous pupils, and he was appointed by Cambridge University to read lectures in the public schools. He wrote, in 1545, a treatise on archery entitled *Toxophilus,* the pure English style of which entitles it to rank as a classic in English literature. For this treatise, which was dedicated to Henry VIII, he was awarded a pension. In 1548, he became master of languages to Lady Elizabeth, afterward queen, and was subsequently appointed Latin secretary to Edward VI and Queen Mary. After the death of Mary, Elizabeth retained him at court as secretary and tutor. His *Schoolmaster,* a treatise on education, exerted great influence on methods of teaching Latin.

Ashburton, Alexander Baring, Lord (1774-1848), English diplomat, second son of the noted merchant, Sir Francis Baring. Having been employed as special ambassador from England to the United States, he concluded in 1842 the famous treaty, called the Ashburton Treaty, by which the frontier line between the state of Maine and Canada was definitely settled.

Asoka (*ä-sō'kä*) was an emperor of India from 264 to about 228 B. C. and was chiefly responsible for the spread of the Buddhist religion in India. He conducted many

remarkable missionary enterprises and set up in the country numerous inscriptions outlining Buddahist doctrines. Asoka is often compared to Constantine, who played a similar role in the establishment of Christianity in Europe.

Aspasia (*ăs-pā'shĭ-ă*), a beautiful Athenian woman, a native of Miletus in Asia Minor, noted for her genius, wit, and political influence, flourished about 440 B. C. After her marriage to Pericles, who repudiated his wife in order to wed her, her house became the meeting place for the learned men of Athens. Socrates is said to have been one of her admirers. She was indicted for impiety, but Pericles successfully defended her in court. After his death, she lived for a year with a sheep owner. Later details of her life are unknown.

Asquith, Herbert Henry. See *Oxford and Asquith, Earl of.*

Asser (*ă'sĕr*), **Tobias Michael Carel (1838-1913),** Dutch statesman, born in Amsterdam. He was made professor of law in the Atheneum of Amsterdam in 1862, and from 1876 to 1893 he occupied a similar chair at the University. He was appointed counselor to the foreign office in 1875, and member of the Dutch council of state in 1893. At the Peace Conference at The Hague in 1899 and in the International Court of Arbitration, he was the delegated representative of the Netherlands.

Asser's profound researches in international law and his distinguished efforts in behalf of the peaceful adjustment of international problems extended his reputation far beyond his own country. In 1911, he received the Nobel peace prize jointly with A. H. Fried. His published works include *Outlines of Dutch Commercial Law, Outlines, of Private International Law, Codification of Private International Law,* and *International Arbitration between the United States and Russia.*

Astaire, Fred (1899-), American actor and dancer whose original surname was Austerlitz. He co-starred with his sister Adele in such musical comedies as *Over the Top, Apple Blossoms, Lady Be Good,* and *The Bandwagon.* They were the first to introduce a touch of humor into their dancing. Following his sister's marriage to Lord Charles Cavendish and her retirement from the stage, he starred alone in a succession of musical comedies, among them *Gay Divorcee* (1932). Then in partnership with Ginger Rogers he appeared in a succession of such films as *Roberta* (1935), *Top Hat* (1935), *Follow the Fleet* (1936), and *The Story of Vernon and Irene Castle* (1939). He later had both Rita Hayworth and Judy Garland as partners. Probably his best picture was *Easter Parade* with Judy Garland. Still later he appeared alone in *Ziegfeld's Follies* and *Blue Skies.* An unusually supple dancer, Fred Astaire has excelled in the technique of tap dancing.

Aston, Francis William (1877-1945), English physicist and chemist, was educated at Malvern College, Mason College, and Birmingham University. In 1910, he entered Trinity College and the Cavendish Laboratory, Cambridge University, receiving, in 1912, a research degree and, in 1913, a Clerk-Maxwell studentship. From 1914 to 1919, he was technical assistant in the royal aircraft establishment at Farnsborough. In 1920, he was made fellow of Trinity College, Cambridge, and became president of the Cambridge Philosophical Society. His chief contribution to science is the discovery that many elements are mixtures of atoms having different weights but otherwise similar. These are called isotopes. For this discovery, which opened up new vistas for research, he was awarded the Nobel prize in chemistry for 1922. See *Isotopes.*

Astor, John Jacob (1763-1848), American merchant, founder of the American Fur Company, was born near Heidelberg, Germany. After spending some years in London, he sailed to America in 1783, and soon invested his small capital in furs. By economy and industry, he so increased his means that after six years he had acquired a fortune of $200,000. Although the increasing influence of the English fur companies in North America was unfavorable to his plans, he ventured to fit out two expeditions to Oregon, one by land, and one by sea. The purpose of these was to open up regular commercial intercourse with the natives.

After many mishaps, Astor's object was achieved in 1811, and the fur-trading station of Astoria was established. From this period, in spite of the War of 1812 and other temporary obstacles, his commercial connections extended over the entire globe. When he died, he left property valued at about 30 million dollars. See *Astoria.*

Astor, John Jacob (1864-1912), capitalist and inventor, great-grandson of John Jacob Astor, was born at Rhinebeck, N. Y. He was graduated from Harvard in 1888; traveled abroad, 1888-91; and was manager of the family estates, 1891-1912. In 1897, he built the Astoria hotel, New York, adjoining the Waldorf hotel, which was built by William Waldorf Astor, his cousin, the two forming one building under the name of Waldorf-Astoria hotel, for many years one of the largest and most costly hotels in the world.

In May 1898, he was commissioned lieutenant colonel of United States volunteers in the Spanish-American War and served in Cuba during operations ending in the surrender of Santiago. Among his inventions were a bicycle brake, a pneumatic road improver, and an improved turbine engine. Died at sea in the sinking of the *Titanic.*

Astor, Nancy Witcher Langhorne, Viscountess (1879-), first woman member of the British Parliament, was born in Virginia, U. S. A. She married Robert Gould Shaw in 1897. Obtaining a divorce in 1903, she married Viscount Astor in 1906. In 1919, she was elected to the House of Commons, retaining her seat until 1945. There she took a prominent part in debates on social reforms and successfully sponsored a bill prohibiting the sale of liquor to minors. She wrote *My Two Countries.*

Astor, William Waldorf, Viscount (1848-1919), capitalist and author, was born in New York. He was a son of John Jacob, second, and great-grandson of John Jacob, founder of the Astor fortune. He was educated by private tutors, finishing in Europe. In 1871, he entered the office of the Astor estate and, in 1890, succeeded his father as head of the Astor family, with personal fortune estimated at $200,000,000. He served as United States minister to Italy, 1882-85; removed to England, 1890; purchased *Pall Mall Gazette* and *Pall Mall Magazine,* 1893; became British subject, 1899; and was created viscount, 1917. His writings include *Valentino, a Story of Rome; Sforza; Pharaoh's Daughter and Other Stories.* Viscount Astor was succeeded in the title by his oldest son, Waldorf Astor (1879-1952).

Atahualpa (*ä'tä-wäl'pä*), **(?-1533),** was the last Peruvian Inca. In 1525, he succeeded his father, Huayna Capac, on the throne of Quito while his half brother, Huascar, although the rightful heir, obtained only the kingdom of Peru. The two brothers engaged in a struggle for supremacy, in which Huascar was defeated.

The Spaniards under Pizarro, taking advantage of these internal dissensions, invaded Peru. By an act of deliberate perfidy, they obtained possession of the person of Atahualpa and attempted to compel him to acknowledge the king of Spain as master and to embrace the Christian religion. His refusal was made a pretext for a massacre of the Peruvians and the imprisonment of their king, whom the Spaniards induced to raise an enormous treasure in the hope of regaining his throne. After a mock trial, however, he was condemned and executed. See *Peru: History.*

Athanasius (*ăth'ă-nā'shĭ-ŭs*), **Saint (c. 296-373),** was born in Egypt. Entering the Church at an early age, he was chosen bishop of Alexandria in 326. He is esteemed one of the most eminent among the ancient fathers of the Church. He was an energetic opponent of Arius. His earnest advocacy of the Catholic faith, more particularly of the doctrine of the Trinity, subjected him to much persecution from the emperors Constantine and Julian, by both of whom he was several times exiled.

The writings of Athanasius are numerous, but consist chiefly of controversial treatises against his opponents and against Arianism. The more important of his writings are his *Apologies, Two Books on the Incarnation, Conference with the Arians, The Life of St. Anthony, The Abridgment of the Holy Scriptures,* and *Letters to Serapion.*

Atherton, Gertrude Franklin (1857-1948), American novelist, great-grandniece of Benjamin Franklin, was born at San Francisco, Cal. She was educated at Saint Mary's Hall, Benicia, Cal., and Sayre Institute, Lexington, Ky. She married G. H. B. Atherton, and soon after his death, she began, in 1892, her literary career with a series of valuable studies of her native state and people. These included *Before the Gringo Came,* later revised as *The Splendid Idle Forties; American Wives and English Husbands; A Daughter of the Vine;* and *California.*

Later, she pictured, with notable skill, eastern scenery, social conditions, and history in *Patience Sparhawk and Her Times, Aristocrats,* and *Senator North* and presented an epic portrayal of Alexander Hamilton in *The Conqueror.* Among her other writings are *Tower of Ivory, Rulers of Kings, Perch of the Devil, The Avalanche, Black Oxen, The Sophisticates, The Adventures of a Novelist* (autobiography), and her last work *My San Francisco—A Wayward Biography* (1946).

Athlone, Alexander Augustus Frederick William Alfred George Cambridge, Earl of (1874-1957), English administrator, was born at London, a member of the British royal family. Educated at Eton and Sandhurst Military College, he participated in the South African War and in World War I, retiring from the army in 1919. From 1923 to 1931, he was governor general of South Africa and governor general of Canada, 1940-46.

Atholstan, Lord. See *Graham, Hugh.*

Atkinson, (Justin) Brooks (1894-), American newspaperman and drama critic, was born at Melrose, Massachusetts, and was educated at Harvard (1917). After serving an apprenticeship in journalism on various provincial newspapers, he became, in 1922, editor of the

New York Times Book Review, a position he held until 1925, when he was made drama critic of the paper. With the exception of the years 1942-46, when he was news correspondent at Chungking, China, and then at Moscow, he has been the *Times'* drama critic. In 1947 he was awarded the Pulitzer prize in journalism. He is the author of *Skyline Promenades* (1925); *Henry Thoreau, Cosmic Yankee* (1927); *East of the Hudson* (1931); *The Cingalese Prince* (1934); and *Once Around the Sun* (1951).

Atticus Herodes, Tiberius Claudius (c. 101 A. D.-177 A. D.), a rich Athenian. To a vast sum of money left him by his father, he added much more by marriage. He was educated by the best masters, devoting special attention to oratory, and became a teacher of rhetoric, having for pupils Marcus Aurelius and Lucius Verus.

The fame of Atticus rests mainly upon his immense expenditures for public purposes. In Athens, he built a race course of Pentelic marble and a splendid theater. In Corinth, he built a theater; in Delphi, a stadium; at Thermopylæ, hot-baths. He also restored several of the partially ruined cities of Greece. Later, he met with family misfortunes, the Athenians became his enemies, and he left the city for his villa near Marathon, where he died.

Attila (*ăt'ĭ-lə*) **(?-453)**, king of the Huns, lived in the 5th century. He styled himself "the scourge of God," and, for a period of about 20 years, ruled central Europe practically from the Caspian Sea to the river Rhine. In 451, he sacked Belgic Gaul and invaded what is now northern France, but was defeated by the armies of Theodoric and Aetius in the terrible battle of Châlons. In 452, Attila attacked northern Italy, devasting Milan, Padua, and other cities. The city of Venice was founded by those who fled before him. See *Huns*.

Attlee, Clement Richard, Earl (1883-), British politician, was educated at Haileybury College and Oxford. He entered Parliament as a Labor member from the Limehouse district in 1922, held several positions under Labor ministries, and was leader of the opposition from 1935 to 1940. In 1940 he entered the coalition war cabinet as Lord Privy Seal, becoming deputy prime minister in 1941. On the defeat of the war ministry in July, 1945, he succeeded Winston Churchill as prime minister and Churchill in turn succeeded him in 1951. On his retirement as leader of the Labor party in 1955 he was created an earl.

Auber (*ō'bâr'*), **Daniel François Esprit (1782-1871)**, French composer, was born at Caen, in Normandy. His father was a print seller in Paris, and, being desirous that his son should devote himself to business, he sent him to London to acquire a knowledge of the trade. But his passion for music obtained the upper hand, and he became a pupil of Cherubini. His opera *Masaniello* is considered his best work. Among his other works are the well-known operas *Fra Diavolo* and *Manon Lescaut*. In 1842, after the death of Cherubini, he was appointed director of the Conservatory of Music, Paris.

Aubigné (*ō'bēn'yā'*), **Jean Henri Merle d'**. See *Merle d' Aubigne, Jean Henri*.

Auden, W(ystan) H(ugh) (1907-), Anglo-American poet, was born in England and educated at Christ Church, Oxford, where he became one of the leaders of a group of young left-wing writers, which included Stephen Spender, Christopher Isherwood, and C. Day Lewis, all of them more or less under the influence of T. S. Eliot. Auden collaborated with Isherwood in writing several plays, namely, *The Dog Beneath the Skin* (1935), *The Ascent of F6* (1936), and *On the Frontier* (1938). He became a resident of the United States in 1939, a citizen in 1946. In 1947, he won the Pulitzer prize for poetry. Auden also wrote the libretto for Igor Stravinsky's opera *The Rake's Progress* (1951), and compiled *The Oxford Book of Light Verse*. His *Shield of Achilles* was published in 1955.

Audubon (*ô'dŏō-bŏn*), **John James (1785-1851)**, American naturalist of French descent, was born near New Orleans, La., in 1780, according to his own statement; but it is claimed by some investigators that he was illegitimate and was born at Aux Cayes, Haiti, in 1785. From childhood, he was devoted to natural history, but it was not until 1830 that the first of the four volumes of his great work, *The Birds of America*, appeared. This magnificent collection of colored plates, which was sold for $1000 a copy, was quickly followed by an explanatory work entitled *American Ornithological Biography*. Audubon also projected a similar work on the *Quadrupeds of America*, but much of this work was done by his sons, John and Victor.

Audubon was not a learned scientist or a great artist, but his self-denying enthusiasm for his subject and the uniformly pleasing qualities of work made him the most distinguished and best beloved of pioneer American naturalists. Died in New York; was elected to American Hall of Fame, 1900. See *Audubon Societies*.

Auenbrugger von Auenbrug (*ou'ĕn-brŏŏg'ĕr fŏn ou'ĕn-brŏŏK*), **Leopold (1722-1809)**, Austrian physician, was born at Graz. He originated the method of examining the lungs by percussion of the chest and published the results of his investigations in a treatise which marks an important advance in the history of medicine. He died in Vienna.

Augier(*ō'zhyā'*), **Guillaume Victor Emile (1820-1889)**, French dramatist, was born at Valence. He was of prosperous middle class parentage, a grandson of Pigault Lebrun, the novelist. After receiving a good education, he prepared for the bar but, upon the success of his play, *La ciguë*, in 1844, began a literary career, producing a long series of plays which blazed the trail to realism in modern French drama. With Dumas, the younger, and Sardou, he held front rank on the French stage during the Second Empire. He was elected to the French Academy in 1857. Among his plays are *Le Gendre de M. Poirier*, *Gabrielle*, *Les lionnes pauvres*, *Madame Caverlet*, and *Les Fourchambault*. He died at Croissy. See *French Literature: Nineteenth Century*.

Augustine (*ô-gŭs'tĭn; ô'gŭs-tēn*), **Saint (354-430)**, one of the Latin church fathers, was born at Tagaste in Numidia. He was sent to school at Madaura and, subsequently, at Carthage, where he mastered rhetoric, logic, geometry, arithmetic, and music. He became a lecturer on rhetoric first at Tagaste and, in 379, at Carthage. Four years later, he departed for Rome, shortly afterward proceeding to Milan, where he continued to pursue his profession.

At Milan, Augustine came under the influence of Neo-Platonism and also heard Christianity preached by Ambrose, the bishop of Milan. His mind was deeply reflective and had led him, as early as 373, to embrace Manichæism, a religion which was, in that age, a rival of Christianity. He deserted this sect and, after a long period of perplexity, decided to become a Christian. Leaving the woman with whom he had lived for about 17 years in what he came to regard as a sinful state, he was baptized with his son, Adeodatus, on April 25, 387 A. D.

In 391, Augustine was ordained a priest. Four years later, he was made colleague of Valerius, as bishop of Hippo. His activity was engaged throughout the remainder of his life in three great religious controversies—against the Manichæans, the Donatists, and the Pelagians. In the course of these controversies, he developed many of the theological doctrines upon which both the Catholic and the Protestant Church are based. As a philosopher, he may be regarded as the father of medieval scholasticism.

His best-known works are his *Confessions* and *De Civitate Dei*, "City of God." The latter, finished in 426, constitutes the first attempt to write a comprehensive philosophy of history. It compares this world with the City of God and describes the triumph of the latter. He died at Hippo, which, at that time, was being besieged by the Vandals.

Augustus, Caius Julius Cæsar Octavianus (B. C. 63-14 A. D.), first Roman emperor, was the son of Caius Octavius and Atia, niece of Julius Cæsar, by whom he was adopted when but four years of age. He was in Epirus when Julius Cæsar was assassinated, but speedily returned to claim his inheritance. In association with Antony and Lepidus, he removed most of their prominent opponents by assassination and divided the empire. By a combination of astute intrigue and bold action, he got rid of his colleagues, and, in 29 B. C., was voted the "imperium" or emperorship, for ten years and later renewed. The title Augustus was conferred upon him in 27 B. C.

Augustus brought peace to the empire after 20 years of civil war. While observing republican forms and claiming to be merely the leading citizen, he reorganized the empire, largely rebuilt Rome, and encouraged art, literature, and education. His plans, however, for the conquest of Germany met with disaster. After his death temples and altars were erected to his memory. See *Rome: History*.

Aurelianus (*ô-rē-lĭ-ān'ŭs*), **Claudius** or **Lucius Domitius (212 A. D.-275 A. D.)**, emperor of Rome, was born in Pannonia, the son of a peasant. He entered the Roman army, in which his exploits attracted the notice of the emperors Valerian and Claudius. On the death of the latter in 270, Aurelianus was proclaimed emperor.

His short reign was a series of brilliant victories: the Goths and Vandals were subdued; the Alemanni, who threatened Rome itself, were exterminated; and Palmyra was sacked. Zenobia, the renowned queen of the East, and Tetricus, the deposed emperor of Gaul, Britain, and Spain, were led captive in the splendid triumph of the emperor. A formidable rebellion at home was crushed with terrible sternness. His severity made him feared even by his friends, who, as they deemed, in pure self-defense, conspired against him and put him to death.

Aurelius, Marcus. See *Marcus Aurelius*.

Ausonius (*ô-sō'nĭ-ŭs*), **Decimus Magnus (c. 310 A. D.-394)**, Latin poet, was born at Bordeaux, Gaul. He was appointed by Valentinian tutor to his son Gratian; he afterward held the offices of quæstor, prefect of Latinium, and consul of Gaul. On the death of Gratian, Ausonius retired to his estate at Bordeaux, where he wrote pie-

grams and descriptive poems, which give the only clear picture extant of Roman civilization in France. His works include *Idyll of the Moselle, In Relatives,* and *List of Great Cities.*

Austen, Jane (1775-1817), English novelist, was born at Steventon, Hampshire, England, of which parish her father was rector. Unmarried, she lived an uneventful life, mostly with her mother and sister. Her principal productions are *Pride and Prejudice, Sense and Sensibility,* and *Persuasion,* novels of trivial events of daily life without assistance of passion, crime, or religion yet portrayed with such fidelity, ironic humor, and dramatic progression as to render them classics. She died at Winchester.

Austin, Alfred (1835-1913), English poet laureate, novelist, and journalist, was born near Leeds; was educated at the University of London; and was admitted to the bar, 1857. His published works include *The Human Tragedy, Savonarola, The Tower of Babel, Prince Lucifer,* and the prose idyll *The Garden That I Love.* In 1896, he was made poet laureate of England, succeeding Tennyson. His writing evinces an intimate love of nature.

Avebury (*ā'bĕr-ĭ*), **John Lubbock, Baron (1834-1913),** English naturalist, banker, and politician, was born in London. He was educated at Eton College and entered his father's banking house. In 1870, he became a member of Parliament, where he served at intervals until elevated to the peerage in 1900. In Parliament he promoted measures regulating hours of work and establishing public libraries and parks. He was most widely noted for his achievements in anthropology and entomology. His *Prehistoric Times* was long a standard textbook on archeology and was translated into many languages. His most popular books are his *Ants, Bees and Wasps* and the charming volume entitled *British Wild Flowers Considered in Relation to Insects.* His writings include also *The Origin of Civilization* and the *Primitive Condition of Man, Fifty Years of Science, Pleasures of Life, The Scenery of England,* and *Marriage, Totemism, and Religion.*

Averroës (*ȧ-vĕr'ō-ēz*) **(1126-c. 1198),** otherwise known as Ibn Roshd, Arabian philosopher, was born at Cordoba, Spain. He was appointed successor to his father as chief mufti and afterward became chief judge in the province of Mauritania. Accused of a departure from the orthodox doctrines of Mohammedanism, he was dismissed from his office and was condemned by the ecclesiastical tribunal of Morocco to recant his heretical opinions and do penance. He later returned to Cordoba and was reinstated in his offices. An enthusiastic student of Aristotle, he transmitted the Aristotelian influence to Europe before Western scholars had access to it in Greek.

Avicenna (*ȧv'ē-sĕn'ȧ*), **(980-1037),** otherwise known as Ibn Sina, Arabian physician and philosopher, was born at Efsene, a village near Bokhara. He was physician to several of the Samanide and Dilemite sovereigns, and was also for some time vizier in Hamadan. His work on medicine, *Kanun fi'l tibb,* based on Greek texts, long held first place in Europe, and it is still highly regarded in the Orient. He died at Hamadan.

Avogadro (*ȧ'vō-gȧ'drō*), **Amadeo (1776-1856),** Italian chemist and physicist, was born at Turin, where for many years he was professor of higher physics in the university. In 1811, he formulated and published the law known by his name, according to which, under the same conditions of temperature and pressure, equal volumes of gases and vapors contain equal numbers of molecules. This is one of the fundamental principles of chemistry and furnishes the chief method of determining atomic weights. He died at Turin.

Ayeshah (*ī'ē-shȧ*; *ā'ē-shȧ*) **(610** or **611 A. D.-678),** the favorite wife of Mohammed, was born at Medina. She was only nine years of age when she married the prophet. Although she bore no children to Mohammed, she was so tenderly beloved by him that he was wont to say that she would be the first of his wives to whom the gates of paradise would be opened. It is stated by Mohammedan historians that to the charms of her beauty she added a knowledge of mathematics, rhetoric, and music. In his last illness, Mohammed, by his request, was carried to her house and expired in her arms. After the prophet's death, Ayeshah headed a force to resist the accession of Ali. She survived Mohammed for 46 years.

Babbitt, Isaac (1799-1862), American inventor, was born at Taunton, Mass. Following the trade of a goldsmith, he became interested in the manufacture of alloys. In 1824, he produced the first britannia ware made in the United States. In 1839, he made the discovery of the widely-known anti-friction alloy of copper, tin, and antimony, which bears his name, "Babbitt metal," For this valuable discovery, Congress voted him $20,000. See *Babbitt Metal.*

Babcock, Stephen Moulton (1843-1931), American chemist, was born at Bridgewater, N. Y. A graduate of Göttingen University, he was professor of agricultural chemistry at the University of Wisconsin from 1887 to 1913, serving also as chief chemist of the Wisconsin Agricultural Experimental Station. He developed a simple test for butterfat in milk, known as the Babcock test, which makes possible rapid grading for market and as a guide in breeding cattle for superior milk-giving strains. Skeptical of current theories of nutrition based on caloric content of food, he conducted feeding experiments which led to the discovery of vitamins. After his retirement in 1913, he conducted basic researches on the relation of matter to energy.

Baber (*bā'ber*) (Zehir-Eddin Mohammed) **(1483-1530),** the first of the great moguls in India, was a descendent of Timur and was barely twelve when he became ruler of the countries lying between Samarkand and the Indus. Having made himself master of Kashgar, Kunduz, Kandahar, and Kabul, he routed at Panipat, in 1526, the vast army of the Afghan emperor of Delhi and entered the capital. Agra shortly after surrendered.

Babson, Roger Ward (1875-), American statistician, was born at Gloucester, Mass., and was educated at the Massachusetts Institute of Technology. He founded the Babson Statistical organization, which, under his direction, won for itself a leading place among business forecasting agencies. During World War I, he was director general of information and education for the United States. Among his publications are *Business Barometers, Bonds and Stocks,* and books dealing with the future of the working class, investments, the churches, world peace, and other topics. He was candidate for the presidency of the United States in 1940 on the ticket of the Prohibition party.

Baccio della Porta. See *Bartolommeo, Fra.*

Bach (*bȧĸ*), **Johann Sebastian (1685-1750),** founder of modern music, was born at Eisenach in Saxe Weimar Eisenach, Germany. In the household of his father, the court and city musician, he early learned to love music; but, after his father's death, he received no sympathy from his guardian brother in his ardent devotion to it. This brother died soon, and Bach, destitute and without a protector, went to Luneburg in 1700, where he sang in the choir of Saint Michael's school. Here, also, he began the study of the organ under Boehm and laid the foundation for his career as the greatest master of composition for the organ and one of its greatest players. The seriousness with which he studied is attested by the fact that several times he walked 25 miles to hear Reinken, a noted organist.

When he was eighteen, he was engaged to play the violin in the orchestra of the Duke of Weimar. It was probably then that he became acquainted with the concertos of Vivaldi, to which he later attributed his ideas of the principles of music.

In 1704, he accepted the office of organist at Arnstadt. Three years later, he became organist at Muhlhausen, where he married Maria Barbara Bach, and, in 1708, he returned to Weimar, now as court organist. His new environment quickened his already active musical faculties, and some of his best organ compositions and cantatas were written at Weimar.

In the years 1717-23, he was chapelmaster for Prince Leopold, and here he composed numerous works for the clavichord and orchestra. In 1721, Bach, being now a widower, married Anna Magdalena Wulkens, who, by reason of rare musical gifts, proved to be an industrious helper for her husband. The next year he published *Forty-eight Preludes and Fugues.*

In 1723, Bach received his most important appointment, that of choirmaster of Saint Thomas's school in Leipzig. His playing became more famous, he had constant opportunity for the production of important works, he had many pupils in composition and instruction, and his income was soon increased by his additional appointment as composer to the Duke of Weissenfels. In 1736, he was made chapelmaster to the court of Dresden. This office gave Bach occasion to write masses and other religious pieces.

Bach was persuaded to visit Frederick the Great at Potsdam in 1747, and he extemporized a fugue which he afterward elaborated for the monarch. Bach finished his *Art of Fugue,* and then his eyesight failed.

Bach was the greatest master of counterpoint in the history of music. He disregarded the prevailing custom of writing in a few keys only, and tuned keyed instruments so as to render them nearly perfect for all keys. He was the first to use the thumb and fourth finger on the pianoforte keyboard. His melody is sometimes fantastic, but never commonplace; his harmony is very effective; his integrity and conscientiousness in composition are unsurpassed. Nowhere is the grandeur of religion more worthily felt than in his sacred compositions. All succeeding composers have acknowledged in him the creative mind that placed music on a deep, scientific basis. See *Music: German Classic Masters.*

Bach, Karl Philipp Emanuel (1714-1788), German composer, second son of Johann Sebastian Bach, was born at Weimar. He was probably the most highly gifted of the eleven brothers, and his influence on the development of certain musical forms gives him a prominent place in the history of the art. He studied in the Thomas School, and afterward in the University of Leipzig. In 1738, he went to Berlin, and soon afterward was appointed chamber-musician to Frederick the Great. In 1767, Bach became chapelmaster at Hamburg, where he passed the remainder of his life. His most ambitious composition is the oratorio *Israel in the Wilderness.* His *True Method of Harpsichord Playing* was long a standard work.

Bache (*bāch*), **Franklin (1792-1864),** American physician and chemist, was born at Philadelphia. He published a *System of Chemistry* in 1819; became professor of chemistry in the Philadelphia College of Pharmacy, 1831, and was appointed to a similar chair in Jefferson Medical College, Philadelphia, in 1841. In 1833, in conjunction with Dr. G. B. Wood, he published the first edition of the *Dispensary of the United States of America,* which became the standard authority on drugs with physicians and pharmacists.

Bacheller, Irving (Addison) (1859-1950), American novelist, was born at Pierrepont, N. Y. He was graduated from Saint Lawrence University, 1882, and entered journalism. For many years, he was actively connected with the press of New York and, 1898-1900, was one of the editors of the New York *World.* His writings, which excel in the depiction of rural and small-town characters, include *The Master of Silence, Eben Holden, D'ri and I, Darrel of the Blessed Isles, The Master, Keeping up With Lizzie, "Charge It," Marryers, In the Days of Poor Richard, A Man for the Ages, Dawn—A Lost Romance of the Time of Christ, The Master of Chaos, From Stores of Memory, The Winds of God,* and poems *In Various Moods.*

Bacon, Francis (1561-1626), English philosopher, jurist, and statesman, was born of distinguished parentage at London. At the age of 12, he was sent to Trinity College, Cambridge. Three years later, he left, strongly convinced of the futility of the Aristotelian philosophy, which was then taught in the schools. In revolt against it, his later intellectual efforts were bent on working out and declaring a philosophy which might confer greater benefits on mankind.

In 1576, his father sent him to France in the suite of the British ambassador, Paulet. Three years later, his father died, and Bacon diligently devoted himself to the study of law. In 1582, he was admitted to the bar and, in 1588, received from Queen Elizabeth the title of "counsel learned in the law extraordinary." In 1596, Bacon wrote his *Maxims of the Law.* The following year, he published the *Essays,* the work by which he is best known to the reading public.

Bacon's political advancement was due in a considerable degree to the favor of James I, by whom he was knighted on July 23, 1603. In 1605, Bacon published the first part of *Advancement of Learning,* which, expanded into *Advancement of Science,* may be said to have introduced a new era in English science. In 1606, he married Alice Barnham, and, the next year, he was appointed solicitor-general of the kingdom. In 1609, he published *Wisdom of the Ancients.*

In 1611, Bacon was appointed joint judge of the knights marshals' court; in 1613, attorney general; in 1617, lord keeper of the great seal; and, in 1618, he was made lord high chancellor and created Baron Verulam. The next year, Bacon received the title of Viscount Saint Albans and opened that fatal Parliament which brought charges of bribery against him, deprived him of his speakership and his seat in Parliament, imposed a heavy fine, and sentenced him to the Tower in disgrace. When he was pardoned, he retired to Gorhambury, where he devoted the remainder of his life to scientific experimentation and the cultivation of philosophy.

The *Novum Organum,* or "New Instrument of Logic," of 1620, has done more perhaps than any other single book toward inculcating into science the spirit of unbiased, careful observation and experimentation. Bacon insisted that all prepossessions were to be abandoned and that nature was to be interrogated by the devising of experiments with a view to discovering the laws of her action. He wrote a utopia of science, *The New Atlantis.* His enthusiasm for science was due to a belief that knowledge is power. He made no scientific discoveries himself, however.

A persistent attempt has been made to prove that Bacon was the author of Shakespeare's plays, the principal supporters of the view being Delia Bacon, Nathaniel Holmes, and Ignatius Donnelly. The theory has not been accepted, however, by any of the great Shakespearean scholars. Bacon died as the result of a cold caught during an experiment on the refrigeration of fresh meat. See *English Literature: The Elizabethans.*

Bacon, Henry (1866-1924), American architect, was born at Watseka, Ill. He was graduated from the University of Illinois in 1888. In the same year, he entered the offices of McKim, Mead, and White, New York City. Winning the Rotch traveling scholarship, he spent two years, 1889-91, of study in Europe. Returning to America, he continued with McKim, Mead, and White until 1897, when he became a member of the firm of Brite and Bacon. In 1903, he began practice alone. The most notable of many important buildings designed by Bacon is the beautiful Lincoln Memorial in Washington. In recognition of his attainments in architecture, he was elected member of the American Academy of Arts and Letters.

Bacon, Nathaniel (c.1642-1676), American colonist and insurrectionary leader, was born in England. As a member of Governor Berkeley's council in Virginia, he became the leader of an alleged insurrection against the colonial government under pretense of resisting aggressions of the Indians. Berkeley was forced to make many concessions to demands for better government; but he broke his promises. A brief civil war followed, in which Jamestown was burned, 1676, and the governor took shelter in an English vessel. Before completing plans for re-establishing the government, Bacon died, and the rebellion soon came to an end.

Bacon, Roger (c. 1214-1294), English scientist and publicist. The most learned man of his day and a celebrated teacher at Oxford University, he is reputed to have advocated the change since made in the calendar, to have invented gunpowder, and to have manufactured magnifying glasses. His great work, *Opus Majus,* anticipates the methods of modern science, emphasizing mathematics and observation.

Baden-Powell (*bā'dĕn-pō'ĕl*), **Robert Stephenson Smyth Baden-Powell, Baron (1857-1941),** British general, was educated at Charterhouse, London. In 1876, he joined the British army and saw service in India, Afghanistan, and South Africa. In the Boer War, with a force of 1200 men he was besieged in Mafeking, which he held against the Boers from the outbreak of the war, October 12, 1899, until May 17, 1900. In recognition of this successful defense, he was made major general.

In order to promote good citizenship in the rising generation, he founded, in 1908, the organization of Boy Scouts and, in 1910, the Girl Guides, the latter with the co-operation of his sister Agnes Baden-Powell. In 1929, he was created Baron Baden-Powell. His writings include *Scouting for Boys, My Adventures as a Spy, Indian Memories, The Wolf Cub's Handbook, Girl Guiding, Rovering to Success,* and *Birds and Beasts in Africa.* See *Boy Scouts; Girl Scouts.*

Badoglio (*bä-dō'lyō*), **Pietro (1871-1956),** Italian general, was born in Piedmont. He served with distinction in the Abyssinian and Libyan wars and in World War I. After World War I he was made chief of the general staff. Though never in full sympathy with Fascism, he retained his position under Mussolini and was sent on foreign missions. Again made chief of staff, he carried through successfully the conquest of Ethiopia, was made Duke of Addis Ababa, and governed Ethiopia for a year. He opposed Italy's entrance into World War II. After the first disasters of the Greek campaign, he retired as chief of staff. Upon Mussolini's fall the king called him to form a ministry, which made peace with the Allies and declared war upon Germany. He resigned in June 1944.

Baedeker, Karl (1801-1859), German publisher, was born at Essen. Going into the printing business at Coblenz, he began to issue a series of guide books, the first appearing in 1839, the *Rheinreise.* In the course of years they developed so as to cover most of the civilized world. Baedeker's son Fritz (1844-1925) succeeded to the business and transferred it to Leipzig in 1872. He improved the series by full description of entertainment facilities, traveling incognito to observe them personally. The care taken in their preparation, has made the name Baedeker synonymous with the most authoritative travel guides.

Baekeland (*bā'kĕ-länd*), **Leo Hendrik (1863-1944),** chemist and inventor, was born at Ghent, Belgium. He was educated at the university of his native city and studied in England, Scotland, Germany, and the United States. Later he specialized in the study of electrochemistry in the Polytechnical School at Charlottenburg, Germany. He taught chemistry and physics in the University of Ghent and in the Normal School of Science at Bruges until 1889, when he migrated to the United States. In 1893, he established the Nepera Chemical Company for the manufacture of velox and other photographic papers of his invention. Selling this to the Eastman Kodak Company in 1899, he devoted himself chiefly to chemical research and to developing chemical industries. See *Bakelite.*

Baer (*bär*), **Karl Ernst von (1792-1876),** Russian naturalist, one of the founders of modern embryology, was born in Estonia. He was educated in Germany and became a professor in the University at Konigsberg. In 1828, he published *History of the Development of Animals,* a work

which announces his discovery of the ovum in animals and the process of fertilization. His discovery of the similarity in the earliest stages of development of all forms of animal life was one of the clues leading to the theory of evolution. He died at Dorpat. See *History of Biology.*

Baeyer (*bā'yĕr*), **Johann Friedrich Wilhelm Adolf von** (**1835-1917**), German chemist was born at Berlin. In 1872 he became professor of chemistry at the University of Strasbourg, and, in 1875, he was appointed Liebig's successor at Munich. He discovered the molecular structure of indigo and produced it synthetically. Dye substances which he produced for the first time include cerulein, eosin, and indol. In 1905 he was awarded the Nobel price for chemistry.

Baffin, William (**1584-1622**), English navigator, was born probably at London. He accompanied James Hall in his search for a passage to Asia north of North America in 1612. Three years later, he explored the inlet now named after him, Baffin bay. Baffin was killed when fighting with the Persians against the Portuguese on the island of Ormuz, Iran.

Bagehot (*bāj'ŭt; bāg'ŭt*), **Walter** (**1826-1877**), English economist and journalist, was born at Langport, Somerset. From a school at Bristol he passed, in 1842, to University College, London, where he took his master's degree in 1848. In 1852, he was admitted to the bar, but joined his father as a banker and shipowner at Langport. In 1858, he married a daughter of James Wilson, founder of the *Economist* newspaper, and, from 1860 until 1877, he was its editor. His influence at the time and later is based on his intimate knowledge of banking operations and government together with a detached point of view which permitted him to describe them understandably and relate them to the entire economic process. His works include *The English Constitution, Physics and Politics, Lombard Street, Literary Studies, Economic Studies,* and *Biographical Studies.*

Bailey, Liberty Hyde (**1858-1954**), American botanist and horticulturist, was born in South Haven, Mich. He was graduated at Michigan Agricultural College, 1882; was assistant to Asa Gray, Harvard, 1882-83; and was professor of horticulture at Michigan Agricultural College, 1883-88. From 1888 to 1903, he was professor of horticulture, and from 1903 to 1913, was dean of the College of Agriculture, Cornell University. In addition to extensive researches in botany and horticulture, he has devoted special attention to rural problems and to rural education.

His writings include *Evolution of our Native Fruits, Lessons with Plants, Principles of Fruit Growing, Plant-Breeding, Principles of Agriculture, Outlook to Nature, The State and the Farmer, The Country-Life Movement, Wind and Weather,* and *The Holy Earth.* He was editor of *Cyclopedia of American Horticulture, Rural Science Series, Garden-Craft Series, Cyclopedia of Agriculture,* and the *Standard Cyclopedia of Horticulture.*

Baillie (*bā'lĭ*), **Joanna** (**1762-1851**), Scotch poet and dramatist, was born in Bathwell manse. In 1784, she went to reside in London and, in 1806, took up her residence at Hampstead, where she remained until her death. At an early age, she began to write poetry, her *Fugitive Verses* appearing anonymously in 1790. Her greatest achievement is the nine *Plays on the Passions,* each of which depicts the effect of one passion on the characters. They are full of impressive poetry and are often characterized by intense dramatic power. The most popular as well as the most powerful of these, the tragedy *De Monfort,* was brought out at Drury Lane, London, in 1800, with Kemble and Mrs. Siddons taking the leading parts. Her *Family Legend* was produced at Edinburgh in 1810 under Sir Walter Scott's auspices.

Bainbridge, William (**1774-1833**), American naval officer, was born at Princeton, N. J. In the War of 1812, he was given command of a squadron, consisting of the *Constitution, Essex,* and *Hornet,* which sailed from Boston in that year. When cruising off the coast of Brazil toward the close of 1812, he captured the British frigate, *Java,* for which act Congress voted him a gold medal together with a share in the prize money. He died at Philadelphia.

Baird, Spencer Fullerton (**1823-1887**), American naturalist, was born at Reading, Pa. He was educated at Dickinson College, Carlisle, Pa., and was afterward professor of natural science in that institution. He became secretary of the Smithsonian Institution at Washington, and later was commissioner of fisheries, the commission having been established at his instance. Under his direction the national museum was begun in 1850. He wrote many papers on birds, reptiles, and fishes, and, in connection with other editors, he published *The Birds of North America, The Mammals of North America,* and *History of the Birds of North America.*

Bairnsfather, Bruce (**1887- **), British artist and cartoonist, was born in India. While serving as a member of a Warwickshire regiment in World War I, he gathered impressions for a series of black-and-white sketches of British soldiers in the midst of difficulties, particularly those connected with trench life. These were treated humorously in his characterization of "Old Bill" and his companions. A successful play, *The Better 'Ole,* was based on Bairnsfather's cartoons. His interpretations of soldier problems both in war and in post-war adjustment are given in several collections of his drawings, most popular of which are *Fragments from France, Bullets and Billets, From Mud to Mufti, Back to Blighty,* and *Old Bill, M. P. 1.*

Bajazet I (*bāj'ā-zĕt'*) (**1347-1403**), sultan of the Turks. In 1389, he succeeded his father, Murad I, who fell in battle near Kossovo, fighting against the Serbians. In three years he conquered Bulgaria, a part of Serbia, Macedonia, and Thessaly; he also subdued most of the states of Asia Minor. From the rapidity with which these extraordinary conquests were effected he received the name of Ilderim, "Lightning." He even blockaded Istanbul for ten years, thinking to subdue it by famine. In 1396, Bajazet defeated Sigismund of Hungary at Nicopolis. Overthrown by Timur at Angora in 1402, Bajazet died in the camp of his conqueror.

Baker, George Fisher (**1840-1931**), American financier, was born at Troy, N. Y. Graduating from Seward University, Florida, N. Y., in 1856, he worked as clerk in the state banking department. In 1863, he was an organizer of the First National Bank of New York. It expanded rapidly after be became active head in 1865 and president in 1877, attaining to the first rank among the world's financial institutions. He also organized the Southern railroad. Among his numerous benefactions was a gift of 6 million dollars to found the Harvard School of Business Administration.

Baker, George Pierce (**1866-1935**), American educator, was born at Providence, R. I. He was educated at Harvard University, where he began to teach English in 1888, becoming professor in 1905. His course in the drama, known as "English 47," attained a celebrity that passed far beyond the college walls. It was the inspiration of a large number of American dramatists who later won distinction in the theater. In 1925, he became head of a newly organized department of dramatic arts at Yale University. He was elected to the American Academy of Arts and Letters the same year.

Baker, Newton Diehl (**1871-1937**), American cabinet officer, was born at Martinsburg, W. Va. He was graduated at Johns Hopkins University in 1892 and at the law school of Washington and Lee University, 1894. After serving as private secretary to Postmaster-general Wilson, 1896-97, he began legal practice at Martinsburg. Later, he removed to Cleveland, where he was city solicitor from 1902 until 1912. He served as mayor of Cleveland, 1912-16, and his ability won appointment by President Wilson to the secretaryship of war in 1916. He showed extraordinary energy in successfully co-ordinating the military efforts of the United States during World War I. President Coolidge appointed him in 1928 to the International Court of Arbitration at the Hague, and President Hoover chose him to serve on the Wickersham commission on law enforcement in 1929.

Baker, Ray Stannard ("David Grayson") (**1870-1946**), American journalist and author, was born at Lansing, Mich. He was graduated at Michigan Agricultural College in 1889 and studied law and literature at the University of Michigan. He was a reporter on the Chicago *Record,* 1892-97; was associate editor, *McClure's Magazine,* 1899-1905; and was an editor of *The American Magazine,* 1906-15. Baker's writings include *Boys' Book of Inventions, Following the Color Line, A History of the Peace Conference,* and *The Life and Letters of Woodrow Wilson.* As "David Grayson," he wrote a series of works including *Adventures in Friendship, Adventures in Solitude, The Countryman's Year,* and *Under My Elm.*

Baker, Sara Josephine (**1873- **), American hygienist, was born at Poughkeepsie, N. Y. After being graduated from the Women's Medical College, New York Infirmary, she became assistant to the commissioner of health, New York City, and, from 1908 to 1923, directed the city's bureau of child hygiene. She organized in New York the first bureau of child hygiene under government control, the influence of which was seen in establishing a lower baby death rate there than was found in any other large city of America or Europe. She wrote, among other works, *Healthy Mothers, Healthy Babies,* and *Fighting for Life.*

Bakst (*bākst*), **Leon** (**1866-1924**), Russian decorative artist, was born in Leningrad. He was a court painter prior to 1900, but thereafter devoted his art chiefly to the designing of theatrical effects, in which his influence throughout the world was revolutionary. He designed scenery for Diaghilev's ballet, Sophoclean tragedies, *Cleopatra, Sheherazade,* and numerous other spectacular dramas. His designs

for scenery and costume aimed at unity of effect, in which color played a characteristically significant role.

Bakunin (*bä-kōō'nyĕn*), **Mikhail (1814-1876),** Russian anarchist and founder of nihilism, was born at Torzhok. A wealthy officer of the imperial guard, he resigned in 1841 to travel in Germany, France, and Switzerland, where he collaborated with radical groups interested in overthrowing the Russian and other oppressive governments. Disobeying a recall to Russia, he was deprived of his estates there. After the failure of the revolutionary movement in Germany in 1849, Bakunin was handed over to the Russian government by Austrian officials and was banished to Siberia. He escaped through Japan and the United States to England, where he became acquainted with Karl Marx. In his rejection of governments, he rejected also political action for overthrowing and superseding them, holding that an uncoerced communism would arise if governments were destroyed. His methods comprised the formation of a secret group acting through other organizations. He was expelled from the Socialist Internationale in 1872. His methods, however, were adopted by many later revolutionary groups.

Balakirev (*bä'lä-kē'rĕf*), **Mili Alexeyevich (1837-1910),** Russian composer, was born at Gorki. In 1855, he was graduated at the University of Kazan. He then went to Leningrad where, encouraged by Glinka, he made a brilliant debut as a pianist. During the revival of patriotic enthusiasm following the Crimean War, he enlisted Cui, Mussorgsky, Rimski-Korsakov, and Borodin in an effort to create a modern Russian school of music based on "truth and nationalism." His own compositions include the symphonic poems *Tamara* and *Russia* and music to *King Lear.*

Balanchine (*bäl'ăn-chēn*), **George (1904-),** dance director, was born in Leningrad, Russia, where he was a ballet dancer, 1921-24. He was with the Serge Diaghilev company in Paris, 1924-28, and in 1929 was made ballet master of the Royal Opera, Copenhagen, Denmark. He assisted in organizing the Ballet Russe de Monte Carlo in 1932, and the following year came to the United States, where he has since remained. In 1934 he founded the American School of Ballet, and from 1934 to 1937 directed the Metropolitan Opera ballet. He has been director of the New York City ballet since 1948. Balanchine has also done the choreography for a number of motion pictures and plays. He is the author of *Balanchine's Complete Stories of the Great Ballets* (1954).

Balboa, Vasco Nuñez de (c. 1475-1517), Spanish conquistador, was born at Jeres de los Caballeros. In 1501, he took part in the expedition of Rodrigo de Bastidas to the New World. He established himself in Santo Domingo, and began to cultivate the soil. Fortune proving adverse, he joined an expedition to Darien in 1510.

An insurrection obtained for Balboa the supreme command in the new colony, but, owing to intrigues at the Spanish court, he was succeeded by Pedrarias Dávila. In a subordinate position, Balboa made several successful expeditions. Accounts of a great western ocean reaching him, he set out in 1513 in quest of it. On September 25 of that year, from a mountain top in the Isthmus of Panama, he obtained the first sight of the Pacific Ocean. He took possession of it in the name of his sovereign. He was executed on the charge of a contemplated revolt.

Baldwin, James Mark (1861-1934), American psychologist, was born at Columbia, S. C., and was graduated at Princeton University, 1884. After a period of study in the universities of Oxford, Leipzig, Tübingen, and Berlin, he held professorships in several American universities.

He was professor of philosophy at Toronto University, 1889-93, where he founded the first psychological laboratory in the British Empire. He founded a second at Princeton University where he was professor of psychology from 1893 to 1903. He then taught at Johns Hopkins University and, 1909-13, in the National University of Mexico. In 1915-16, he was Herbert Spencer lecturer at Oxford University, and, in 1919, was made professor in the School of Advanced Social Study at Paris. He was the chief exponent of the school of experimental psychology in America. His extensive writings include *Mental Development in the Child and the Race, Thought and Things, Darwin and the Humanities, The Super-State,* and *Between Two Wars—Memories and Opinions.*

Baldwin of Bewdley, Stanley Baldwin, Earl (1867-1947), British statesman and prime minister, was born in Worcestershire, England, and was educated at Cambridge University. On his mother's side, he was a cousin of Rudyard Kipling and a nephew of Edward Burne-Jones. Until 40 years of age, he was engaged in the iron manufacturing business. He became member of Parliament in 1908 as a Conservative, and was financial secretary of the treasury from 1917 to 1921. During World War I, he made a voluntary contribution of 25 per cent of his private fortune to the national treasury. He was chosen president of the British board of trade in 1921; sat as member of the British commission which, early in 1923, arranged for the funding of the British war debt to the United States; and, in May 1923, assumed the leadership of the British government. Following the defeat of the Conservatives in the elections held late in 1923, Baldwin resigned the premiership early in 1924 only to be returned to power in November of the same year. Among the achievements of his second administration are to be numbered a leading part in the negotiation of the Locarno treaties and the successful weathering of a general strike in 1926. His government was defeated by the Labor Party in 1929, but he joined the cabinet of Ramsay MacDonald in the national government of 1931. He was again prime minister from 1935 to 1937. On his retirement he was created Earl Baldwin of Bewdley.

Balfe (*bälf*), **Michael William (1808-1870),** operatic composer and singer, was born at Dublin, Ireland. At 16, he was engaged in the Drury Lane orchestra in London. While there, he attracted the attention of an Italian nobleman, Count Mazzara, who took him to Italy to study music. After singing at Paris in the Italian Opera under Rossini, Balfe returned to Italy and produced, in 1830, several operas. In 1835, he went to England as a vocalist and composer of opera. His most popular work, *The Bohemian Girl,* appeared at Drury Lane in 1844 and was followed by several other operas.

Balfour (*bäl'fo͝or*), **Arthur James Balfour, Earl (1848-1930),** British statesman and author, was born in Scotland. He was educated at Eton and at Trinity College, Cambridge. During 1878-80, he was private secretary to Lord Salisbury, attending him at the Congress of Berlin, 1878. He was secretary for Scotland, with a seat in the cabinet, 1886-87; was chief secretary for Ireland, 1887-91; was first lord of the treasury and leader of the house, 1891, and again in 1895-1906.

On the retirement of Lord Salisbury, in 1902, Balfour became prime minister, serving until the end of 1905. In May 1915, he became first lord of the admiralty in Asquith's coalition cabinet, and in December 1916, was made secretary of state for foreign affairs in Lloyd George's war cabinet, serving until 1919. In this capacity he issued the "Balfour Declaration," which led to the establishment of a "Jewish state" in Palestine. In 1917, he headed the British mission to America and, in 1921-22, was the leading member of the British delegation to the Washington Conference. His writings include *A Defense of Philosophic Doubt, The Foundations of Belief, Economic Notes on Insular Free Trade, Speeches of Fiscal Reform, Criticism and Beauty, Theism and Humanism.*

Ballou (*bă-lo͞o'*), **Hosea (1771-1852),** American preacher and one of the founders of Universalism, was born in New Hampshire. He was self-educated; was expelled from his father's church on declaring his belief in the final salvation of all men; began to preach at 21, and became minister of the Second Universalist church in Boston, in which he preached 35 years. He started the *Universalist Magazine* in 1819, and, in 1831, began the *Universalist Expositor.* It is said that he preached over 10,000 sermons, none of which was written before delivery.

Baltimore, George Calvert, first Lord (c. 1580-1632), was born at Kipling, in Yorkshire. He entered Parliament in 1609, was knighted in 1617, and, in 1619, became secretary of state. In 1625, he declared himself a Catholic and, resigning office, was created Baron Baltimore in the Irish peerage and retired to his Irish estates. As early as 1621 he had dispatched colonists to a small settlement in Newfoundland, and, in 1627, he visited the place. The next spring, he returned with his family, and remained until the autumn of 1629. The severe winter induced him to sail southward in search of a more genial country, but his attempts to settle in Virginia led to disputes, and he returned home to obtain a fresh charter. He died in 1632. His son and heir, Cecelius Calvert (1605-75), governed under the new charter, which covered parts of the present Maryland and Virginia, exercising his authority from England through deputies. The third Lord Baltimore, Charles Calvert (1637-1715), governed in person, but his charter was overthrown by a Protestant revolt in 1689. See *American History: The Founding of Maryland.*

Balzac (F. *bäl'zäk'*; E. *bäl'zăk*), **Honoré de (1799-1850),** French novelist and founder of the realistic school of fiction, was born at Tours, France. When twelve years old, he was sent to the College of Vendôme, near Blois. Here he devoted himself so intensely to mystic books and reveries that he injured his health. He next studied law at the Sorbonne, Paris. Being employed as clerk to a notary, he gathered a knowledge of chicanery which was later turned to account in his romances. His occupation, however, proved intolerable, and he was left by his family to work, starve, and struggle for the next ten years on a scanty pittance. He read omnivorously and tried to make money by scribbling unpromising novels under assumed names.

In 1826, he formed a partnership with the printer Barbier and published various works. This business turned out ill, however, and he was laden with a debt which harassed him until the end of his career. His first successful novel was *The Chouans*, which appeared in 1829. His next works, *The Physiology of Marriage* and *The Wild Ass's Skin*, produced in 1830, also proved popular.

Between the years 1831 and 1850, Balzac produced those stories which composed his great *Human Comedy*. Of these, the most widely read was *Father Goriot*. The others include *Eugenie Grandet* and *Lost Illusions*. He was phenomenally industrious and productive, writing 85 novels in 20 years. In them he aimed to represent all ranks, professions, arts, and trades, and all phases of manners in town and country. He exhibited an extraordinary range of knowledge, observation, and sympathy, a steadfast determination for thoroughness, and a keen analysis of character and conduct. His faults include moralizing and an overinsistence on detail. It is impossible to judge justly any one of these tales separately, because each is only a fragment in the development of the *Human Comedy*.

In 1849, Balzac traveled to Poland and visited the rich Countess Hanska, to whom he had dedicated his novel *Seraphita* and whom he had loved for 15 years. In 1850, they were married, and his long-standing debts were paid.

The most striking feature of Balzac's genius is the immensity of his imaginative achievements. He wrote in all, 97 books. His name is one of the greatest in the literature of France since the era of the Revolution. He died three months after his marriage. See *Comedie Humaine*.

Bancroft, George (1800-1891), American historian, was born at Worcester, Mass. He was graduated at Harvard College in 1817 and, in 1818, went to Göttingen, where he studied history and philology. At Berlin, he attended the lectures of Hegel and had frequent intercourse with Schleiermacher, Humboldt, Savigny, and other literary men of note. Subsequently, he traveled in Germany, France, Italy, and England. Returning to the United States, he spent some time in teaching and then devoted himself to politics. He rose to prominence as a Democratic politician, and was made collector of customs at Boston. He still continued his literary labors, especially in lectures upon German literature and philosophy.

When Polk was elected president, in 1845, he appointed Bancroft secretary of the navy. While in this office, he established an observatory at Washington and a naval school at Annapolis. In 1846, he was sent by Polk as ambassador to England, where he remained until 1849, collecting additional materials for his monumental *History of the United States*, a work of solid excellence, the last volume of which appeared in 1874. From 1867 to 1874, Bancroft was minister to Germany. He was elected to the American Hall of Fame, 1910.

Bancroft, Hubert Howe (1832-1918), American historian, was born at Granville, Ohio. He worked in a bookstore in Buffalo, N. Y., in 1848, and, from 1852 to 1868, was a book dealer and publisher in San Francisco. In connection with his book trade, he made large collections of historical material and finally retired from business in order to devote himself to the production of historical works. With the aid of collaborators, he published *Native Races of the Pacific States* and a monumental *History of the Pacific States of North America*, in 21 volumes, and other historical works. In 1905, his vast historical library, consisting of 60,000 volumes, was acquired by the University of California.

Bandinelli (*bän'dê-nĕl'lē*), **Baccio (1488-1560),** Italian sculptor, the son of a famous goldsmith, was born at Florence. He was a jealous rival of Michelangelo, who is said to have repaid his enmity with contempt. His talent, however, secured him many patrons, and Pope Clement VII bestowed on him an estate. Among his works are his colossal "Hercules and Cacus," his "Adam and Eve," his copy of the "Laocoön," and the exquisite *bassirilievi* in the Cathedral of Florence.

Bankhead, Tallulah Brockman (1902-), American actress, daughter of William B. Bankhead, was born at Huntsville, Ala. She was educated in convents. Making her first appearance on the stage in 1918, she played in New York until 1923 and then went to London, where for nearly ten years she attracted an appreciative public in numerous plays including *The Green Hat* and *Blackmail*. She returned to America to take leading parts in motion picture plays, including *Tarnished Lady*, *My Sin*, and *Antony and Cleopatra*. Once more turning to the legitimate stage, she starred in *Forsaking All Others*, *Reflected Glory*, and *The Little Foxes*.

Banks, Sir Joseph (1743-1820), English naturalist, was born in London. He was educated at Oxford University, where the first lectures on natural history were later established through his efforts. In 1766, he made a voyage to Newfoundland and Labrador, collecting plants; from 1768 to 1771, he sailed with Cook around the world in the capacity of naturalist. The marsupial animals of Australia were made known to science by this expedition. In 1772, he explored Iceland and discovered the great geysers. For 42 years, he served as president of the Royal Society. His valuable library and collections are preserved in the British Museum.

Banting, Sir Frederick Grant (1891-1941), Canadian scientist, was born near Alliston, Ont. He was educated in the University of Toronto and served as a captain in the medical department of the Canadian army in World War I. He was wounded at Cambrai and was awarded the military cross for bravery.

Banting later began practice at London, Ont., and, in 1920, became a demonstrator in Western University. Shortly afterward he went to the University of Toronto and, with the help of facilities there made available, carried out investigations that led to the discovery of the insulin method for the treatment of diabetes. This drug was first obtained from the pancreas of cattle and hogs and, more recently, has been prepared from certain fish and clams. In 1923, Banting was awarded, jointly with J. J. R. MacLeod, the Nobel prize for medicine, his share of which he divided with a collaborator, C. H. Best. The Canadian government conferred on Banting an annuity of $7500 in consideration of his contribution to medicine, and the Ontario government provided $10,000 a year for a chair in medicine at the University of Toronto, Banting being appointed the first occupant. He invented a device to free mine air of silica dust, cause of the fatal disease silicosis. He was knighted in 1934. He was killed in an airplane crash while flying to England on a wartime mission.

Bantock, Granville (1868-1946), English composer and conductor, was born in London. He was educated for the East India service but his interest in music led him to enter the Royal Academy of Music in 1889, where he won the Macfarren prize during his first year. After editing *The New Quarterly Musical Review*, 1893-1896, he began his career as conductor of opera, attracting attention by producing only English compositions of the most recent date. In 1908, he was made professor of music in Birmingham University. He became one of the most vigorous champions of modern English music and a prolific and able composer. His works include operas, symphonic poems, overtures, an oratorio, a choral symphony, and various other vocal and orchestral compositions. He was knighted in 1930.

Barbarossa (*bär'bä-rŏs'ä*). See *Frederick I.*

Barber, Samuel (1910-), American composer, born at West Chester, Pennsylvania. He was graduated from the Curtis Institute of Music, Philadelphia, in 1932, and since then his music has been played by all the major orchestras in the United States. His *Symphony in One Movement*, which he has described as "a synthetic treatment of the classical four-movement symphony," was the first American work to be played at the Salzburg Festival (1937). His *Adagio for Strings* and his *Essay for Orchestra* were the first American compositions to be included by Toscanini in his repertoire. He has been awarded the Grand Prix de Rome and the Pulitzer prize for his music.

Barbirolli, John (1899-), English orchestra conductor, was born in London. Having received his musical training at Trinity College and the Royal Academy, London, he appeared as a cellist after returning from service in World War I. In 1925, he organized an orchestra, the success of which led to his being chosen as conductor successively of the British National Opera Company in 1926 and of the International opera at Covent Garden theater in 1933. He officiated as conductor at the coronation of George VI in 1936. The same year he became conductor of the Philharmonic Symphony Orchestra in New York, conducting regular broadcasts. In 1943 he became conductor of the Halle Orchestra, England.

Barbour (*bär'bĕr*), **John (c. 1316-1395),** early Scottish poet and historian. He was archdeacon of Aberdeen from 1357, or earlier, until his death. His national epic, *The Brus*, was first printed at Edinburgh in 1571.

Barbusse (*bär'büs'*), **Henri (1873-1935),** French novelist was born at Asnières, a suburb of Paris. Prior to World War I, he wrote two novels, *Les suppliants* and *L'enfer*, which won considerable success. He attained international fame by *Le feu*, written in 1916 and translated into English as *Under Fire*, which contains perhaps the most unforgettable description of modern warfare in the world's literature. His subsequent books, including *Les enchainements*, *Elevation*, and *Zola*, evince a hatred of war and a favorable attitude toward Russian Communism.

Barclay de Tolly (*bär'klā'dĕtŏ'lē'*), **Michael, Prince (1761-1818),** Russian general, was born in Livonia. He fought with great bravery in the Turkish war of 1788-89, in the campaign against Sweden in 1790, and in the campaigns against Poland, 1792 and 1794. In 1806, at Pultusk, he

commanded Benningsen's advance guard. He lost an arm at the battle of Eylau. After the defeat of the Russians at Smolensk in 1812, he yielded the chief command to Kutuzov, led the right wing of the army at Borodino, did brilliant service at Bautzen, and afterward took part in the battles of Dresden, Culm, and Leipzig. Although severely disapproved by the Russians at the time, Barclay de Tolly's Fabian military policy of watchful waiting in the end accomplished the ruin of Napoleon.

Barham, Richard Harris (1788-1845), "Thomas Ingoldsby," English poet and humorist, was born at Canterbury. He was clergyman of the Church of England, and, in the latter part of his life, was rector of Saint Augustine's in the city of London. The *Ingoldsby Legends*, which constitute his chief claim to fame, were first contributed to *Bentley's Miscellany*. Some of Barham's previously uncollected writings were published under the title of the *Ingoldsby Lyrics*. He died in London.

Baring-Gould, Sabine (1834-1924), English divine, novelist, and miscellaneous writer, was born at Exeter. He was educated at Clare College, Cambridge, and, after graduation, spent some years in travel. In 1864, he was appointed curate of Horbury; in 1871, he became rector of East Mersea; and, in 1881, he succeeded to his father's estate, which had been in the family for nearly three centuries, and was made rector of Lew Trenchard. He was a versatile writer, with an attractive style, and published numerous books of fiction, history, travel, religion, folklore, and mythology. Among his best novels are *Mehalah*, *John Herring*, *Court Royal*, *Pennycomequicks*, *The Red Spider*, and *Broom Squire*. His interesting contributions to folklore and antiquities include *Book of Were-wolves*, *Curious Myths of the Middle Ages*, and *Curious Survivals*. He wrote also "Onward Christian Soldiers," "Now the Day is Over," and other well-known hymns.

Barker, Harley Granville. See *Granville-Barker, Harley*.

Barkley, Alben William (1877-1956), American politician, was born on a farm in Graves County, Ky. Educated at Marvin and Emory colleges and the law school of the University of Virginia, he practiced law and served as prosecuting attorney and later as judge in McCracken County, Ky. He was a Democratic member of the House of Representatives from 1913 to 1927 and then was elected to the Senate for four terms, 1927-51. After the death of Senator Joseph T. Robinson in 1937, Barkley was elected majority leader in the Senate. In 1948 he was the successful Democratic candidate for the office of vice president. In 1952 he was reelected to the Senate, and in 1955 again became Democratic majority leader.

Barlow, Joel (1754-1812), American poet and politician, was born in Connecticut. He served as a military chaplain during the war for independence. In 1787, he published a poem called *The Vision of Columbus*, which, in 1807, appeared anew in an enlarged form as *The Columbiad*. He spent some years in Europe in political, literary, and mercantile pursuits. For a short time he was American consul at Algiers. In 1811, he was appointed ambassador to France.

Barlow, Howard (1892-), American conductor, was born at Plain City, Ohio. He was educated at Reed College, Portland, Ore., and Columbia University. He made his debut as an orchestral conductor in 1919 at the MacDowell Festival at Peterboro, N. H. Although as guest conductor he has held the baton over the leading American orchestras, he is best known for his symphonic conducting over the national radio systems. He was with the Columbia Broadcasting Company from 1927 to 1943, and has since been active with the National Broadcasting Company. Well-known programs he has conducted include the Philco Hour, and the Voice of Firestone on TV as well as radio.

Barnard (*bär'närd*), **Edward Emerson (1857-1923),** American astronomer, was born at Nashville, Tenn. He was graduated at Vanderbilt University, 1887. From 1887 to 1895, he was astronomer at Lick Observatory, California. In 1895, he became professor of practical astronomy, and astronomer of the Yerkes Observatory, University of Chicago. His discoveries include the fifth satellite of Jupiter and 16 comets. He also did important work in celestial photography, making photographs of the milky way, comets, and nebulæ.

Barnard, Frederick Augustus Porter (1809-1889), American mathematician, physicist, and educator, was born at Sheffield, Mass. He was graduated at Yale in 1828; was professor in the University of Alabama, 1837-54; and was successively professor, president, and chancellor, 1854-61, University of Mississippi. In 1864, he was elected president of Columbia College, New York, and served until 1888. Barnard College, affiliated with Columbia university, is named after him because of his notable interest in higher education for women. His published writings are mostly scientific and educational.

Barnard, George Grey (1863-1938), American sculptor, was born at Bellefonte, Pa. He was educated at the Art Institute, Chicago, and at Paris. His style is distinctly idealistic and is characterized by marked originality and admirable technique, particularly in marble. Among his more noted works are "Two Natures," in the Metropolitan Museum, New York; "The Great God Pan," on Columbia University campus, New York; "Adam and Eve," and "Rising Woman," property of John D. Rockefeller, Pocantico Hills, N. Y.; "Prodigal Son and Father," in the Carnegie Museum, Pittsburgh; the bronze statue of Lincoln, in Lytle Park, Cincinnati; and a group of 31 figures of heroic size in the capitol at Harrisburg, Pa. Elected to the American Academy of Arts and Letters in 1930.

Barnard, Henry (1811-1900), American educational reformer, was born in Hartford, Conn. He was graduated at Yale in 1830 and was admitted to the bar in 1835. As a member of the state legislature, 1837-40, he was an energetic advocate of prison reform. As school commissioner of Rhode Island, 1843-47, he recognized the educational system of the state. He was state superintendent of schools for Connecticut, 1850-54, and principal of the State Normal School at New Britain during the same period.

In 1857, Barnard was made president of the University of Wisconsin and, in 1865, president of Saint John's College at Annapolis. During 1867-70, he was United States commissioner of education, the first to occupy that position. In 1855 he founded the *American Journal of Education*, of which he was editor until 1886. His *American Library of Schools and Education* fills 52 volumes. He ranks as one of the foremost educational pioneers of America.

Barnes, Henry A. (1906-), American traffic engineer, was born in Newark, N. J. One of the pioneers in the new field of traffic control, he has made important contributions to pedestrian safety, relief of congestion, increase of traffic flow and reduction of accidents involving motor vehicles. Plans and experiments worked out by him as director of traffic engineering at Flint, Michigan, Denver and, more recently, at Baltimore, have attracted widespread notice. Although he advocates full use of mechanical aids such as paint ("great quantities"), signs, lights, and safety islands, of regulations governing parking and one-way streets, and of complete patrol systems, he places great emphasis on thorough and continuing education of motorists and pedestrians. Hence his traffic programs call for a strong public relations department.

Barnes, Mary Sheldon (1850-1898), American educator, daughter of E. A. Sheldon, was born at Oswego, N. Y. She was educated at the Oswego Normal School and the University of Michigan, graduating in the first class which admitted women. After further study at Newnham College, Cambridge, England, and at the University of Zurich, she was professor of history at Wellesley College, 1876-80, at Oswego Normal School, 1882-84, and at Stanford University, 1891-96. Following her marriage to Earl Barnes in 1884, she spent seven years in study and travel.

Mrs. Barnes was the first instructor in America to apply the Pestalozzian method to the teaching of history. Her adaptations are embodied in her books entitled *Studies in General History*, *American History*, and *Studies in the Historical Method*. She was also the pioneer American teacher to develop the source method of instruction in history.

Barneveldt (*bär'nē-vělt*), **John van Olden (1547-1619),** Dutch statesman. He was pensionary of Rotterdam in 1576, at a time when the Spanish arms were victorious everywhere in the united provinces. In 1585, he was sent at the head of an embassy to offer the sovereignty of the Netherlands to Queen Elizabeth of England. On his return, he was appointed grand pensionary of The Netherlands. After a severe contest with the stadholder Maurice of Nassau and his party, he obtained from the Spaniards recognition of the independence of The Netherlands and, in 1609, concluded a truce for 12 years.

Barneveldt courageously opposed the ambition of Maurice, who aimed at the supreme power, and supported Arminius against the Calvinists, the sect to which Maurice belonged. Arrested in 1618, he was tried by a special commission and condemned to death. This sentence being confirmed by the synod of Dort, the venerable statesman was beheaded.

Barnum, Phineas Taylor (1810-1891), American showman, was born in Bethel, Conn. At the age of 13, he was employed in a country store, and, about five years afterward, went into the lottery business. When 19 years old, he married and removed to Danbury, Conn., where he edited the *Herald of Freedom*. In 1834, he removed to New York, where, hearing of Joyce Heth, nurse of General Washington, he bought her for $1000 and exhibited her, realizing considerable profit.

In 1841, Barnum bought the American Museum in New York, which he raised at once to prosperity by exhibiting

a Japanese mermaid (made of a fish and a monkey), a white negress, a wooly horse, and, finally, a noted dwarf, styled "General Tom Thumb," whom he exhibited later in Europe and elsewhere. He introduced Jenny Lind to the American public, and then became proprietor of "the greatest show on earth." He made and lost several fortunes, and his show was twice destroyed by fire. He published *The Humbugs of the World, Struggles and Triumphs,* and an *Autobiography.*

Baroja (*bä-rō'hä*), **Nessi Pío** (**1872-1956**), Spanish novelist, was born at San Sebastian. A depictor of the rebels and outcasts of society, he wrote, among other novels, *The Struggle for Existence, The Tree of Knowledge,* and *Youth and Egolatry.* His style is direct; the sardonic drama of his stories arising from the marshaling of badly stated facts. In *Memories of a Man of Action,* he wrote a series of books about the historical character Eugenio de Aviraneta.

Barr, Stringfellow (**1897-1956**), educator, was born at Suffolk, Virginia. He was educated at the University of Virginia, at Oxford, where he was a Rhodes scholar, and at the University of Paris. After serving as teacher of modern European history and as editor of *The Virginia Quarterly* at the University of Virginia, he was called by President Hutchins of the University of Chicago to assist in revising the course in liberal arts. He is known particularly for the use of "Great Books" as an approach to education, which requires a student to be thoroughly familiar with world classics. As president of St. John's College he had an opportunity to put his educational philosophy into practice. He is the author of *Mazzini: Portrait of an Exile.*

Barras (*bä'rä'*), **Count Paul François Jean Nicolas** (**1755-1829**), French revolutionist, was born in the department of Var. An original member of the Jacobin club, he represented Var in the national convention, voted for the king's execution, and had a share in the Girondists' downfall. He conducted the siege of Toulon, and suppressed, with great cruelty, the revolt in the south of France. Hated by Robespierre, he played the chief part in the tyrant's overthrow, and by the terrified convention was appointed virtual dictator.

In 1795, being again appointed dictator, Barras called to his aid his young friend Bonaparte, who assured his own future with the historical "whiff of grapeshot." The directory being appointed, Barras was nominated one of the five members. Once more dictator in 1797, he guided the state almost alone until Bonaparte, with the help of Sieyès, overthrew him, 1799. Compelled to remove from Paris, he resided in Brussels, Marseilles, Rome, and Montpellier; in 1815, he returned, and purchased an estate near Paris with part of the great fortune acquired during the Revolution. See *France: History.*

Barrett, Lawrence (**1838-1891**), American actor, was born at Paterson, N. J. His first appearance was at Detroit, 1853. He was leading actor in the Boston Museum, 1858; served as captain of the Massachusetts volunteers in the Civil War; from 1864, continued as leading actor and manager; and, beginning in 1866, was closely associated with Edwin Booth. His most notable role was that of Cassius; but he played Hamlet, Shylock, King Lear, and Richelieu with great distinction. He did much to elevate the American stage and to encourage dramatic authorship. He wrote *The Life of Edwin Forrest* and the biography of Booth in *Actors and Actresses of the Time.*

Barrie (*bär'i*), **Sir James Matthew** (**1860-1937**), British novelist and dramatist, was born at Kirriemuir, Scotland; was educated at Edinburgh University; and, after a year and a half as a journalist in Nottingham, settled in London, becoming a regular contributor to leading periodicals. His first volume, *Better Dead,* was largely a satire on London life; in *Auld Licht Idylls,* he opened a new and rich vein, the humor and the pathos of his native village. *The Little Minister,* his first novel, came out in 1891 and was dramatized in 1897. *Walker, London,* a farcical comedy, had a prodigious run in 1892; *Jane Annie* was written with Sir Conan Doyle. Other pieces, nearly all notably successful, are *The Professor's Love Story, The Admirable Crichton, Peter Pan, Quality Street, What Every Woman Knows, Sentimental Tommy, Der Tag,* and *Mary Rose.* See *English Literature: Contemporary Drama.*

Barrows, David Prescott (**1873-1954**), American educator and ethnologist, was born in Chicago. He was graduated at Pomona College in 1894 and studied at the University of California, Columbia University, and the University of Chicago. He became city superintendent of schools at Manila, P. I., in 1900, chief of the bureau of non-Christian tribes in 1901, and was director of education for the Philippine Islands, 1903-09.

In 1910, he was made professor of education at the University of California and, in 1911, was elected to the chair of political science. He served as a cavalry officer in the Philippines and in Siberia in 1917-19. From the latter year until 1923, he was president of the University of California. His publications include *The Ethno-Botany of the Coahuilla Indians, A History of the Philippines,* and *Berbers and Blacks.*

Barry, John (**1745-1803**), American naval officer, was born in Ireland. Coming to America about 1766, he acquired wealth as a vessel owner. He was appointed to command the brig *Lexington* in 1776. By taking the tender *Edward,* he was one of the first commissioned officers of the United States navy to capture a ship. Subsequent exploits led to his choice, in 1794, as ranking captain of the United States navy.

Barrymore, Ethel (**1879- **), American actress, a niece of John Drew, was born at Philadelphia. Barrymore is a stage name, adopted in place of Blythe. She was educated at the Convent of Notre Dame, Philadelphia. She made her first appearance as Julia in *The Rivals,* 1894; played Priscilla in *Secret Service,* London; later appeared in leading roles with Henry Irving; first starred in *Captain Jinks,* 1900; later appeared in *Cousin Kate, A Doll's House, The Silver Box, The Twelve Pound Look, The Witness for the Defense, The Constant Wife,* and *Rasputin and the Empress.*

Barrymore, John (**1882-1942**), American actor, was born at Philadelphia, Pa. Making his debut at Chicago in 1903 as Max in Sudermann's *Magda,* he played increasingly ambitious roles both in the United States and other English speaking countries. As a co-star with his brother, Lionel, he won memorable success in *The Jest.* His playing of the title role in Shakespeare's *Richard III* and *Hamlet* added greatly to his reputation, which was widened by successes in motion pictures. Among the screen plays in which he played the chief role are *The Sea Beast, A Bill of Divorcement,* and *Reunion in Vienna.*

Barrymore, Lionel (**1878-1954**), American actor, older brother of Ethel and John Barrymore, was born at Philadelphia. His debut was at Philadelphia in a minor role in *The Rivals,* in which his grandmother, Mrs. John Drew, played Mrs. Malaprop. He starred in *Squire Kate, The Fires of Hate,* and, with John Barrymore, in *The Jest.* His reputation on the stage was paralleled on the screen, where he was one of the first to take advantage of the opportunities afforded by the sound films.

Barth (*bärt*), **Heinrich** (**1821-1865**), German geographer and explorer, was born in Hamburg. He was educated at the University of Berlin. After visiting Italy in 1845, he began explorations in Tunis, Tripoli, and Barca. Later he extended his journeys into Egypt, Palestine, and Greece, publishing a valuable account of these researches in 1849.

With Dr. Overweg and James Richardson he set out for central Africa early in 1850. They covered a region previously almost entirely unknown, nearly two million square miles in extent. After the death of both Overweg and Richardson, who succumbed to the climate, Barth continued alone. He returned to Tripoli in 1855, after having traveled more than 12,000 miles. In this notable journey he revealed the true nature of the Sahara Desert, determined the course of the Niger and its tributaries, and made many other important discoveries. The scientific thoroughness and vast extent of his investigations place him in the front rank of African explorers.

Bartholdi (*bär'tôl'dē'*), **Frédéric Auguste** (**1834-1904**), sculptor, was born at Colmar, Alsace, of Italian ancestry on his father's side. His best-known work is the colossal bronze "Liberty Enlightening the World," which was unveiled on Bedloe Island, New York harbor, in 1886; the statue itself is 151 feet high, and the top of the torch rises over 305 feet above low-water mark. His chief sculptural works are likewise conceived on a colossal scale, combined with massive architectural effects. Among these are the group presented by France to Switzerland and "The Lion of Belfort," an immense monument, generally regarded as his masterpiece. Statues of Lafayette in New York and of Lafayette and Washington in Paris are representative of the patriotic and national spirit of his work. He received the cross of the Legion of Honor in 1887.

Bartlett, Paul Wayland (**1865-1925**), American sculptor, was born at New Haven, Conn.; studied at Boston under Frémiet and in Paris under Cavelier. At first he devoted himself to animal sculpture, notable examples of which are his "Dying Lion" and "Bear Tamer." In nearly all his work, he preferred the realistic to the symbolic, and his thoroughly modern technique is fundamentally French in character. He produced statues of General McClellan, General Joseph Warren, Columbus, Michelangelo, and Benjamin Franklin in this country; Lafayette in Paris; the pediment over the House wing of the Capitol; and many decorative groups and numerous other works in the art collections of Philadelphia, Boston, Chicago, and Paris. He was made an officer of the Legion of Honor and a member of the American Academy of Arts and Letters. See *Sculpture.*

Bartolommeo (*bär'tô-lôm-mē'ō*), **Fra** (**1475-1517**), otherwise known as Baccio della Porta, Italian painter, was

born near Florence. His first teacher was Cosimo Rosselli; but he owed his more advanced training to the study of the works of Leonardo da Vinci. He won considerable fame in early life. After the tragic death of Savonarola, however, with whom he enjoyed an intimate friendship, he renounced painting and became, in 1500, a Dominican monk.

The visit of young Raphael to Florence in 1504 appears to have stimulated Bartolommeo to resume his art. He imparted to Raphael his own method of coloring and acquired from him a more perfect knowledge of perspective. His subjects are mostly devotional and the greater part of his pictures belong to the later period of his life. His figures are clothed with finely treated masses of drapery, and he is said to have been the first painter to use the lay figure. His most important works are preserved in Italy, chiefly in Florence, where he died.

Barton, Clara (1821-1912), American philanthropist, was born in Oxford, Mass. She was graduated from Clinton Liberal Institute, New York; taught school ten years; during the Civil War, did relief work on battlefields and organized search for missing men; and aided in the founding of hospitals during the Franco-Prussian War.

By her efforts, the American Red Cross Society was founded in 1881, and she was its president until 1904. She secured adoption of the Treaty of Geneva, 1882; was appointed to represent the United States at various international conferences, 1884-1903; inaugurated an amendment empowering the Red Cross Society to provide relief during great calamities; and superintended relief activities at the Johnstown flood, 1889, the Russian famine, 1892, the Armenian massacre, 1896, and on various other occasions. She wrote *History of the Red Cross, America's Relief Expedition to Asia Minor,* and *Story of My Childhood.*

Bartram, John (1699-1777), American botanist, was born at Darby, Pa., of Quaker parentage. He was appointed American botanist to George III and corresponded extensively with Linnæus and the leading naturalists of Europe, exchanging his collections of American plants for scientific books. At Kingsessing, in 1728, he established the first botanical garden in America. Linnæus styled him "the greatest natural botanist in the world." Among his published works are numerous papers on the natural history of his region.

Baruch (*bȧ-rōōk'*), **Bernard Mannes (1870-),** American financier, was born at Camden, S. C. During World War I, he discharged many important duties connected with the supply of war materials. In 1919, he was made a member of the supreme economic council of the Peace Conference at Paris. As a trusted elder statesman, he was often consulted during F. D. Roosevelt's administration, and he was later chairman of a committee to prepare a plan for international control of atomic energy.

Barye (*bȧ'rē'*), **Antoine Louis (1795-1875),** French sculptor of animals, was born at Paris. He was at first an engraver and metal worker. In 1831, he exhibited his widely known "Tiger Tearing a Crocodile," and, in 1832, his still more famous "Lion Battling with a Serpent," which secured for him the cross of the Legion of Honor. He excelled in accurate delineation of the anatomy, character, and movements of animals.

Barzun, Jacques (1907-), American educator, writer, critic, was born in Paris. He came to America in 1919 and became a naturalized citizen of the United States in 1933. At Columbia University, where he studied and received his Ph.D. degree, he has been lecturer and more recently professor in history. His writings, noted for their interesting style and challenging opinions, have reached a large public outside the field of education. They include *Berlioz and the Romantic Century, Pleasures of Music, God's Country and Mine,* and the widely quoted book *Teacher in America.* Later works are *Berlioz and the Romantic Century* (1950), *God's Country and Mine* (1954), and *Music in American Life* (1956).

Basedow (*bȧ'zē-dō*), **Johann Bernhard (1723-1790),** German educational reformer, was born at Hamburg. He was educated in philosophy and theology at the University of Leipzig. He became professor of moral philosophy at Soro, Denmark, in 1753 and at Altona in 1763. At Altona, he fell under the Influence of Rousseau's *Emile,* which resulted in his abandoning theology for educational work in 1767.

His *Elementarwerk,* issued in 1774, combining the methods of Comenius with the principles of Bacon and the revolutionary ideas of Rousseau, met with wide approval and led to the establishment of his celebrated Philanthropinum at Dessau in 1774. This continued in existence until 1793, exerting a great influence on the education of children throughout Germany. The fundamental idea of his reform was "education according to nature." Many of his ideas were later carried out by more practical educators, such as Pestalozzi and Froebel. See *History of Educational Reformers.*

Basil (*bȧz''l*), **Saint (c. 329-379),** surnamed the Great, bishop of Cæsarea, was born there about 329. Converted to Christianity by his sister, Saint Macrina, he became one of the most eminent of the Christian fathers, succeeding Eusebius in the see of Cæsarea in 370. His leadership in this capacity was a principal factor in the triumph of Christianity in the Eastern Empire. In his *Rule of St. Basil,* he laid down a constitution for monastic institutions long followed in the East. Saint Basil made several unsuccessful attempts to reunite the two hostile churches of the East and the West.

Bates, Henry Walter (1825-1892), English naturalist and traveler, was born at Leicester. He began life as a hosiery clerk, but became interested in natural science through early acquaintance with A. R. Wallace. In 1848, he joined Wallace on a collecting trip to the Amazon, paying expenses by the sale of specimens. He spent three years collecting in the vicinity of Para and seven years on the upper Amazon, discovering, at Ega, 550 new species of butterflies. After many hardships, he returned to England in 1859, having found 8000 species of insects new to science.

Like Darwin, he was much afflicted by dyspepsia after returning from the tropics. In 1863, he published a delightful book, *The Naturalist on the River Amazon,* which is a classic of scientific travel. In 1864, he became assistant secretary of the Royal Geographical Society, editing the *Transactions* and numerous books, including Belt's *Naturalist in Nicaragua.* In his paper on *Fauna of the Amazon Valley,* he stated and solved the problem of mimicry and protective coloration. According to Darwin, Bates is second only to Humboldt in describing the animal and plant life of the tropical forest.

Bates, Katharine Lee (1859-1929), American author and educator, was born in Falmouth, Mass. Following graduation from Wellesley College, 1880, she taught in Natick High School, 1880-81, and in Dana Hall, 1881-85. She became instructor in English at Wellesley College in 1885 and was professor of English literature there from 1891 to 1925. Besides charming poetry for children, she wrote the hymn "America the Beautiful." Her works include *Rose and Thorn, Fairy Gold, Sigurd, The Golden Collie and Other Comrades of the Road,* and *Yellow Clover.*

Baudelaire (*bō'd'-lâr'*), **Charles Pierre (1821-1867),** French poet, was born at Paris. Orphaned of his father at six years of age, he was brought up by guardians who sent him on a trip to India in 1841 on account of the irregularities of his conduct. His two-year stay there left its imprint on his poetry, the first volume of which appeared in 1857 under the title *Fleurs du mal,* "Flowers of Evil." The consummate art which these poems displayed impressed the public less than his selection of morbid subjects and many of them were banned at the time as obscene. Full appreciation of their merit was delayed until the 20th century. Attracted to the works of Edgar Allan Poe, he produced masterpieces of translation in rendering them into French. Involved in the failure of his publisher, he settled in Belgium, where he resorted to drink and opium and spent his last two years in sanitariums.

Bayard (*bȧ'yȧr'*), **Pierre du Terrail, Chevalier (1647-1706),** French knight, was born near Grenoble. In an expedition against Naples, serving under Charles VIII, and in the wars against the English and the Spaniards, he distinguished himself by his bravery and nobility of character. In the reign of Francis I, he gained a great victory for the king at Marignano and defended the city of Mezieres against Charles V, for which he was called the "savior of his country." He is known as "the knight without fear and without reproach," without rival as an exemplar of chivalric virtue. He was killed in a battle at the river Sesia, Italy.

Bayle (*bēl*), **Pierre (1647-1706),** French philosopher and critic, was born at Carlat. He studied philosophy under the Jesuits at Toulouse and, for a year and a half, turned Catholic. To escape ecclesiastical censure, he withdrew to Geneva and from there to Coppet, on the lake of Geneva, where he studied the philosophy of Descartes. After a few years, he returned to France; in 1675, he was elected to the chair of philosophy at Sedan and, in 1681, at Rotterdam.

In 1684, Bayle began to write *Nouvelles de la republique des lettres,* one of the most successful attempts at a popular journal of literary criticism. He devoted much of his leisure to the *Dictionnaire historique et critique.* This work, the first published under his own name, exercised an immemse influence over literature and philosophy; its destructive criticism of accepted history and philosophy became the foundation of 18th century rationalism.

Beach, Rex Ellingwood (1877-1949), American author and playwright, was born at Atwood, Mich.; was educated at Rollins College, Winter Park, Fla.; studied law in Chicago two years between 1896 and 1900. Devoting himself to writing, he became widely known for his stories of adventure, which include *Pardners, The Spoilers, Going*

Some, The Ne'er-Do-Well, The Net, The Mating Call, and *Jungle Gold.* He dramatized *Going Some* (with Armstrong) and *The Spoilers* (with McArthur).

Beaconsfield, Earl of. See *Disraeli, Benjamin.*

Beard, Charles Austin (1874-1948), American historian, was born near Knightstown, Ind. He was educated at De Pauw, Oxford, Cornell, and Columbia universities, in the last of which he taught from 1907 to 1917. He was director of the Training School for Public Service, New York City, from 1917 to 1922 and adviser on municipal affairs to Japanese authorities for the next two years. Beginning in 1904, he wrote and edited a long series of books, mainly historical and written from an economic viewpoint, which placed him in the front rank of interpreters of contemporary life. His *Rise of American Civilization,* written with his wife Mary, is the best known of his works, which include also *American City Government, The Economic Basis of Politics,* and *America in Midpassage.*

Beardsley, Aubrey Vincent (1872-1898), English black-and-white illustrator, was born at Brighton, England. Encouraged by Whistler, he became art editor of *The Yellow Book* at the age of twenty-two, but much of his own work appeared later in *The Savoy.* His strikingly original and highly decorative style of drawing attracted much attention and influenced many artists. Among the books which he illustrated now sought for by collectors are Mallory's *Morte d' Arthur,* Oscar Wilde's *Salome,* Pope's *Rape of the Lock,* and Jonson's *Volpone.*

Beattie (*bē'tĭ; bā'tĭ*), **James (1735-1803),** Scottish poet and writer on philosophy, was born at Laurencekirk. He was professor of moral philosophy in Marischal College, Aberdeen, 1760-97. His writings include an *Essay on the Nature and Immutability of Truth, The Elements of Moral Science,* and *Essays on Poetry and Music.* His fame, however, now rests almost wholly on *The Minstrel,* a descriptive poem on the progress of genius, written in the Spenserian stanza and marked by great harmony of style, rich imagery, and delicate sentiment.

Beatty (*bē'tĭ*), **David, Earl (1871-1936),** British admiral, was born in Wexford, Ireland. Entering the navy in 1884, he served with distinction in Sudan operations, 1896-98, and in China, 1900, rising to the rank of captain. In 1901, he married Ethel Field, only daughter of Marshall Field, the noted Chicago merchant. In 1910, he was made rear admiral and, in 1912, was placed in command of the first British battle-cruiser squadron.

Beatty played a distinguished part in World War I. On January 24, 1915, his squadron encountered a German squadron of fast cruisers. After sinking the German cruiser *Blücher,* Beatty drove the remaining enemy vessels to the shelter of their mine fields. On May 31, 1916, he led his squadron against the entire German high seas fleet in the great battle of Jutland, suffering and inflicting terrible losses, until the arrival of the main British fleet. Following this action, which forced the German fleet to flight to its protected base never to reappear in battle formation, Beatty was made vice admiral and was placed in command of the grand fleet. On November 21, 1918, he received, off the coast of Scotland, the surrender of all the important components of the German navy, 90 ships in all, besides 87 U-boats—the greatest naval surrender of modern times. In 1919, he became an earl and also first sea lord of the British admiralty, in which capacity he attended, in 1921, the Washington Conference on the limitation of armaments. He retired in 1924. See *World War: The Battle of Jutland.*

Beaumarchais (*bō'mär'shĕ'*), **Pierre Augustin Caron de (1732-1799),** French dramatist and poet, the son of a watchmaker named Caron, was born at Paris. He married a widow, Madame Franquet, in 1757 and from a little property of hers took the aristocratic name of Beaumarchais. In 1768, he married a second time, obtaining on this occasion a splendid fortune with his wife. Meanwhile devoting himself to literature, he produced *Eugenie,* a drama in five acts; *Les deux amis, ou Le negociant de Lyon; Le barbier de Séville;* and *Le mariage de Figaro.* On the last two of the foregoing his fame now rests. These brilliant comedies inspired the noted operas of Rossini and Mozart that bear the same names as the dramas. In plot, construction, and dialogue, his works represent the culmination of 18th century dramatic writing in France.

Beaumont (*bō'mŏnt*), **Francis (1584-1616),** English poet and dramatist, best known by his literary partnership with John Fletcher, was born at Grace Dieu, Leicestershire. He was educated at Oxford. At 19, he became the friend of Ben Jonson. About 1607, his famous friendship with Fletcher began, and so intimate did the two friends become that they lived in the same house until Beaumont's marriage in 1613. Their joint works comprise some fifty plays, among the best of which are *Philaster, The Maid's Tragedy,* and *The Faithful Shepherdess.* In some of their plays Massinger collaborated, and certain passages in *The Two Noble Kinsmen* are by Shakespeare. See *English Literature: The Elizabethans.*

Beauregard (*bō'rē-gärd*), **Pierre Gustave Toutant (1818-1893),** general of the army of the Confederate states during the Civil War, was born near New Orleans, La. He was graduated at West Point in 1838 and served with distinction in the Mexican War. He resigned the superintendency of West Point to join the Confederate army early in 1861; was assigned command at Charleston, S. C., where, on April 12-13, he began the war by the bombardment of Fort Sumter; July 21, he won the battle of Bull Run; was defeated, April 7, at Pittsburg Landing; in 1863, he defended Charleston and aided in the defense of Richmond. After the war, he became a railroad president and, in 1878, adjutant general of Louisiana.

Beaux (*bō*), **Cecilia (1863-1942),** American painter, was born at Philadelphia, of French descent. She studied painting in her native city under William Sartain, and, in 1889-90, she worked at Paris under Bouguereau and other masters. Returning to America, she settled in New York, where she attained distinction as a portrait painter, especially of women and children. She won many prizes and, in 1902, was made a member of the National Academy. Among her best-known paintings are "Last Days of Infancy," "Mother and Daughter," "The Dreamer," "A New England Woman," "Dorothea and Francesca," "Banner Bearer," and "Girl with Cat."

Beaverbrook, William Maxwell Aitken, First Baron (1879-), British publisher and administrator, was born at Newcastle, N. B., Canada. He entered the brokerage business in Montreal, acquiring a seat on the stock exchange in 1907. Asked by a bank to examine a merger plan for three cement mills, he succeeded in 1910 in bringing about an amalgamation of all Canadian cement companies, from which operation he netted a large fortune.

Having thus reached his predetermined goal of making a million pounds sterling, he retired from business to enter politics in England. Winning a seat in the House of Commons, he became secretary to Bonar Law, who was leader of the Conservative party from 1911. During World War I he acted as Canadian "Eye Witness" at the front and, in 1918, joined the British cabinet as minister in charge of propaganda. He was raised to the peerage in 1917. He abandoned politics in 1919 and entered publishing, taking over or establishing the *Daily Express,* the *Sunday Express,* and the *Evening Standard,* three London papers whose success brought their publisher into the front rank of British journalism.

In 1940, when Germany conquered France, and it became evident that air power was of paramount importance, Lord Beaverbrook was placed in charge of aircraft production, which he succeeded in increasing many fold. He was made minister of state and minister of supply in 1941 and was Lord Privy Seal, 1943-45.

Beck, Sir Adam (1857-1925), Canadian manufacturer, politician, and administrator, the chief founder of the Ontario hydroelectric system, was born at Baden, Ont. He was graduated at Western University, London, Ont., and entered his father's foundry business at Baden. Beginning a wood-veneer and box making enterprise at Galt in 1880, he expanded it rapidly, establishing headquarters in London with branches in other leading cities of Canada.

A year after his election to the provincial parliament in 1902, he was appointed to a commission to study the development of electric power. Largely through his influence, the Ontario Hydroelectric Commission was created in 1906, which, under his chairmanship, developed into one of the largest and most successful public power projects in the world. He was knighted in 1914.

Becket, Thomas à (c. 1118-1170), English prelate, son of a merchant, was born at London; studied at Oxford, Paris, and Bologna; and, on his return home, entered the Church. Henry II made him high chancellor and preceptor to Prince Henry in 1155, admitted him to the closest intimacy and confidence, and, in 1162, raised him to the archbishopric of Canterbury. Becket immediately gave up his courtier habits, assumed a rigid austerity of manner, and became an uncompromising champion of the privileges of the clergy. A violent contest ensued between the sovereign and the prelate, and the latter was at length obliged to flee from the kingdom. In 1170, however, he was restored, and he instantly renewed his resistance to the monarch. Irritated by this fresh provocation, Henry uttered a hasty speech, which four of his knights not unnaturally construed into a command to rid him of the pertinacious archbishop. They accordingly hastened to Canterbury and murdered Becket in the cathedral. He was canonized in 1172. The king later did penance at Becket's tomb. See *England: History, Beginnings of Constitutional Government.*

Becque (*bĕk*), **Henri François (1837-1899),** French dramatist, was born at Paris. He was a journalist and, for a time, was engaged in banking. His literary abilities were first made known by his libretto for the opera *Sardanapale*

in 1867; but his earliest plays, *Michel Pauper* and *The Elopement*, written about 1870, met with little recognition, and his most important plays were rejected for several years. The production of *The Crows*, however, at the National Theater at Paris in 1882, together with that of *The Parisian Woman* in 1885, marked the beginning of the modern French naturalistic school, of which Becque is now universally acknowledged as the originator. He wrote also *The Merry-go-round*, *Honest Women*, and *The Buffoons*, together with some miscellaneous pieces.

Becquerel (*bĕk'rĕl'*), **Alexandre Edmond (1820-1891)**, French physicist, son of Antoine César Becquerel, was born in Paris. He manifested scientific tastes and talents similar to those of his father, with whom he collaborated in important investigations, succeeding him as professor of physics in the Conservatoire des Arts et Métiers in 1878. He conducted researches on electricity, light, and phosphorescence; invented the phosphoroscope; and did important work on the solar spectrum and the spectrum of the electric light. He published numerous scientific papers, was the author of *La Lumière, ses causes et ses effets*, and, jointly with his father, produced *Eléments de physique terrestre et de météorologie* and other works.

Becquerel, Antoine César (1788-1878), French physicist, the first of three generations of eminent French scientists, was born at Loiret. While studying the physical properties of yellow amber, he had occasion to make experiments on the liberation of electricity by pressure. The result of his inquiries was the overthrow of Volta's theory of contact and the construction by him of the first constant pile. He next discovered a method of determining the internal temperature of human and animal bodies and, by physiological applications, demonstrated that when a muscle contracts there is a development of heat. He was one of the creators of electrochemistry, and he invented a method of electrotyping.

Becquerel, Antoine Henri (1852-1908), French physicist, son of Alexandre Edmond Becquerel, was born in Paris. He received his education in scientific schools in Paris and became professor of physics in the Museum of Natural History in 1878 and at the Ecole Polytechnique in 1895. His researches were chiefly concerned with optical subjects, including phosphorescence, magnetic rotation of polarized light, ultra-red rays, and the invisible radiation from uranium, now named Becquerel rays in honor of his discovery, for which he received the Rumford Medal. In 1903, the Nobel prize for physics was divided between M. Becquerel and M. and Mme. Curie in recognition of the value of their researches in radioactivity. See *Radioactivity*.

Bede (*bēd*), or **Bæda** (*bē'dà*) **(c. 673-735)**, surnamed "the Venerable," English monk, scholar, and church historian, was born in the county of Durham. He is said to have been the most learned Englishman of his day. In the seclusion of his cell, he wrote his important *Ecclesiastical History of England*, which was translated from the Latin into Anglo-Saxon by King Alfred; also a number of commentaries, homilies, hymns, and lives of the saints.

Beebe, William (1877-), American ornithologist and author, was born at Brooklyn, N. Y., and was educated at Columbia University. In 1899, he was appointed honorary curator of ornithology by the New York Zoological society and became director of the British Guiana Zoological Station in the same year. In 1934, with Otis Barton, he descended into the ocean in a bathysphere to a depth of over 3000 feet, a feat which he later described in *Half Mile Down*. To his skill as an observer he added an artistry of language exemplified in these works among others: *Edge of the Jungle*, *Galapagos*, *Arcturus*, *Beneath Tropic Seas*, and *Zaca Venture*. His more recent books include *Unseen Life of New York* (1953) and *Adventuring with Beebe* (1955).

Beecham, Sir Thomas (1879-), English conductor, composer, and operatic impresario, was born at St. Helen's, Lancashire, England, a son of Sir Joseph Beecham, proprietor of Beecham's pills and a patron of music. A church organist in St. Helen's gave Sir Thomas his first music lessons when he was a small boy. By the time he was seven he could read Wagner's scores, and at ten he conducted an amateur orchestra. After going to Oxford, he studied music in Paris under Moszkowsky. He first made a name for himself in London by his work with Beecham's Orchestra which he organized in 1909. The following year he established the Beecham Opera Company, and in 1911 became conductor at Covent Garden, introducing many new works and making England opera conscious. Knighted in 1914 for his services to British music, he inherited his father's baronetcy in 1916. On his first visit to America in 1928, Sir Thomas was described in the press as the most athletic conductor seen in this country in many years. "He does everything," said one critic, "short of turning a somersault backwards."

Beecher, Henry Ward (1813-1887), preacher, theologian, lecturer, orator, third son of Lyman Beecher, was born at Litchfield, Conn., was graduated at Amherst College in 1834; and studied theology under his father at Lane Seminary, Cincinnati. After a pastorate of ten years in two churches in Indiana, he removed to Brooklyn and assumed charge of Plymouth Church, "an organization of orthodox Congregational believers." For many years he drew one of the largest and most influential regular congregations in the United States, and his published sermons became a power throughout the United States and in other countries. On the slavery question, he was emphatically an abolitionist. He visited Great Britain in 1863 with the avowed object of enlisting sympathy for the people of the North; and, although very unfavorably received at first, he succeeded in effecting no inconsiderable change in public opinion. For nearly 20 years, he was editor of the New York *Independent*, and, in 1870, he became editor of the *Christian Union*. His most important works include *Lectures to Young Men, Industry and Idleness*, and the *Life of Christ*. Elected to the American Hall of Fame, 1900.

Beecher, Lyman (1775-1863), preacher and theologian, was born at New Haven, Conn.; was graduated at Yale College; and began preaching at East Hampton, L. I., where he remained until 1810. He then went to Litchfield, Conn., where were born the two most famous of his thirteen children,—Henry Ward and Harriet (Mrs. Stowe). All his sons, of whom there were seven, became clergymen. In 1826, he became pastor of Hanover Street church, Boston, from which he went to Cincinnati as head of Lane Theological Seminary. He remained there 20 years, in the course of which he was tried and acquitted by the Church courts on the charge of preaching false doctrine. Beecher ranked among the foremost orators and preachers of his time.

Beerbohm, Sir Max (1872-1956), writer and caricaturist, was born in London; was educated at Oxford; in 1910, married Florence Kahn, of Memphis, Tenn.; and afterward took up his residence in Rapallo, Italy. His publications include *The Happy Hypocrite*, *Zuleika Dobson*, and *And Even Now*. His caricatures, noted for their delicate and incisive satire, have been exhibited in art galleries at London and elsewhere. Many of them have been collected and published under various titles, including *The Second Childhood of John Bull*, *The Poet's Corner*, and *Fifty Caricatures*. He was knighted in 1939.

Beers, Clifford Whittingham (1876-1943), American reformer, founder of the mental hygiene movement, was born in New Haven, Conn. Three years after being graduated from Yale University in 1897, he became insane. Despite the cruel treatment he received, which was at that time usual in handling insane patients, he recovered his sanity by 1903 and devoted his later years to the creation of a more wholesome and scientific attitude toward mental disease, its prevention, and its treatment. He wrote his experiences in *A Mind That Found Itself*. Through the National Committee for Mental Hygiene, organized in 1909, he was the leading spirit in carrying forward an educational movement directed toward the removal of emotional maladjustments which underlie much juvenile delinquency, crime, mental disease, and personal unhappiness.

Beethoven (*bā'tō-vĕn; bāt'hō-*), **Ludwig van (1770-1827)**, German composer of instrumental music, was born at Bonn, Prussia. In his fourth year, he was compelled by his father to practice daily on the harpsichord. Beethoven's musical taste was intellectual rather than intuitive, and it had to be awakened before his interest was excited. Pfeiffer and Van der Eden laid the foundation of his technical skill, and Neefe made him familiar with the grand conceptions of Bach and Handel.

When eleven years old, Beethoven appeared in The Netherlands as a piano virtuoso, chiefly in Bach's music, and was made the assistant of Neefe at the organ in the Elector's chapel. In 1787, he went to Vienna, at the expense of the Elector of Cologne, to study with Mozart; but he was soon recalled to Bonn by the illness of his mother, and, at her death, he became the main support of the family. He now began giving lessons and making occasional public appearances.

Life In Vienna. In 1792, Beethoven went to Vienna, where, with the exception of a few short journeys for business or pleasure, he remained for the rest of his life. The first five years of his residence there were the happiest he ever knew. He had excellent patrons; he was received in the best society; and, in his study under Haydn and Albrechtsberger, he made rapid progress in the study of musical form.

About 1795, he made his debut in Vienna as a pianist, and, with his "Concerto in C major," he won instant recognition. His "Opus I," containing three trios for the piano, appeared this same year. As a relaxation from music, Beethoven's ardent interest in general literature

received a fresh impetus at this time. His absorption in reading tended in some measure to soften the afflictions which afterward fell to his lot. From about 1798, he was troubled with a defect in hearing, and his sensitive nature was greatly perturbed. By 1814, the loss of his hearing was complete, and this so sorely affected him that his compositions were tinged with a passionate melancholy.

Before the end of 1800, Beethoven had composed twenty sonatas for the pianoforte, a large number of trios and quartets, and his first and second symphonies. A pension was at length settled upon him on condition that he continue to reside in Austria. These years were productive; among his works were a sonata containing the well-known funeral march, the "Moonlight Sonata," the "Kreutzer Sonata," the "Heroic Symphony," and his one opera *Fidelio*, written in 1805.

Beethoven's fourth, fifth, and sixth symphonies were composed between 1805 and 1810; the music to Kotzebue's "Ruins of Athens" was first performed in 1812; the "Battle Symphony," in 1813; the cantata "The Glorious Moment," in 1814; and the eighth symphony was written in 1814, when he was totally deaf. The principal productions of the last ten years of his life were several sonatas for the pianoforte; the grand "Mass in D," a three years' labor; the "Overture in C, opus 115"; the ninth symphony with chorus, the greatest of his productions, completed in 1823; and the last grand quartets.

Though he was surrounded in Vienna by friends and admirers, Beethoven led a solitary life. During his last four years, he lived in want and privation in order that he might bequeath more to a nephew, who, although ungrateful for kindnesses, nevertheless continued to receive from the musician a lifelong and extravagant affection.

Character And Genius. Beethoven was characterized by genuine simplicity and sincerity. His temperament, reacted upon by his deafness, led him to turn the energies of his soul within, and it is to his music that we look for the deepest expressions of his heart. He felt all phases of human emotion and expressed all. The simple emotion of confiding youth, then a sense of life's perplexities with the courage that surmounts them, and, finally, the exhaustion of a soul broken by struggle, which renounces earthly affections and thirsts for ideal, solitary communion with the Infinite—such is the immense circle which his genius embraced. Beethoven's principal title to fame lies in his unchallenged superiority as a composer of symphonies. In the symphony, music finds its highest intellectual dignity; in Beethoven, the symphony found its loftiest master. See *Music: German Classic Masters.*

Behring (*bā'rĭng*), **Emil Adolf von (1854-1917),** German physician, was born at Hansdorf. He studied medicine in Berlin, became an army surgeon in 1880, and was appointed professor at the University of Halle in 1894. In 1895, he accepted the directorship of the Hygienic Institute at Marburg. His greatest contributions to medical science were his discovery of diphtheria antitoxin and his researches in the study of immunity. In 1905, he announced the discovery of a substance produced from the virus of tuberculosis and called bovi-vaccine, which prevents tuberculosis in cattle. His publications include *Die Blutserumtherapie, Bekämpfung der Infektionskrankheiten,* and *Die Beiträge zur experimentellen Therapie.* In 1901, he received the Nobel prize in medicine in recognition of his discovery of diphtheria serum.

Belasco (*bē-lăs'kō*), **David (1854-1931),** dramatic manager and playwright, was born at San Francisco, and was educated at Lincoln College, California. Through his skill in training actors for specific roles and the remarkable success of his methods of stage lighting and stage setting, he became widely known as a producing manager. He is also the author or collaborator of 200 plays, including *Zaza, The Wife, The Girl of the Golden West, The Return of Peter Grimm.*

Belisarius (*bĕl'ĭ-sā'rĭ-ŭs*) **(c. 505-565),** Byzantine general under Justinian, was born in Illyria. After commanding an expedition against the king of Iran about 530, he suppressed an insurrection at Istanbul, conquered Gelimer, king of the Vandals, and put an end to the latter's dominion in Africa. In 535, he was sent to Italy to carry on war with the Goths, from whom he captured Rome in 536. He was afterward sent against the Iranians and the Huns. In 563, he was charged with conspiracy against Justinian, but was acquitted.

Bell, Alexander Graham (1847-1922), scientist and inventor, was born at Edinburgh, Scotland, the son of Alexander Melville Bell, whose system of "visible speech," a universal phonetic alphabet, has been widely used in teaching deaf-mutes to speak. He received a professional training from his father, a lecturer at Edinburgh University from 1843 to 1865. His formal education was obtained at the universities of Edinburgh and London, his father having removed to the latter city in 1865. His family settled in Brantford, Canada, in 1870, and in the following year he delivered lectures on vocal physiology at Boston University, taking up his residence in Boston in 1872. He applied for American citizenship in 1874, becoming later a naturalized citizen of the United States.

After some three years of experiment, Bell succeeded in constructing a practical device for transforming the sound vibrations of speech into equivalent variations of electric current, which, after transmission over a wire, might be reconverted to sound waves and heard as speech. He obtained a patent for a transmitter, the basic telephone patent, on March 7, 1876. The first telephone line was installed at the residence of his father at Brantford, Ontario, June 25, 1876. Despite many years of litigation, Bell realized a substantial fortune from his invention. Litigation was with Elisha Gray, who filed notice of invention of a transmitter the same day Bell applied for his patent. Gray claimed also to have had priority in exhibiting a receiver.

Bell's life after 1876 was devoted mainly to further inventions, to the encouragement of scientific research, and to promoting the proper education of deaf-mutes. Among the many patents he secured were those for the telephone probe, an electrical device for detecting the presence of foreign metal masses in the body; the Volta graphophone; the photophone, by which variations of light may be registered as sounds; the spectrophone, enabling invisible colors of the spectrum to be detected by means of sounds; and a device for stabilizing the balance of flying machines.

Bell devoted much of his wealth to scientific and humanitarian projects. With donations of over $300,000, he founded the American Association to Promote the Teaching of Speech to the Deaf. His other benefactions include $50,000 to found *Science*, later the official journal of the American Association for the Advancement of Science; $30,000 to conduct investigations in the art of flying; and $5000 to found the Astrophysical Observatory at the Smithsonian Institution. Elected to American Hall of Fame, 1950. See *Telephone.*

Bell, Andrew (1753-1832), Scottish educational reformer, was born at Saint Andrews, and was educated at the University of Saint Andrews. He was a tutor in Virginia, 1774-81, but returned to Great Britain and took orders in the Church of England.

In 1787, he went to India, becoming an army chaplain, and, in 1789, was placed in charge of an orphan school at Madras. Being unable to secure competent teachers, he conceived the plan of conducting the school by the aid of the pupils themselves, thus originating the famous "monitorial system." He wrote numerous books on education and left £120,000 to found educational institutions in Scotland.

Bellamy (*bĕl'ā-mĭ*), **Edward (1850-1898),** American novelist and economist, was born at Chicopee Falls, Mass. He was educated in Germany; was admitted to the bar; was on the staff of the New York *Evening Post* in 1871-72; and, on his return from the Hawaiian Islands in 1877, founded the Springfield *News*. He is best known by his novels *Looking Backward* and *Equality*, both socialistic works.

Bellini (*bĕl-lē'nē*), **Gentile (c. 1427-1507),** Venetian painter, son of Jacopo Bellini. He was employed with his brother Giovanni to decorate the great council chamber of the Venetian senate house. Among his most important works are "Procession of Corpus Domini" and "Miracle of the True Cross" at Venice; "Sermon of St. Mark," now in the Brera Gallery, Milan; and portraits in the Academy, Venice, and in the Louvre, Paris.

Bellini, Giovanni (1426-1516), Venetian painter, brother to Gentile Bellini and, with him, the founder of the Venetian school of painting. He first studied with his father, Jacopo Bellini. He was greatly influenced in his work by his famous brother-in-law, Andrea Mantegna, and by the sculptures of Donatello. His best works are altarpieces. Among his more famous pictures are his "Infant Jesus," "Holy Virgin," and "Christ and the Woman of Samaria." There is a well-known picture of Bellini's, "Christ on the Mount," in the National Gallery, London, and another, "The Circumcision," at Castle Howard. Among Bellini's many pupils the most distinguished were Giorgione and Titian.

Bellini, Vincenzo (1801-1835), Italian composer of operas, was born at Catania, Sicily. He was sent to the conservatory of Naples, where he studied composition. After a number of early operas had made him known in Italy, he wrote, in 1827, the opera *Il Pirata*, which gave him a name in the musical world. Bellini's music is notably well adapted to the voice, and the greatest singers from Jenny Lind and Lilli Lehmann to Patti, Nilsson, and Rosa Ponselle have included roles from his operas in their repertoires. Among his best works are *Norma, I Puritani,* and *La Sonnambula.*

Bellman (*bĕl'măn*), **Karl Mikael (1740-1795),** Swedish poet, was born at Stockholm. He became court secretary in 1775. His later and more brilliant pieces are chiefly idyllic

or humorous songs, for which he also furnished original melodies. The best specimens of his genius, which is of a rare order, are to be found in the collections prepared by himself—*Bachanaliske Ordenskapitlets Handbibliothek, Fredmans Epistlar,* and *Fredmans Sanger.* A monument was erected to his memory at Stockholm in 1829. See *Swedish Literature.*

Belloc (*bĕ-lŏk'*), **Hilaire Joseph Peter (1870-1953),** English writer and politician, was born in France, of French-English parentage. He was graduated at Balliol College, Oxford, 1895, and soon devoted himself to writing. By the range and the quality of his novels, essays, books of travel, and other works, he won an enviable position in English letters. He was member of the House of Commons, 1906-10. His numerous writings, many of which support a Roman Catholic point of view, include *The Bad Child's Book of Beasts, The Moral Alphabet, The Path to Rome, General Sketch of the European War, Joan of Arc, The Crisis of Our Civilization,* and *The Great Heresies.*

Bembo (*bĕm'bō*), **Pietro (1470-1547),** Italian scholar, was born at Venice. In 1513, he was made secretary to Pope Leo X and, in 1539, was made a cardinal by Paul III, who afterward appointed him to the dioceses of Gubbio and Bergamo. Bembo was the restorer of the classic style in both Latin and Italian literature. Among the most famous of his works are a short treatise on Italian prose, which marked an era in Italian grammar; *Gli Asolani,* a dialogue; and a *History of Venice.* See *Italian Literature: The Renaissance.*

Benavente, Jacinto (1866-1954), Spanish poet and dramatist, was born at Madrid, son of a noted physician. He was educated in his native city and studied law at the university there. Upon his father's death in 1885, he gave up plans for a legal career and devoted himself to literature. From 1885 to 1892, he traveled in France, England, and Russia, and later became an actor. In 1893, he published a small book of verse and a volume of plays entitled *The Fantastic Theater.* This was the beginning of a career of great brilliance and fertility as a dramatic writer and satirist of social institutions. The production in 1913 of the popular *La Malquerida,* was followed by his election to a chair in the Spanish academy. In 1922, he was awarded the Nobel prize for literature. His other works include *Other Birds' Nests, The Passion Flower, Bonds of Interest,* and *The Fabricated Truth.*

Benedict XV, Pope (1854-1922), Giacomo della Chiesa, successor to Pius X, was born at Pegli, near Genoa. He was the son of a nobleman of wealth; was educated in Genoa and Rome; and was ordained to the priesthood in 1878. He was associated with Cardinal Rampolla at Madrid, 1883-87, and later at Rome, where he became consultor of the holy office in 1901; was appointed archbishop of Bologna in 1907 and cardinal in May 1914; became pope later in the same year. He was known as a determined foe of modernism in religion. During World War I, he made repeated efforts to effect peace.

Benedict, Saint (c. 480-c. 543), one of the originators of monastic institutions in the West, was born at Nursia, in Italy. Early in life he retired into a desert and spent three years in a cavern. Being discovered, his sanctity drew to him such numbers of people that he founded twelve convents. In 529, he went to Monte Cassino; built a monastery, afterward one of the most famous in Italy; and established the Benedictine order.

Benes (*bĕ'nāsh*), **Edward (1884-1948),** Czechoslovak statesman, was born at Kozlany, Czechoslovakia. Despite the handicap of early poverty, he acquired an education at the University of Prague and principal French universities. Prior to and during World War I he took a leading part in the agitation for Czechoslovak independence, and, in 1918, became foreign minister of the newly formed nation of Czechoslovakia. In this office he made himself one of the most influential statesmen of Europe, being the chief organizer of the Little Entente. In 1935, he was elected president. It was his lot in 1938 to surrender his country to Germany. Resigning, he accepted a professorship at the University of Chicago. In 1945 he returned to Czechoslovakia as president. He again resigned in 1948, refusing to accept the constitution put forward by the Communists after their seizure of the government. He wrote *Democracy Today and Tomorrow.*

Benét, Stephen Vincent (1898-1943), American poet, was born at Bethlehem, Pa. After being graduated from Yale University, he devoted his time chiefly to writing. *Five Men and Pompey,* a product of his student days, is the first of a number of works of increasing caliber culminating in the historic poem of epiclike quality, *John Brown's Body,* which won the Pultizer prize in 1928. Later works include *Burning City, The Devil and Daniel Webster,* and *Tales Before Midnight.* Elected to the American Academy of Arts and Letters in 1938.

Ben-Gurion, David (1886-), Israeli statesman, born at Plonsk, Poland. Following the pogroms of 1905, he escaped to Palestine, where he became active in the Zionist movement. During World War I he was exiled by the Turkish government for his opposition to Turkish rule in Palestine. Coming to the United States, he was active in organizing the Jewish Legion, with which he fought against the Turks under Allenby in Asia Minor. He became the first prime minister of Israeli when the country achieved its independence in 1948, and has since retained the position.

Bennett, (Enoch) Arnold (1867-1931), English novelist, was born at Hanley in the Potteries. He was educated at Newcastle Middle School and at the University of London. He began life as a law clerk; became editor of a woman's magazine; and, beginning with 1900, devoted himself entirely to literary work, producing, besides numerous essays and plays, a group of novels which rank among the most notable in recent English fiction. This series includes *Anna of the Five Towns, The Old Wives' Tale,* and *The Matador of the Five Towns.* Among his other works are *Clayhanger, Lenora, Denry the Audacious, Your United States, Paris Nights,* and *Our Women.*

Bennett, James Gordon (1795-1872), journalist, was born in Scotland. He studied for the Roman Catholic priesthood, but never took orders. In 1819, he emigrated to America; after teaching in Halifax and later serving as proofreader in Boston, he became a journalist in New York. In 1825, he purchased the *Sunday Courier;* subsequently, 1832, he started the *Globe,* neither project succeeding. In 1835, he issued the first number of *The Herald,* a journal which, through his great ability and enterprise, soon commanded world-wide attention.

His paper was the first to publish the stock lists and a daily financial review; many other original features were afterward added. The collection and dissemination of news was ever his paramount object. His news-gathering staff for four years during the Civil War involved an expense of a half million dollars. At the time of his death, *The Herald* was the most valuable newspaper property in the United States. The first speech ever reported in full by telegraph was sent to *The Herald.*

His son of the same name (1841-1918) carried on and broadened the same journalistic policy, in furtherance of which he financed the expedition of Stanley into Central Africa to find David Livingstone, 1869-71. He established trophies for international yacht, balloon, and airplane races.

Bennett, Richard Bedford (1870-1947), Canadian lawyer and politician, was born at Hopewell, N. B. Graduating from Dalhousie University, he was called to the bar in 1893. He removed to Calgary, Alta., in 1897 and was elected to the legislature of the Northwest Territories in 1898. As a lawyer, he was counsel for the Canadian Pacific railway and the Hudson's Bay Company. He controlled through gift the E. B. Eddy Company and became director of other important corporations. He sat in the Alberta legislature from 1909 to 1911 and then in the Dominion House of Commons, where he was minister of justice and attorney general in the government of Arthur Meighan. On the latter's retirement in 1927, Bennett was chosen leader of the Conservative party. He was prime minister of Canada, 1930-35, championing a policy independent of British or American influence. He initiated several measures of social legislation, most of which were later declared unconstitutional. In 1939 he retired to private life in England. In 1941 he was created Viscount Bennett of Mickleham and of Calgary and Hopewell.

Benson, Ezra Taft (1899-), agriculturist and marketing specialist, was born at Whitney, Idaho. After taking extended courses at various agricultural colleges, he operated his own farm for several years in Idaho. From 1930 to 1939 he was agricultural economist and marketing specialist for the University of Idaho extension service and the the State of Idaho department of agriculture. He was then for five years secretary of the National Council of Farmer Co-operatives. As a young man and as a member of the Church of Jesus Christ of Latter Day Saints, he served for two years as a missionary in the British Isles, and from 1943 to 1953 was a high official of the church. In 1953, President Eisenhower appointed him Secretary of Agriculture.

Benson, Frank Weston (1862-1951), American painter, was born at Salem, Mass. He studied art at the Boston Museum, 1880-83, and with Lefebvre and Boulanger in Paris, 1883-85. In 1889, he was made instructor of drawing and painting in the art school of the Boston museum. He excelled as a painter of women and children, usually in outdoor scenes abounding in light and color. His influence as a teacher has been far-reaching and beneficial, and his paintings have won high rank in present-day American art. His works include "My Little Girl," "In the Spruce Woods," "Pomona," "Against the Sky," "Moonlight at Sea," "Eleanor," "My Daughter," and decorations in the Congressional Library, Washington, entitled "The Seasons" and "The Three Graces."

Bentham, Jeremy (1748-1832), English writer on ethics and jurisprudence, was born at London. He was admitted to the bar in 1772. Turning from the practice of law to its theory, he became the greatest critic of legislation and government in his day. In all his ethical and political writings the doctrine of utility is the leading and pervading principle, and his favorite vehicle for its expression is the phrase, "the greatest happiness of the greatest number." This phrase was coined by Priestley, though its prominence in politics was due to Bentham.

Benton, Thomas Hart (1782-1858), American statesman, was born near Hillsboro, N. C.; began legal practice at Nashville, Tenn., in 1811; settled at Saint Louis, Mo., in 1815; and was elected United States senator in 1820, becoming a prominent supporter of General Jackson. Re-elected in 1826, he became a noted advocate of the gold and silver monetary policy and supported Jackson in the latter's antagonism to the United States bank. He held a seat in Congress for a period of thirty years, voting for the annexation of Texas and against the doctrines of nullification and states' rights. He wrote *A Thirty Years' View*, a valuable political retrospect.

Benz, Karl (1844-1929), German engineer and constructor of the first automobile, was born at Karlsruhe. In 1879, he built a model one-cylinder gas engine and erected a factory to manufacture it. His financial sponsors refusing to countenance the making of any but fixed engines, he left the firm and devised a light two-cylinder engine which he attached to a three-wheel vehicle and, in 1885, demonstrated to the inhabitants of Mannheim the first vehicle to move under its own power. Its speed was about 12 miles an hour. He discovered the differential gear, battery ignition system, and carburetor.

Béranger (*bā'rän'zhā'*), **Pierre Jean de (1780-1857),** French lyric poet, was born of humble parentage in Paris. He became apprenticed to a printer. In 1815, he began to bring out a series of national and other songs, which created a powerful sensation; many of them were satires upon the government and procured for their author a heavy fine and several months' imprisonment. Admiring friends paid the fine, and his cell was the reception room for many of the most distinguished men of the time. His poems contributed in no small degree to the revolution of 1830. In 1848, he was elected to the constituent assembly, but declined to serve. He was an intense believer in democracy.

Bergerac (*bĕr' zhĕ-rák'*) **Savinien Cyrano de (1619-1655),** French novelist and dramatist, was born in Perigord, 1619. He attended the College Beauvais, later studied science with Gassendi, and learned some astrology from Campanella. In youth, he divided his time between literature and adventure; served two years as a soldier, in the course of which he was twice wounded; and carried through life the reputation of a reckless duelist.

During his short and restless career, he published a volume of letters; a political satire on Mazarin; *Agrippine*, a tragedy; and *La Pédant joué*, a comedy that was followed by his most famous book, *The Comic History of The States and Empires of the Moon and of the Sun.* He was the earliest writer to employ the novel to teach natural science and was thus a forerunner of Jules Verne and H. G. Wells. He was also the first writer of French drama to break with the rule of the unities in tragedy, which, adopted from Aristotle's dictum, had long been observed in France. In his comic histories, he made startling forecasts of modern discoveries, such as the phonograph, and of a universal language, such as Esperanto. He has been immortalized in Rostand's famous drama *Cyrano de Bergerac.* See *French Literature: The Nineteenth Century, Rostand.*

Bergius (*bĕr'gĭ-ŏŏs*), **Friedrich (1884-),** German chemist, was born at Goldschmieden, near Breslau. After being trained at Breslau, Leipzig, and Berlin universities and at technical institutes, he established a private laboratory, where he investigated the effect of high pressures on chemical reactions. One outcome was a method of converting coal dust and low grade coal into oil and gasoline. This discovery was made the basis of a great industry of especial importance to Germany because of the vulnerability of her petroleum supplies in time of war. Bergius discovered also a means of converting wood into sugar. He was awarded one-half of the Nobel prize in chemistry for 1931.

Bergson (*bĕrg'sôN'*), **Henri (1859-1941),** French philosopher, was born in Paris. He was graduated at the Ecole Normale in 1881, and became a teacher. He was professor of philosophy in the College de France, 1900-21, and, in 1901, was elected to the Institute. His books, *Time and Free Will*, published in 1889, *Matter and Memory*, 1896, and *Creative Evolution*, 1907, attracted wide attention and placed him in the front rank of contemporary philosophers.

According to his view, nearly all previous philosophies have been developed either by intellect alone or by intellect chiefly. He endeavors to avoid the limitations of intellect by depending upon intuition, maintaining that intellect is unable to comprehend the nature of life and of spirit. He asserts that instinct would empower us to understand life except that its object is not concerned with understanding it. He argues that what is needed for full understanding is intuition, which has at once the immediate certainty of instinct and the wide range of intellect. He was elected to the French Academy in 1914, and received the 1927 Nobel prize for literature. His works include also *Laughter*, *Intellectual Energy*, and *Thought and Motion.*

Bergström (*bĕrK'strōm*), **Hjalmar (1868-1914),** Danish playwright. He completed a university education, obtaining the degree of Ph.D. in 1893, and became a teacher in the Brockske Commercial School, where he taught until 1905. Turning his attention to the drama, he became a director of the Danish Dramatic Society and member of an organization for preserving neglected writings of Danish playwrights. Among his plays are *When King David Grew Old*, *Karen Borneman*, *Together in the Dance*, and *The Way to God*—all of which were presented in the Royal Theater. *Karen Borneman* was forbidden by censor, but the ban was afterward removed.

Bering, Vitus Janassen (1680-1741), Russian navigator, was born at Horsens, Denmark. He was employed on an expedition planned by Peter the Great to determine the limits of Asia. Setting out in 1725, he crossed Siberia and, after three years, reached the northeastern extremity of Asia. In 1741, under the instruction of Empress Anne of Russia, he crossed the strait later known as Bering and landed in North America. On his return voyage, his ship was wrecked on the desert island still known by his name, and he died there of exposure.

Bériot (*bā'rē-ō'*), **Charles Auguste de (1802-1870),** Belgian composer and violinist, was born in Louvain. He displayed precocious and original talent, and his playing was distinguished by refined taste and purity of tone. In 1836, he became the husband of the famous singer, Mme. Malibran. About 1842, he was made professor in the Brussels Conservatory, but resigned nine years later in consequence of failing eyesight. He wrote a complete manual for the violin, and many popular compositions for that instrument.

Berkeley, George (1685-1753), Irish clergyman and philosopher, was born in Ireland. He was educated at Kilkenny School and Trinity College, Dublin, where he enjoyed the society of Dean Swift. On his return from a visit to America, he was made bishop of Cloyne. In philosophy, he was an idealist. He held that all things exist only in so far as they are perceived or known and that the existence of the universe is due to its being known by God. Berkeley, Cal., was named for him because of his saying, "Westward the course of empire takes its way." His most important works are the *Principles of Human Knowledge*, *Minute Philosopher*, and *Theory of Vision.*

Berkeley, Sir William (1610-1677), colonial governor of Virginia, was born at London, England. He was appointed governor of Virginia in 1641, but resigned in 1651 upon Cromwell's rise to power. He remained in the colony, however, and, in 1660, was chosen governor by the general assembly. Some years later, he lost the favor of the people by failing to protect them from the Indians, and a rebellion led by Nathaniel Bacon broke out against the governor. It failed because of Bacon's sudden death. Berkeley was recalled in 1676. He wrote *A Discourse and View of Virginia* and a drama called *The Lost Lady.*

Berlichingen (*bĕr'lĭK-ĭng-ĕn*), **Götz** or **Gottfried von (1480-1562),** German knight and soldier of fortune, was born in Jagsthausen. He took part in the war of the peasants against the nobles and was sentenced by Maximilian I to pay a heavy fine. He wore an artificial hand which replaced one lost in battle, and was surnamed the "Iron Hand." He was a staunch supporter of Luther; took part in a campaign against the Turks in 1542; and espoused the cause of Charles V against Francis I in 1544. While in retirement, he wrote his autobiography, which Goethe made the subject of his famous drama *Götz von Berlichingen.* This play initiated the *"Sturm und Drang"* movement in German literature. He was mortally wounded defending his own castle.

Berlin, Irving (1888-), is the adopted name of Israel Baline, American song writer, born in Russia. He was brought to the United States in 1893. At 14, he earned his living as a singing waiter in Chinatown restaurants of New York City. He composed his own songs, the increasing popularity of which brought him wealth and the distinction of being the "father" of ragtime and jazz music. "Alexander's Ragtime Band," "Pack up your Sins," "Russian Lullaby," "God Bless America," and "This is the Army" are examples of his numerous songs. In 1954 President Eisenhower signed a bill giving him a gold medal in recognition of his services in composing many popular songs, including "God Bless America."

Berliner (*bûr'lĭn-ẽr*), **Emile (1851-1929)**, inventor, was born at Hanover, Germany; was graduated at Samson School, Wolfenbuttel, 1865; and came to the United States, 1870. In 1878, he was appointed chief inspector of instruments for the Bell Telephone Company, where his inventive skill was applied to perfecting various features of the telephone. In 1877, he invented the loose contact telephone transmitter, known as the Berliner microphone, and was the first to use an induction coil in connection with transmitters, 1878. In 1887, he invented the gramophone. He invented also the present method of duplicating disk records and was the first to construct the revolving cylinder internal combustion motor, extensively used on airplanes. See *Phonograph*.

Berlioz (*bĕr'lĭ-ōz*), **Hector (1803-1869)**, French composer, was born at La Cote Saint Andre. While inferior in melodic invention to the leading composers of his century, his accurate knowledge of instrumentation enabled him to make great advances in orchestral technique. The progress made by Wagner, Liszt, and Richard Strauss is founded on developments originally worked out by Berlioz. Among his most notable productions are *The Damnation of Faust*, *Harold*, *Romeo and Juliet*, and *The Trojans*. He was chief of the romantic school of music.

Bernard (*bûr'nărd; bĕr-närd'*), **Saint (1091-1153)**, of Clairvaux, was born of a noble family at Fontaines, near Dijon, France. In 1113, he entered the Cistercian monastery of Citeaux and, in 1115, became the first abbot of the newly founded monastery of Clairvaux, in Champagne. His studious, ascetic life and stirring eloquence made him the oracle of Christendom. He founded 160 monasteries. The "mellifluous doctor" is regarded by the Catholic Church as the last of the fathers. He drew up the statutes of the Knights Templars in 1128; secured the recognition of Pope Innocent II; and kindled the enthusiasm of France for the Second Crusade.

The influence of Saint Bernard as a spiritual teacher, through his fervid piety and living grasp of Christian doctrine, was a wholesome antidote to the dry and cold scholasticism of the age. He was one of the greatest of the Latin hymn writers, many modern hymns being based on his *Jesu Dulcis Memoria*. He was canonized in 1171.

Bernard of Cluny (c. 1100-c. 1156), Benedictine monk, was born of English parents at Morlaix, Brittany. He is known principally for a poetical description of heaven which, translated, has given rise to three famous hymns—"Jerusalem the Golden," "The World is Very Evil," and "For Thee, O Dear, Dear Country." The original description was in Latin verse, the introduction to his *De Contemptu Mundi*, "On Contempt of the World."

Bernhardt, Rosine Sarah (1844-1923), French tragic actress, was born at Paris. Her parents were Jewish, of French-Dutch descent, but she was educated in Grandchamp Convent at Versailles. She made her first appearance on the stage in 1862 at the Thêâtre Français, but at first attracted little notice. In 1867, her playing of the part of the queen in Victor Hugo's *Ruy Blas* made her famous. The war of 1870-71 interrupted her career, and for a while she became a nurse. She then won a position in the Thèâtre Français, the troupe of which she accompanied in 1879 to London, where her triumphs were repeated in succeeding years and where, in 1882, she married Jacques Damala, a Greek actor, from whom she separated the next year. She toured with great success in America and in all the principal countries of Europe. In 1893, she established a theater of her own in Paris. Endowed with a matchless voice and a remarkable gift of artistic poise and movement, she was excelled in dramatic art by no actress of her time. She was also a painter and sculptor and she wrote two plays—*L'aveu* and *Adrienne Lecouvreur*—in addition to a volume of memoirs. Despite an accident necessitating the amputation of a leg, she continued to act in restricted roles until the end of her life.

Bernini (*bĕr-nē'nē*), **Giovanni Lorenzo (1598-1680)**, known as the Cavalier Bernini, Italian painter, architect, and sculptor, was born at Naples. His "Apollo and Daphne," produced from a single block, when he was but 18 years of age, was considered a masterpiece, but his finest works are found in the colonnade at Rome. He became one of the architects of Saint Peter's at Rome, completed the famous Barberini palace, restored the bridge of Sant' Angelo, designed or completed about 40 busts, over 50 statues, and some 50 architectural works. During his lifetime, he was loaded with honors such as few artists have ever received. His ideals of sculpture profoundly influenced the art of Europe for a century. In architecture, he was a leader in development of the baroque style.

Bernoulli (*bĕr'nōō'yē'*), **James (1654-1705)**, Swiss mathematician, was born at Basel. He devoted his life to the study of mathematics, of which he became professor in the University of Basel. Among his first works were *A Method of Teaching Mathematics to the Blind* and *Universal Tables on Dialling*. These were followed by *Conamen Novi Systematis Cometarum* and an essay *De Gravitate Ætheris*. Among his triumphs are to be recorded his solution of Leibnitz's problem of the isochronous curve, his determination of the catenary, and his investigation of the properties of isoperimetrical figures.

Bernoulli, John (1667-1748), brother of the preceding, was born at Basel, 1667. He and James were the first two foreigners honored by the Academy of Sciences at Paris. John devoted himself to chemical as well as to mathematical science. In 1694, he became a doctor of medicine and, soon after, professor of mathematics at Groningen, whence he later removed to succeed his brother James in the University of Basel. His forte was pure mathematics, in which he had no superior in Europe in his day. Among his achievements were the determination of the "line of swiftest descent," and the invention of the "exponential calculus." His son Daniel (1700-82) developed the kinetic theory of gases,

Bernstein (*bĕrn'stĭn*), **Henry Leon Gustave Charles (1875-1953)**, French dramatist of Jewish parentage, was born in Paris. He received his education in Paris and early turned his attention to the drama. Beginning in 1900, he produced many popular plays, several of which have been presented on the English and the American stage. Exhibiting much technical skill in the construction of plots, his work is characterized by bold execution and intense emotion. His first play, *Le marche*, was produced at the Free Theater in Paris by Antoine. His subsequent plays include *La détour*, *La griffe*, *La rafale*, *Le voleur*, *Samson*, and *Israel*. These plays depict the conflict of the human will to outer forces. Later, he portrayed the soul in conflict with itself. Among his later dramas are *L'assaut*, *Le venien*, and *Le coeur*.

Bernstein, Leonard (1918-), American conductor, pianist, and composer, was born at Lawrence, Mass. He was educated at Harvard (1939) and the Curtis Institute of Music (1941). He sprang into prominence as a conductor one night in November 1943 when, owing to the illness of Bruno Walter, he was called upon at short notice to conduct the New York Philharmonic Orchestra. This brought him many engagements with major orchestras in this country and Europe.

Bernstein first became known as a composer in 1944 with the performance of his symphony *Jeremiah* which won the critics' award. His humorous ballet about three sailors on shore leave, *Fancy Free*, came later the same year, as did his musical comedy on the same theme, *On The Town*, which was a Broadway success. His second symphony, *The Age of Anxiety*, was first performed in 1949.

Bernstein has been on the faculty of the Berkshire Musical Center since 1948, and professor of music at Brandeis University since 1951.

Berry, Martha McChesney (1866-1942), American philanthropist, was born near Rome, Ga. Her early education was received at a private school and through European travel, after which she won a degree at the University of Georgia when 44 years of age. In the meantime she had devoted her efforts to founding a group of schools at Mount Berry for the children of mountaineers in Georgia. For her work in thus extending educational opportunities to an underprivileged group, she was voted a "distinguished citizen" by the Georgia legislature in 1924 and, in 1931, was chosen as one of the twelve greatest American women in the *Pictorial Review* poll.

Berthelot (*bĕr't'-lō'*), **Pierre Eugène Marcellin (1827-1907)**, French chemist, was born at Paris. He served as professor of organic chemistry at the Ecole Superieure de Pharmacie, 1859-65, and then accepted a similar chair, created for him, in the College de France. He succeeded Louis Pasteur in 1889 as permanent secretary to the Academy of Sciences. His work in synthesizing organic compounds for the first time disproved the theory that a "vital force" was necessary for their formation and laid the foundation for the modern science of inorganic chemistry.

Berthollet (*bĕr'tô'-lĕ'*), **Claude Louis, Count de (1748-1822)**, French chemist, was born at Talloire, in Savoy. He studied medicine at the University of Turin. After obtaining his degree in 1768, he proceeded to Paris, where he studied chemistry, becoming associated with Lavoisier. In 1785, he pointed out the use of chlorine for bleaching purposes. He was appointed professor at the Ecole Normale in 1794 and accompanied Napoleon's expedition to Egypt, 1798-99. Returning, he was made senator, count, and grand officer of the Legion of Honor. Among his many inventions and discoveries were processes for preserving water in ships, glazing linen, bleaching fabrics, and the artificial production of niter. He was the first to introduce the idea of equilibrium into chemical theory, and he did much to reform chemical nomenclature.

Bertillon (*bĕr'tē'yôn'*), **Alphonse (1853-1914)**, French anthropologist, was born at Paris. He was long head of the identification department in the prefecture of police of Paris and, in 1880, founded the "Bertillon system" for

identifying people by means of bodily measurements. It has been widely adopted in American penal institutions. His publications include *La photographie judiciaire, Identification anthropométrique,* and *Anthropologie métrique et photographique.*

Berzelius (*bĕr-zē'lĭ-ŭs*), **Jön Jakob (1779-1848),** Swedish chemist, was born at Westerlosa, in East Gothland, Sweden. He was permanent secretary of the Academy of Sciences at Stockholm and was made baron in recognition of his scientific discoveries.

He is the author of the dualistic (binary) theory of the chemical constitution of compounds and devised the system of chemical symbols now in use. He determined with great accuracy the combining weight of a number of elements and thus placed Dalton's atomic theory on a firm quantitative basis. He discovered the elements selenium, cerium, and thorium and was the first to produce columbium, tantalum, and silicon in an isolated state. The range, number, and accuracy of his investigations were remarkably great, and the science of inorganic chemistry largely rests upon his theories and discoveries. See *Selenium; Symbols, Chemical.*

Besant (*bĕs'ănt; bĕz'ănt*), **Annie (1847-1933),** née Annie Wood, English theosophist, was born in London. She was educated privately in England, Germany, and France. At first a devout ritualist, she married Rev. Frank Besant in 1867, from whom she was separated in 1873. In the following year, she joined the National Secular Society and worked in the free thought and radical movements led by Charles Bradlaugh, with whom she was coeditor of the *National Reformer.* She joined the Theosophical Society in 1889, became a devoted pupil of Mme. Blavatsky, and traveled to all parts of the globe in service of theosophy. She founded the Central Hindu College in 1898 and, in 1904, the Central Hindu Girls' School, Benares. She also helped to found the Hindu University. Espousing the cause of Indian independence she organized the India Home Rule League; and, in 1917, was president of the Indian National Congress. In 1926-27, she traveled in the West with her protégé, J. Krishnamurti, whom she heralded as a messiah or world teacher, although he later renounced the role. Her publications include *Reincarnation, Death and After, Karma, Man and His Bodies, The Religious Problem in India, Theosophy and the New Psychology, India,* and *The New Civilization.*

Bessborough, Vere Brabazon Ponsonby, Earl of (1880-1956), 13th governor general of Canada, was born in County Kilkenny, Ireland. He graduated from Trinity college, Cambridge, qualified as a lawyer, and was a member of the House of Commons from 1907 to 1920, when he succeeded to his father's title. During World War I, he served in the Gallipoli campaign and on the British military staff in France. He was prominently identified later with mining and railroad corporations. From 1931 to 1935 he was governor general of Canada.

Bessel (*bĕs'ĕl*), **Friedrich Wilhelm (1784-1846),** German astronomer, was born at Minden, Prussia. He attracted attention by his computation of the orbit of the comet of 1607. In 1810, he was appointed director of the new observatory at Königsberg, where the rest of his active life was passed. His *Fundamenta Astronomiæ* and *Tabulæ Regiomontanæ* were epoch-making works. His determinations of the parallax of stars ushered in a new era in sidereal science. He has been called the father of modern observational astronomy.

Bessemer, Sir Henry (1813-1898), English engineer and inventor, was born at Charlton, England. Of his many inventions, the chief is the process, named after him, of converting pig iron into steel by blowing a blast of air through the iron while in fusion until everything extraneous is expelled and only a definite quantity of carbon is left in combination. This process revolutionized the iron and steel industry throughout the world, enormously increasing production and reducing the cost to a small fraction of that of earlier methods. He was knighted in 1879. See *Bessemer Steel.*

Bethmann-Hollweg (*bāt'măn-hōl'vāĸ*), **Theobald von (1856-1921),** German statesman, was born of Jewish lineage at Hohenfinow, near Berlin; was educated at the College of Pforta and at the universities of Strasbourg, Leipzig, and Berlin; and was elected to the Reichstag in 1890. In 1909, he became chancellor of the German Empire and, as such, was a friend and adviser of Emperor William II. In an interview with Sir Edward Grey in 1914, Bethmann-Hollweg referred to the Belgian neutrality treaty as a "scrap of paper"—a phrase that became historic. See *World War I.*

Bethune (*bŭ-thōōn'*), **Mary McLeod (1875-),** American Negro educator, was born at Mayesville, S.C. After she was graduated from the Moody Bible Institute, Chicago, in 1895, she became a teacher, and in 1904 founded the Daytona (Florida) Normal and Industrial School for Girls (now Bethune-Cookman College), of which she was president from 1904 to 1942. Active with many organizations concerned with the welfare of the colored people, Mrs. Bethune has served as adviser on minority matters to officials of the Federal government, and has been honored by many institutions and associations for her outstanding services to the Negro race.

Bevan, Aneurin (1907-), British socialist statesman, was born at Tredegar, Monmouthshire, England. The son of a coal miner, he followed the same occupation when he left school, at the age of 13. He became active in the South Wales Miner's Association. Since 1929 he has been a Labor party member of Parliament, noted for his skill in debate. In 1945 Prime Minister Clement Attlee made him minister of health, a cabinet post which he held until 1951, when he was appointed minister of labor and national services. He resigned the same year because of difference with the Labor party leadership. His book, *In Place of Fear,* was published in 1952.

Beveridge, Albert Jeremiah (1862-1927), American publicist, was born on a farm in southwestern Ohio. His family removed to Illinois after the Civil War. He was graduated at DePauw University, Indiana, 1885, read law, was admitted to the bar, and began practice. He was identified with many important cases and, in 1899, was elected to the United States Senate, continuing to sit until 1911. He was well known as an orator and Republican campaign speaker and became a leader of the Progressive party in 1912. His publications include *The Young Man and the World, The Meaning of the Times,* and *Life of John Marshall.* He was elected to the American Academy of Arts and Letters in 1924.

Bevin, Ernest (1884-1951), English labor leader and politician. As a dock worker in London he joined the Transport and General Workers union. He was secretary of the union in 1924, when the union called a strike of 100,000 workers in demands for a pay increase of 2 shillings a day and regularity of employment. He was credited with tipping the scales toward a favorable settlement by producing at the conference table food in the actual amount which the average worker was able to buy in a week on his current earnings. In 1937, he was made chairman of the Trades Union Congress, where he supported the government in its policy of non-intervention in Spain, although his more radical opponents warned that a Fascist victory in Spain would threaten the safety of democratic countries. When the threat of invasion by Germany overhung England in 1940, Bevin was made minister of labor supply. With the Labor party's victory in 1945, he became secretary for foreign affairs. He resigned shortly before his death.

Bewick (*bū'ĭk*), **Thomas (1753-1828),** English wood engraver, was born near Newcastle. He was apprenticed to Ralph Beilby at Newcastle at the age of 14. His first important work was a series of cuts for Gay's *Fables* in 1775, followed by enlarged editions in 1779 and 1784. His first cuts from his own original designs appeared in the *General History of Quadrupeds* in 1790. His greatest work is the *History of British Birds.* He illustrated many books, including Thomson's *Seasons,* Burns's *Poems,* and *Æsop's Fables.*

Bewick revived the art of wood engraving. He was the first to cut into the end of the block instead of the side and was the inventor of the white line, which is the characterizing feature of modern engraving, the design being cut into the block instead of remaining in relief.

Bidault (*bē'dō'*), **Georges (1899-),** French statesman, was born in Moulins. He fought in World War I, was graduated from the Sorbonne, and engaged in teaching and journalism. He served in World War II, was taken prisoner, and on his return to France in 1941 joined the underground, and became president of the National Council of Resistance. In 1944 Bidault became minister of foreign affairs in DeGaulle's provisional government, and continued to hold that position, except for the interlude of Blum's ministry, until the fall of Schuman's government in 1948. He was also provisional president and premier in 1946. He represented France in the San Francisco convention and in the first United Nations assembly. He was minister of national defense in 1951-52 and minister of foreign affairs in 1953.

Biddle, John (1615-1662), founder of English Unitarianism, was born at Wotton under Edge, Gloucestershire. For preaching heretical doctrines he was thrown into jail in 1645 and twice during the Commonwealth, until Cromwell, to save his life, banished him for three years to the Scilly isles. Returning, he preached in London, where he was again committed to jail in 1662.

Bierce, Ambrose (1842-c. 1913), American satirist and story writer, was born in Meigs County, Ohio. He was self-educated with the aid of his father's ample library. Having served through the Civil War, in which he was breveted a major for bravery, he entered journalism as editor of the *News Letter* in San Francisco. Going to London in 1872, he won the name "Bitter Bierce" for his caustic humor in the periodical *Fun* and several books,

including *The Fiend's Delight*. Returning to San Francisco in 1876, he wrote a column "Prattle" in the *Examiner*, which, by making or unmaking literary and political reputations, rendered him a power to reckon with on the West Coast for a quarter of a century. His books include *Fantastic Tales, The Cynic's Word Book* (republished as *The Devil's Dictionary*) and *The Shadow on the Dial*. In 1913 he departed for Mexico, and was never heard of again.

Bierstadt (*bēr'stät*), **Albert (1830-1902),** landscape painter, was born near Dusseldorf, Germany, and, in infancy, came to New Bedford, Mass. After studying in Europe, and making repeated visits to the western United States, he specialized in pictures of scenes in the Rocky Mountains, Sierras, and Switzerland. With F. E. Church and Thomas Moran, he introduced the panoramic manner into American landscape art.

Bigelow, Poultney (1855-1954), American author and journalist, was born in New York. He was graduated from Yale, 1879, and from Columbia Law School, 1882; was admitted to the bar, 1882, but gave up law practice for travel and journalism. During 1875-76, he went around the world in a sailing ship, visited shores of New Guinea, and was wrecked on the Japanese coast. He circumnavigated the world three times, studying tropical colonization, and lectured at leading universities on colonial administration. He became intimate with William II of Germany. During the Spanish-American War, he was correspondent for the London *Times*.

"Billings, Josh." See *Shaw, Henry Wheeler*.

Binet (*bē'nĕ'*), **Alfred (1857-1911),** French psychologist, was born at Nice, France. He was one of the editors of *L'Année Psychologique*, and director of the psychological laboratory at the Sorbonne, Paris. His works treat many subjects in physiological psychology, particularly with reference to the study of practical, social, and educational questions. In this field, he collaborated with Thomas Simon, endeavoring to find a standard by which degrees of intelligence may be measured. Their combined researches resulted in the publication, in 1905, of the *Binet-Simon Tests*, which have been widely employed by educators. See *Education: General Intelligence Tests*.

Biot (*b'yō'*), **Jean Baptiste (1774-1862),** French astronomer and physicist, was born at Paris. He is noted for his researches in the circular polarization of light and was the founder of saccharimetry by use of the polariscope.

Birdseye, Clarence (1866-1956), pioneer frozen food industrialist, was born in Brooklyn, New York. Soon after he was graduated from Amherst College in 1910, he became a fur trader in Labrador, where he discovered that he had a taste for frozen seal, whale, and caribou. Devising a machine which would freeze foods quickly, he organized a company at Gloucester, Massachusetts, which specialized in processing and selling frozen seafoods. In 1929 he sold out to the Postum Company, which became General Foods Corporation. Continuing as consultant to that company, he carried on his work of developing processes for the preservation of food. In this field and in that of incandescent light he has been granted about 250 patents in the United States and foreign countries.

Birmingham, George A. See *Hannay, James Owen*.

Bishop, Sir Henry Rowley (1786-1855), English composer, was born at London. At an early age, he devoted himself to the composition of dramatic music, and, in 1809, produced his *Circassian Bride*, which was a marked success. In 1810, he became director of music at Covent Garden theater, and, while engaged in this position, produced many operas, including *The Lady of the Lake, Guy Mannering*, and *The Slave*. In 1840, his dramatic piece, *The Fortunate Isles*, was produced in honor of Queen Victoria's wedding. In 1842, he was knighted and, in 1848, became professor of music at Oxford. He wrote the familiar melody to John Howard Payne's "Home, Sweet Home."

Bismarck-Schönhausen (*bĭs'märk - shûn'hou'zĕn*), **Prince Karl Otto Eduard Leopold von (1815-1898),** German statesman and the creator of German unity, was born at Schönhausen, Prussia. He studied at the universities of Göttingen and Berlin. He obtained his degree in jurisprudence in 1835 and, the next year, entered the army. In 1839, his help was needed at home to settle the property left in sadly embarrassed circumstances by his father. There he evinced a shrewd business tact and knowledge of men, the provident calculation, and the habit of organizing and commanding others that, in other circumstances, operated toward his later success as diplomat, economist, and chief of a government.

In 1847, Bismarck married Johanna von Puttkamer. In the same year, he won attention in the new Prussian diet as an ultraroyalist, and, in 1849, he was elected to the second chamber of the diet. His diplomatic career began in 1851, when he was appointed Prussian member of the resuscitated Germanic diet at Frankfort. There he manifested the zeal for the interests and aggrandizement of Prussia that undeviatingly guided him thereafter.

In 1859, Bismarck was sent as minister to Saint Petersburg, now Leningrad. In the spring of 1862, he was transferred as ambassador to Paris, and he had interviews with Palmerston and Disraeli in London. In the autumn, he was recalled to take the portfolio of the ministry for foreign affairs and the presidency of the cabinet. Throughout the events that ended in the humiliation of Austria at Königgrätz in 1866 and in the reorganization of Germany under the leadership of Prussia, Bismarck was the guiding spirit, and he logically became chancellor in 1867.

During the Franco-Prussian War of 1870-71, Bismarck was the spokesman for Germany. By falsifying a telegram, he had been largely responsible for the war, and he dictated the terms of peace to France. These included the cession of Alsace and Lorraine to Germany and an indemnity of one billion dollars, which was paid in gold in two years. He had been made a count in 1866, and he now became a prince. He was the first chancellor of the German Empire. The sole aim of his policy, domestic and foreign, was to consolidate the young empire by stabilizing its institutions and by making it secure, through alliances and political combinations, from attack by other nations.

Soon after the accession of William II, differences arose between him and the chancellor, and Bismarck resigned in March 1890. He spent the remainder of his life in open denunciation of the government, although a formal reconciliation took place between him and the emperor in 1894. Died at Friedrichsruh. See *History: Germany*.

Bitter, Karl Theodore Francis (1867-1915), sculptor, was born at Vienna. Austria. He studied sculpture in the Vienna Academy. In 1889, he came to the United States and soon rose to distinction as a sculptor. He won the competition for the Astor memorial bronze doors in Trinity Church, New York. He executed sculpture on the Administration building, World's Columbian Exposition, Chicago, and on the residences of C. P. Huntington and Cornelius Vanderbilt, New York.

In 1901, he was director of sculpture at the Pan-American Exposition, Buffalo, and, in 1904, was chief of department of sculpture, Saint Louis Exposition, contributing his notable "Louisiana Purchase" group. He designed much decorative sculpture for great commercial buildings in New York and other cities, and executed many fine marble and bronze statues and busts.

Bizet (*bē'zĕ'*), **Georges (1838-1875),** French composer, was born at Paris. He studied at the Paris Conservatory under Halévy, and in Italy. His best-known works are *Les pecheurs de perles, La jolie fille de Perth, L' Arlésienne, Djamileh*, the overture *Patrie*, and *Carmen*. The last named, which is founded on Mérimée's novel, has become one of the most popular of modern operas.

Björnson (*byûrn'sŭn*), **Björnstjerne (1832-1910),** Norwegian poet, novelist, and dramatist, was born in Kvikne. He entered the University of Oslo in 1852 and soon after began work as a journalist and dramatic critic. His first novel, *Synnöve Solbakken*, a story of peasant life, published in 1857, was followed by *Arne, A Happy Boy, The Fisher Maiden*, and many other pieces. In 1858, he became director of the theater at Bergen and produced two dramas, *Between the Battles* and *Lame Hulda*. An ambition to create a new national saga in a peasant setting was substantially realized in *Sigurd the Bastard*. Among his later well-known plays are *Mary Stuart in Scotland, Sigurd Slembe*, and *The Newly Married*. Besides his dramas, he wrote a series of folk plays, an epic, and much beautiful lyric poetry. A charge of treason based on his radical and republican views compelled him to reside abroad from 1881 to 1887. Björnson was the foremost novelist and poet and, excepting only Ibsen, the chief dramatist of his time in Norway. He received the Nobel prize for literature in 1903. See *Norwegian Literature*.

Black, Hugo Lafayette (1886-), American legislator and jurist, was born at Harlan, Ala. Obtaining a law degree at the University of Alabama in 1906, he entered practice at Birmingham, Ala., served as police judge for 18 months in 1910-11, and was prosecuting attorney for Jefferson county, 1915-17. In 1927, and again in 1934, he was elected, as a Democrat, to the United States Senate, where he sponsored an investigation of mail shipping subsidies that led to important changes of policy.

While in the Senate, Black became known as a vigorous exponent of legislation favorable to labor and to public ownership of utilities. He was a leader among those who asserted the power of Congress to regulate economic activities and to prevent the Supreme Court from blocking its efforts in this direction through what he called a tortured construction of the Constitution. He favored increasing the court's membership to bring about this result.

When Justice Van Devanter retired in 1937 from the tribunal, President Roosevelt nominated Senator Black to

succeed him. His opinions on the court established his reputation as an able and liberal jurist.

Black Hawk (1767-1838), American Indian warrior, was born at the Sauk village on Rock River, near the Mississippi, in what is now Illinois. He was Chief of the Sacs and Foxes, who attempted in 1831 to recover their tribal lands east of the Mississippi, which previously by treaty had been ceded to the United States government. This caused the "Black Hawk War," which resulted in the defeat and surrender of Black Hawk in Wisconsin in August 1832. The capture of Black Hawk terminated all serious resistance and the rapid settlement of Iowa and other disputed territory followed. Black Hawk died on the Sauk and Fox reservation on the Des Moines River, in Iowa. See *American History: Black Hawk War.*

Blackie, John Stuart (1809-1895), Scottish scholar and man of letters, was born at Glasgow. He was educated at Marischal College, Aberdeen, and at the University of Edinburgh. For three years, he was a student of theology at the University of Aberdeen. In 1829, he went to Germany, studying at Göttingen and at Berlin. Returning to Scotland, he made extensive preparations for the law, but his strong love of the classics and his taste for letters led him to adopt a literary and scholastic career. In 1839, he was made professor of Latin in Marischal College, and from 1852 to 1882 was professor of Greek at Edinburgh University.

Blackie was a zealous educational reformer, took an active interest in the remodeling of the Scottish universities, founded a Celtic chair in Edinburgh University, and spoke and wrote on a wide variety of subjects. Among his works, which are numerous, are *Self-Culture, Four Phases of Morals, The Language and Literature of the Scottish Highlands, Life of Burns, Christianity and the Ideal of Humanity,* a translation of Æschylus, and several volumes of verse.

Blackmore, Richard Doddridge (1825-1900), British novelist, was born at Longworth, Berkshire. He graduated at Exeter College, Oxford, in 1847; afterward studied law; was admitted to the bar; and practiced for a time as a conveyancer. Of his novels the earliest were *Clara Vaughan* and *Cradock Nowell;* but his greatest success was *Lorna Doone,* a 17th century romance with notably beautiful descriptions in rhythmic prose, which has become a classic of English fiction. Blackmore's other novels include *The Maid of Sker, Alice Lorraine, Cripps the Carrier, Erema, Mary Anerley, Christowell, Tommy Upmore, Springhaven, Perlycross,* and *Dariel.*

Blackstone, Sir William (1723-1780), English jurist, was born at London. He was a judge, a member of Parliament, and author of the well-known *Commentaries on the Laws of England.* At the bar, after seven years' practice, his prospects were so indifferent that he retired to Oxford on his fellowship and there gave public lectures on English law. Their success is supposed to have suggested to Viner the propriety of establishing a professorship of law in the university, to which office Blackstone was elected in 1758, being the first Vinerian lecturer. In 1770, he became one of the judges of the common pleas.

Blackwell, Elizabeth (1821-1910), physician and writer, was born in Bristol, England. She emigrated to the United States in 1832, was educated in private schools in New York, and taught school in Kentucky and in the Carolinas. After being refused admission to several medical colleges, she entered the Medical School at Geneva, N. Y., 1847. She was the first woman in the United States to receive the degree of doctor of medicine.

After establishing a practice in New York, 1851, she founded a hospital and, in 1867, with her sister, Dr. Emily Blackwell, organized the Woman's Medical College of New York infirmary. She lectured in England, 1858-59; registered as a physician in England, 1859; and, after 1869, practiced in London and in Hastings. Her writings include *Physical Education of Girls, Religion of Health, Counsel to Parents on Moral Education, Pioneer Work in Opening the Medical Profession to Women, The Human Element in Sex,* and *Scientific Method in Biology.*

Blaine, James Gillespie (1830-1893), American statesman, was born at Brownsville, Pa. At 17 he graduated from Washington College, Pa.; he taught school at Georgetown, Ky., 1848-51, and in Philadelphia, 1852-54. In 1854, he went to Maine to engage in journalism, which he relinquished four years later for a seat in the legislature. He served there until 1862, when he was elected to Congress, where he remained 18 years. From 1869 to 1875, he was speaker of the House of Representatives. At the Republican national convention of 1876, Blaine was balloted on for the presidency and received 351 votes out of a total of 754. He was then elected United States senator, and four years later was again an unsuccessful aspirant for nomination to the presidency.

In 1881, President Garfield appointed him secretary of state but he resigned from the cabinet soon after Garfield's death. In 1884, he received the Republican nomination for president, but was defeated by Grover Cleveland by a very narrow margin. A change of less than a thousand votes in New York State would have made Blaine president. In 1889, he again became secretary of state, in the cabinet of President Harrison. Blaine was a parliamentarian of great ability, a brillant orator, and a notably resourceful and popular party leader. He wrote *Twenty Years of Congress* and *Political Discussions.* See *Mugwumps, Mulligan Letters.*

Blake, Eugene Carson (1906-), American religious leader, was born at St. Louis, Mo. He was graduated from Princeton University in 1928, and from Princeton Theological Seminary in 1932. He was assistant pastor of the Collegiate Church of St. Nicholas in New York (1932-35), and then successively pastor of the First Presbyterian Church, Albany, N. Y. (1935-40), and the Pasadena (California) Presbyterian Church (1940-51). Since 1954 he has been president of the National Council of Churches of Christ in the United States.

Blake, Robert (1599-1657), English admiral, who, more than any other, contributed to render England mistress of the seas, was born at Bridgewater, in Somersetshire. In 1649, in conjunction with two other officers of equal rank, he was appointed "general of the sea." After practically destroying the squadron of Prince Rupert, which had sought safety in the Tagus in 1651, Blake forced the Royalists to surrender Guernsey, Jersey, and the Scilly Islands.

In 1652, Blake was made sole admiral of the fleet and, during this year, fought four engagements with Dutch fleets under Tromp, Ruyter, and DeWitt. In the first, on May 19, the Dutch retreated under cover of darkness, with the loss of one man-of-war captured and another sunk. In the next engagement, a squadron of twelve ships was captured; in the third, on September 28, three Dutch vessels were destroyed and the rear admiral was taken.

In 1654, Blake was appointed by Cromwell to command an English fleet in the Mediterranean, where he soon made the British flag respected by Dutch, Spanish, and French alike. He next sailed to Algiers and Tripoli, and set free all the English who were detained as slaves. With Venice and Tuscany he concluded alliances highly favorable to England. In 1657, he defeated the Spaniards at Santa Cruz, one of the most daring actions in his career. He died at Plymouth harbor.

Blake, William (1757-1827), English artist and poet, was born at London. After studying art for some years, he began to paint in water colors and to engrave illustrations for magazines. At the same time, he wrote poetry which showed great power and beauty. His *Poetical Sketches, Songs of Experience,* and *Songs of Innocence* are among his best works. Most of his other poems are valuable chiefly because of the way, which he claimed had been revealed to him, of illustrating and printing them in various colors. He firmly believed that he held converse with the spirits of Homer, Virgil, Dante, and other great men. Among these quaint and now rare editions are *Books of Prophecies, Gates of Paradise, Vision of the Daughters of Albion,* and *America.*

Blakelock, Ralph Albert (1847-1919), American painter, was born in New York City. He was graduated from the College of the City of New York in 1869. He early abandoned the career of a physician and determined to become a painter. With no training in art and without guidance or assistance, he opened a studio in New York. While at length he produced many excellent pictures, recognition of their merits was exceedingly slow. Finally, the hardships and privations which he endured unsettled his mind. For about 18 years he was confined in an insane asylum. In 1916, he was released, seemingly completely recovered, and resumed painting.

Blakelock ranks with Inness, Wyant, and Homer among the foremost American painters of landscape. He is essentially a colorist and is distinguished for his evening and moonlight scenes and for his studies of the Indians of the West. Characteristic landscapes are his "Autumn," "Sunset," "Navarra Range," "Solitude," "Abode of the Stately Deer," and "Morning." Among his notable Indian pictures are "The Pipe Dance" (in the Metropolitan Museum of Art, New York), "Uintah Tribe," "Indian Girl," and "Shooting the Arrow."

Blasco Ibañez (*blăs'kō ē-bä'nyāth*), **Vicente (1867-1928),** Spanish novelist, was born in Valencia. His earliest works, such as the *Mayflower,* are sketchy pictures of life in his native province. Later, he developed a more minute and realistic style, somewhat resembling that of Zola, and produced novels which are characterized by great keenness of observation and descriptive power. Among his works, several of which have been translated into English, French, and other languages, are *The Shadow of the Cathedral, The Four Horsemen of the Apocalypse, Our Sea, Woman Triumphant, Blood and Sand,* and *The Temptress.* He was imprisoned 30 times for his political activities and views.

His *Alfonso XIII Unmasked*, in 1925, led to his exile from Spain. See *Spanish Literature: Contemporary Writers.*

Blashfield, Edwin Howland (1848-1936), American artist, was born in New York, and was educated in Boston Latin School. He studied painting at Paris, 1867, under Léon Bonnat; exhibited at several Paris salons, 1874-92, and also at the Royal Academy, London. He returned to the United States in 1881 and produced many genre pictures, portraits, and mural decorations. Among his paintings are "Christmas Bells" and "Angel with the Flaming Sword." He decorated the central dome of the Library of Congress, portions of the State capitols of Minnesota, Iowa, South Dakota, and Wisconsin, and other public buildings, and executed much private work. In recognition of his achievements, he was elected a member of the American Academy of Arts and Letters. He wrote *Mural Painting in America*, and, with his wife, Evangeline Wilbur Blashfield, was coauthor of *Italian Cities.* Jointly with Mrs. Blashfield and A. A. Hopkins, he edited Vasari's *Lives of the Painters.*

Blavatsky (*blä-vät's'kĭ*), **Helena Petrovna (1831-1891),** theosophist, was born in Ekaterinoslav. She was of noble descent and married a Russian councilor of state, from whom she separated soon after their marriage. She visited Tibet, where, she claimed, she discovered the doctrines later formulated as the tenets of the Theosophical Society. From 1873 to 1879, she was a resident of New York, became a naturalized American citizen and, with Col. H. S. Olcott and others, founded the Theosophical Society in 1875. Its purpose is to form the nucleus of the universal brotherhood of man, to promote the study of comparative religion, philosophy, and science, and to investigate the unexplained laws of nature and the powers latent in man. In 1876 she published *Isis Unveiled*, a book basic to the movement. Her other writings include *The Secret Doctrine*, and *The Voice of Silence.*

Bliss, Tasker Howard (1853-1930), American general, was born at Lewisburg, Pa. He was educated at Lewisburg Academy, Lewisburg University (now Bucknell), and at the United States Military Academy at West Point, from which he was graduated in 1875. Entering the army, he rose steadily, becoming divisional chief of staff in the Puerto Rican campaign, 1898. He was collector of customs, Havana, 1898-1902. He was then promoted brigadier general and made member of the Army War College Board. After serving on the general staff, 1903-05, he commanded departments in the Philippines until 1909, when he became assistant chief of staff. Following service in various commands, including the Mexican border, 1911, he was made major general, 1915, chief of staff, 1917, and general, 1917, in the United States army. He was also made member of the Supreme War Council in France and, in 1919, served as military delegate of the United States to the Peace Conference at Versailles.

Blough, Roger M. (1904-), American lawyer and business executive, was born at Riverside, Pennsylvania. He received his bachelor of arts degree from Susquehanna University in 1925 and his legal degree from Yale in 1931. He practiced law in New York City from 1931 until 1942, when he was made general solicitor of the United States Steel Corporation, a position he held until 1951, at which time he was made vice president in charge of law and secretary of the company. Since 1952 he has been chairman and chief executive officer of the corporation.

Blücher (*blü'kĕr*), **Gebhard Leberecht von (1742-1819),** Prussian field marshall, was born at Rostock, Germany. He first entered the Swedish army but soon passed to the Prussian army, in which he served during the Seven Years' War. He went through the Polish campaign of 1772, and gained rapid promotion during the struggle with the French invaders, which began in 1792. In the campaign of 1814, Blücher held high command and,though defeated by Napoleon, he beat Marshal Marmont and entered Paris with the allies. In the Waterloo campaign, he commanded the Prussian army in Belgium, and was severely defeated by Napoleon at Ligny. However, by outmaneuvering Grouchy, he was able to arrive at Waterloo in time to decide the victory for the allies and to pursue the routed French army. See *Napoleonic Wars.*

Blum (*blüm*), **Leon (1872-1950),** French political leader, was born at Paris. A graduate of the Ecole Normale Supérieure, Paris, and a man of means, he devoted himself to literary work. When 53 years old, he obtained election to the Chamber of Deputies as an orthodox Socialist. Becoming leader of the Socialist party he long held the balance of power, but never served in the cabinet until 1936. In that year, organizing a "popular front" by alliance with the Communist party, he won an electoral victory which elevated him to the post of prime minister. Among his first laws were those securing governmental authority over the privately controlled Bank of France, increasing wages of laborers, and otherwise seeking to redistribute income. His ministry fell in 1937. He was arrested by the Vichy government and later taken to Germany, but returned when the war ended. He headed an economic mission to the United States in 1946, and in 1946-47 headed an interim government preceding the inauguration of the Fourth Republic.

Blumenbach (*bloo'mĕn-bäĸ*), **Johann Friedrich (1752-1840),** German physiologist and anthropologist, was born at Gotha. In 1776, he was made professor of medicine in the University of Göttingen, a chair which he filled with distinction for nearly 60 years. He was the founder of anthropology and his works gave a great impulse to scientific research. His chief writings are *Institutiones Physiologicæ*, *Manual of Natural History*, and *Manual of Comparative Anatomy and Physiology.* He was the first to classify the human species as Caucasian, Mongolian, African, American, and Malay.

Boabdil (*bō'ăb-dēl'*) **(?-1536),** or Abu-Abdallah, was the last Moorish king of Granada. He dethroned his father, Abu-l-Hasan, in 1481, and, two years later, was defeated and taken prisoner by the Castilians near Lucena. He was set free on condition of paying tribute. The Spaniards later besieged Granada, which was finally starved out in 1491, in spite of the reckless courage of the Moors and of Boabdil, whose weak and vacillating nature fell from him in the hour of battle. The spot from which he looked his last on Granada, after giving up to Ferdinand the keys of the city, still bears the name of *el ultimo sospiro del Moro*, "the last sigh of the Moor." Boabdil soon crossed to Africa, where he died in battle.

Boccaccio (*bōk-kä'chō*), **Giovanni (1313-1375),** Italian story-teller, was born probably in Paris. From an early period he displayed a love for poetry. In 1350, he formed an intimate friendship with Petrarch, and, following his friend's example, collected books and copied rare manuscripts which he could not afford to buy. It is said that he was the first Italian who ever procured from Greece a copy of the *Iliad* and of the *Odyssey.* Boccaccio was not only one of the most learned men of his time, but he was also one of the most enlightened in his scholarship.

While in Naples, about 1334, Boccaccio fell passionately in love with a young woman, called by him Fiammetta, who was generally supposed to be a daughter of King Robert. His passion was returned, and, to gratify her, he wrote *Il Filocopo*, a prose romance, and afterward *La Teseide*, the first attempt at romantic epic poetry, of which Boccaccio may be considered the inventor. In 1344, he wrote his *Amorosa Fiammetta.* He composed his humorous and lusty *Decameron* in Naples, to please Joanna, the daughter and successor of King Robert. In abundance of incident it is almost inexhaustible, though many of the stories are taken from older collections. See *Italian Literature: Early Period.*

Bode (*bō'dĕ*), **Johann Elert (1747-1826),** German astronomer, was born at Hamburg. At the age of 18 he foretold by calculation an eclipse of the sun. The next year he wrote an elementary treatise on astronomy. In 1774, he commenced the *Astronomical Year Book.* His fame rests chiefly on the *Uranographia*, published in 1801, in which he gives observations on 17,240 stars, or about 12,000 more than can be found in any previous charts. He reproduced the statement of the relations of the planetary distances, previously made known by Titus of Wittenberg, but afterward called "Bode's law." He died at Berlin.

Bodin (*bō'dăN'*), **Jean (1530-1596),** French publicist and economist, was born at Angers. He served as attorney to Henry III, exerting an influence in favor of freedom of conscience. He wrote one of the earliest treatises on the theory of prices. According to Bodin's greatest work, *Les six livres de la republique*, property and the family form the basis of society, and a limited monarchy is the best possible form of government, a theory which was at variance with the then current doctrine of the divine right of kings. He died at Laon.

Bodley, Sir Thomas (1545-1613), English diplomat and scholar. His family being forced to flee from England during the persecutions of Mary, he settled at Geneva. On the accession of Elizabeth, he returned to England and completed his studies at Oxford, thereafter becoming a member of the faculty. He was employed by the queen in diplomatic missions to Denmark, France, and the Netherlands, whence he returned to Oxford in 1596 and devoted himself to restoring and enlarging the library originally established there by Humphrey, Duke of Gloucester. The library was named Bodleian, in recognition of his work and his benefactions to it.

Boerhaave (D., *bōōr'hä-ve;* E., *bōr'hāv*), **Hermann (1668-1738),** Dutch physician, was born near Leiden, the Netherlands. In 1689, he was made doctor of philosophy; in 1693, he gained his medical degree at Harderwijk and returned to Leiden, where, in 1701, he was appointed lecturer on the theory of medicine. To combine practice

with theory, he caused a hospital to be opened, where he gave clinical instructions to his pupils.

In 1718, he undertook the professorship of chemistry, and published, in 1724, his *Elementa Chemiæ*, a work which occupies a high place in the history of chemistry. Peter the Great of Russia visited him at Leiden. His best-known works are his *Institutiones Medicæ* and *Aphorismi de Cognoscendis et Curandis Morbis.*

Boethius (*bō-ē'thĭ-ŭs*) or **Boetius** (*bō-ē'shĭ-ŭs*), **Anicius Manlius Torquatus Severinus** (**c. 480-524**), Roman statesman and philosopher. He absorbed most of the learning of his time and also filled the highest offices under the government of Theodoric the Goth. He became consul in 510 and was long the oracle of his sovereign and the idol of the people; but his strict integrity and inflexible justice incited enemies, to whose machinations he at last fell a victim. Falsely accused of a treasonable correspondence with the court of Istanbul, he was imprisoned and condemned to death. His *Consolations of Philosophy*, written in prison, and his translations of Aristotelian writings formed for centuries Europe's chief source of a knowledge of Greek philosophy. He was executed. See *Latin Literature: Period of Decline.*

Bogardus, James (**1800-1874**), American inventor, was born in Catskill, New York. He became a watchmaker and engraver, and manifested a marked aptitude for invention. His improvements on timepieces include the eight-day, three-wheeled chronometer clock. He invented the ring-flyer for cotton spinning, the eccentric mill where both stones turn in the same direction but with different speeds, and an engraving machine for engine turning. In 1833, he invented the dry gas meter; in 1839, he won the prize offered by the British government for the best machine for making postage stamps. In 1847, he built in New York for his factory the first structure erected entirely of cast iron. He also constructed implements for working india rubber and for deep sea sounding.

Bohlen, Charles Eustis (**1904- **), American diplomat, was born at Clayton, New York, and was educated at St. Paul's School and Harvard (1927). A career man in the United States Foreign Service, which he entered in 1929, he was vice consul at Prague (1929-31), Paris (1931-34), and Moscow (1934). In 1936 he was with the Department of State in Washington, and then second secretary at Moscow (1937) and consul (1938). He served as second secretary at Tokyo (1940-41); Department of State (1942); assistant chief, Division of European Affairs (1943); first secretary, Moscow (1943); chief, Division of Eastern European Affairs (1943); assistant to Secretary of State for White House Liaison (1944); special assistant to Secretary of State (1946); counselor, Department of State (1947); minister at Paris (1949); and again counselor, Department of State (1950-53). Since 1953 he has been United States Ambassador to the U.S.S.R. He has attended many important international conferences.

Bohr, Niels Henrik David (**1885- **), Danish physicist, was born at Copenhagen. He entered the University of Copenhagen in 1903. After receiving, in 1911, the degree of doctor of philosophy from the University of Copenhagen, he studied in England, first at the University of Cambridge under J. J. Thompson and later at the University of Manchester under E. Rutherford. He was an instructor in physics in the University of Manchester from 1914 to 1916, when he was elected professor of physics at the University of Copenhagen.

Bohr indicated how to fix mathematically the orbit of the electrons in the inner part of the atom and how to calculate the processes taking place there. According to his theory, supported by later verifications, electrons may jump from one orbit to another, the jump being accompanied by the emission of light. He thus adapted the quantum theory to atomic structure. In 1922 Bohr was awarded the Nobel prize for physics. In 1940 he escaped from Denmark to England, and took part in the work on the atomic bomb. In 1948 he came to the United States to join the Institute for Advanced Study at Princeton. He wrote *Theory of Spectra and Atomic Constitution* and *Atomic Theory and Description of Nature.*

Boito (*bō'ē-tō*), **Arrigo** (**1842-1918**), Italian composer and librettist, was born at Padua. He received his musical education at the Milan Conservatory where, about 1856, he composed parts of his opera *Mefistofele* which was a pronounced failure as first produced in 1868 at La Scala, Milan. After extensive revision it was successfully presented in Bologna in 1875 and in New York in 1880.

Boito won fame as the author of the librettos for Verdi's *Otello* and *Falstaff* and for Ponchielli's *Gioconda.* He also published several novels. He owes his chief distinction to the fact that his *Mefistofele* marks the epoch-making change in Italian opera from mere tunefulness and coloratura display to the new dramatic school exemplified by the later works of Verdi and by Ponchielli, Mascagni, Puccini, and Leoncavallo. See *Italian Opera.*

Bok (*bŏk*), **Edward William** (**1863-1930**), editor, was born in Helder, in the Netherlands. He came to the United States at the age of six; was educated in the public schools of Brooklyn, N. Y.; and was employed for a time by Henry Holt & Co. and by Charles Scribner's Sons, publishers. In 1886, he organized the Bok Syndicate Press, which handled Beecher's sermons with notable success. In 1887, he edited *The Beecher Memorial.* From 1889 to 1919, he was editor in chief of *The Ladies' Home Journal.* His writings include *The Young Man in Business, Successward, Why I Believe in Poverty, The Americanization of Edward Bok,* and *Twice Thirty.* In 1923, he gave a prize of $100,000 for an essay containing the most promising suggestions for the insurance of world peace. He was buried within his "singing tower," a bird refuge with a famous carillon of bells at Mountain Lake, Florida.

Boleyn (*bōōl'ĭn*), **Anne** (**c. 1507-1536**), queen of England and daughter of Sir Thomas Boleyn, was brought up at the French court. She became maid of honor to Queen Catherine of England. King Henry VIII, attracted by her beauty, had his marriage with Catherine declared void, and was married privately to Anne. She soon lost his favor, and, on a charge of unfaithfulness, was tried, condemned, and beheaded. She was the mother of Queen Elizabeth.

Bolingbroke (*bŏl'ĭn-brōōk*), **Henry Saint John, Viscount** (**1678-1751**), English statesman, was born in Battersea. Having studied at Eton, he entered Parliament in 1701, and, in 1704, became secretary for war. He afterward became secretary of state for foreign affairs, and negotiated the Treaty of Utrecht, which ended the War of the Spanish Succession by transferring French territory in the New World to England. In 1712 he was raised to the peerage. On the accession of George I, he was impeached on a charge of high treason, including the charge of having a secret understanding with France during the war. He fled from the country and was secretary of state to the first pretender, James Stuart, claimant to the English throne, for a short time prior to the pretender's defeat in 1715. Bolingbroke's property was confiscated but, in 1723, he was permitted to return. His estates were restored but he was not allowed to sit in the House of Lords. As a Tory leader, he opposed Walpole by intrigue and the pen. After 1735, he retired to his estates in France. There he wrote *The Idea of a Patriot King* and other works much admired in their time.

Bolivar (*bŏl'ĭ-vär;* Sp., *bō-lē'vär*), **Simon** (**1783-1830**), South American statesman, founder and first president of the republic of Colombia, is known as "the liberator of South America." He was born in Caracas, Venezuela; was educated in Madrid; and traveled in Europe and the United States. When the revolt against the Spanish yoke broke out in Venezuela, he joined the rebels, but was compelled to flee. In 1813, he returned and, gathering a force, defeated General Monteverde at Caracas. The tide then turned against Bolivar, who fled to Jamaica. He soon returned and, after varying fortunes, won decisive battles in 1819. These victories resulted in the establishment of the republic of Venezuela, to which was afterward united New Granada.

In 1822, Bolivar went to the aid of the Peruvians in their struggle for liberty, and was given the chief command. After long campaigns, the Spaniards were driven from Peru in 1825. A large area in southeastern Peru called Upper Peru, was constituted a separate republic, with the title of Bolivia in honor of the liberator. Later, Bolivar became president of Colombia. While circumstances compelled him to use dictatorial power, there is no proof that he was ever insincere in his devotion to the cause of liberty for which he spent his large fortune. In 1921, an equestrian statue of Bolivar was erected in Central Park, New York. See *History: Latin America, Bolivia, Colombia, Venezuela.*

Bonaparte, Charles Louis Napoleon. See *Napoleon III.*

Bonaparte, Jérôme (**1784-1860**), youngest brother of Napoleon I, was born at Ajaccio. He served as naval lieutenant in the expedition to Haiti. When war broke out between France and England in 1803, Jerome was cruising off the West Indies, but he was soon compelled to take refuge in New York. While in the United States, he married, in 1803, Elizabeth Patterson, daughter of a Baltimore merchant. Subsequently, he was employed by Napoleon in the liberation of Genoese prisoners who had been captured by the dey of Algiers. In the war with Prussia, he commanded an army corps in Silesia, and, in 1807, was made king of Westphalia.

After his brother's abdication, Jerome left Paris, 1814, and visited Switzerland and Austria, but ultimately settled in Florence. His request to be allowed to return to France was at first rejected, but was afterward granted. In 1848, he was appointed governor of the Invalides and, in 1850, was made a French marshal.

Bonaparte, Joseph (1768-1844), oldest brother of Napoleon I, was born at Corte, in Corsica, and was educated at Autun. On the death of his father, he returned to Corsica, exerted himself to support the younger members of the family, and removed with them to Marseilles in 1793. In 1797, he was elected a member of the council of five hundred and, in the same year, was sent as ambassador from the republic to Rome. In 1800, having proved his ability in several offices of state, he was chosen by the first consul as plenipotentiary to conclude a treaty of friendship with the United States.

After the coronation of Napoleon, Joseph was made commander in chief of the army of Naples and, in 1806, king of Naples. In 1808, he was summarily transferred by his brother to the throne of Spain, and Murat took his place as king of Naples. For Joseph this was an unfavorable change; he found himself unprepared to cope with the Spanish insurgents, and, after the defeat of the French at Vitoria, he returned to his estate at Morfontaine, in France. From 1815 to 1832, he lived in the United States.

Bonaparte, Josephine (wife of Napoleon I). See *Josephine, Marie Josèphe.*

Bonaparte, Louis (1778-1846), brother of Napoleon I and father of Napoleon III. After receiving various honors, he was nominally made king of the Netherlands, being, however, little more than a subordinate to his brother. Although a foreigner, he administered the affairs of the kingdom in the interest of his people. He refused to accept the crown of Spain, and did not enrich himself by his reign. After the restoration of the house of Orange, Louis considered himself free from all responsibility, and returned to Paris, 1814.

Bonaparte, Lucien (1775-1840), brother of Napoleon I, and prince of Canino. He received his education in the College of Autun. Rising gradually from one office to another, he was elected deputy for the department of Liamone, and in the council of five hundred spoke against the squandering of state property, and formed a party favorable to the views of his brother Napoleon. Shortly before the 18th Brumaire, 1799, he was elected president of the council of five hundred, and was of great assistance to his brother in securing the dictatorship of France.

As ambassador to Madrid, 1800, Lucien contrived to gain the confidence of King Charles IV. It is said that for his services in the treaty of peace concluded between Spain and Portugal, 1801, he received five million francs. His opposition to Napoleon's progress toward monarchy involved the brothers in many quarrels and, finally, Lucien was exiled from France. In 1810, he sailed for America, was captured, and was taken to England. There, after a debate in Parliament, he was declared a prisoner, but was treated with distinction. After his brother's downfall, he lived for some years in or near Rome.

Bonaparte, Napoleon. See *Napoleon Bonaparte.*

Bonaventura (*bŏ'nȧ-vĕn-tōō'rȧ*), **Saint (1221-1274),** cardinal, surnamed the "seraphic doctor," his real name being Giovanni Fidanza, was born in Tuscany. He entered the Franciscan order in 1238; was chosen general of the order in 1257; and was made cardinal in 1273. Of a mystical cast of mind but possessed of great subtlety in theological argument, he opposed the Aristotelian wing of thought represented by Roger Bacon. His piety and strict orthodoxy won him wide-spread veneration. He was canonized in 1482.

Bond, Carrie Jacobs (1862-1946), American song writer, was born at Janesville, Wis. She was educated in the public schools and, in 1887, married Dr. Frank L. Bond of Iron River, Mich., who died in 1895. In 1903, she published a group entitled *Seven Songs,* which became widely popular. These were followed in 1904 by the groups entitled *Ten Songs* and *Eleven Songs.* She won success as a program entertainer, singing her own songs and reading her own sketches and poems, which are simple in style and homely in sentiment. Her published works include also *Path o' Life; Stories in Verse; Animal Stories; The Roads of Melody,* an autobiography; and numerous songs among which are "A Perfect Day," "God Remembers When the World Forgets," and "Do You Remember." With her son, she established a music publishing business in Chicago, producing chiefly her own compositions.

Bondfield, Margaret Grace (1873-1953), English politician and first woman member of the British cabinet, was born at Chard, Somerset. Employed as a clerk in a store, she joined the Shop Assistants' Union, in which her executive and platform ability brought her the assistant secretaryship of the union in 1898. She was later an official in the Union of General and Municipal Workers. She became widely known as a lecturer on socialism and labor, and served as official of various national and international labor groups, representing England at the International Labour Office for six years. She was a member of Parliament in 1923-24 and 1926-31. Under Ramsay Macdonald's premiership she served as minister of labor.

Bone, Sir Muirhead (1876-1953), English etcher and painter, was born at Glasgow. Studying architecture, drawing, and painting at the Glasgow School of Art, he made numerous pencil and dry point illustrations of buildings in the city. He removed to London in 1901 and, in 1903, gave an exhibition of his work which established his reputation. His skill in depicting intricate scaffolding appears in "The Great Gantry," showing Charing Cross station being repaired in 1905. Among his other well-known illustrations are "Ayr Prison," "The Shot Tower," and "Liberty's Clock." While official artist for the British army and navy during World War I, he produced a series of illustrations entitled "The Western Front." He was knighted in 1937.

Bonheur (*bŏ'nûr'*), **Marie Rosalie** (more commonly called Rosa) **(1822-1899),** French artist and painter of animals, was born at Bordeaux. Her first master was her father, Raymond Bonheur, an artist of merit, who died in 1853. In 1841, she contributed two small pictures entitled "Two Rabbits" and "Goats and Sheep" to the French exhibition. These were followed by a succession of highly finished compositions. In 1849, she produced what some consider her finest picture, "Tillage in Nivernais," which was placed in the Luxembourg. In 1853, her famous "Horse Fair" was principal attraction of the Paris Exhibition, and, in 1865, she exhibited a new landscape of large dimensions, "Hay-making Season in Auvergne."

During the siege of Paris, 1870-71, her studio and residence at Fontainebleau were spared by special order of the crown prince of Prussia. The "Horse Fair" came into the possession of A. T. Stewart, of New York, and at the sale of his pictures in 1887 was bought for $55,500 by Cornelius Vanderbilt, and by him presented to the Metropolitan Museum, New York.

Boniface (*bŏn'ĭ-fās*), **Saint (680-755),** was born at Crediton, in Devonshire, England. His real name was Winfrid. Sent in 717 by Pope Gregory II to evangelize Germany, he performed the task so satisfactorily that he was made bishop in 723. His subsequent labors there, under the protection of Charles Martel, included also the extirpation of heresy and bringing German Christendom securely under the papal influence. Popularly known as "the apostle of Germany," he was named archbishop of Germany in 732 by Gregory III and primate of Germany in 748 by Pope Zachary. He was killed by a mob of armed pagans at Dokkum, in West Friesland.

Bonner, Edmund (c. 1500-1569), English prelate. A reputation he gained at Oxford by his knowledge of the canon law recommended him to the notice of Wolsey, who promoted him to several offices in the Church. After the fall of Wolsey, Bonner took an active share in the work of the Reformation and received due promotion from Henry VIII. In 1533, he was deputed to appear before the pope at Marseilles, to appeal for the excommunicated monarch to a general council. In 1540, he was made bishop of London. Bonner's Protestantism, however, extended only to the supremacy of the monarch over the pope. When Henry died, and the movement was extended to doctrine under Edward VI, he proved recalcitrant and was imprisoned, 1549.

The accession of Queen Mary restored Bonner to office, and gave him the opportunity of revenge. As vicegerent and president of the convocation, he was the principal agent in the persecution which was directed against the Reformers during the reign of Mary. After the accession of Elizabeth he refused to take the oath of supremacy. He was accordingly ejected from his bishopric and imprisoned in the Marshalsea, where he died.

Bonnet (*bŏ'nĕ'*), **Charles (1720-1793),** Swiss naturalist and philosopher, was born at Geneva. His *Recherches sur l' usage des feuilles dans les plantes* argues, on the basis of observations, that plants possess powers of sensation and discernment. In his *Considerations sur les corps organises,* he examined the theories of generation and described for the first time parthenogenesis among insects (aphids). He originated the term "evolution," and, by constructing a hierarchy of animals and contending that the same germ cells persist from generation to generation of individuals, he prepared the way for the content given by Darwin and Wallace to the term.

Bonnivard (*bō'nĕ'vär'*) **François de (1496-1570),** Swiss patriot and hero of Byron's *Prisoner of Chillon,* was born at Seyssel. He was educated at Turin, and became prior of Saint Victor, near Geneva, 1510, at the age of 14 years. An ardent republican, he took sides with the Genevese against Duke Charles III of Savoy. Having fallen into the hands of robbers who delivered him into the power of the Duke of Savoy, he was imprisoned in 1530 in the castle of Chillon. The Genevese, aided by the Bernese, effected his liberation in 1536. On his return to Geneva, he was awarded a pension. Byron's account of him draws heavily on legend.

Bonsels, Waldemar (1881-), German writer and traveler, was born at Ahrensburg, Holstein. Rebelling

against the business career marked out for him, he traveled widely as a vagabond in Europe and later made journeys through India, Ceylon, Egypt, and South America. His writings in large part are blends of descriptive material and reflections on life and society worked into a texture of rare artistry. Others are imaginative tales with allegorical overtones. Among his works translated into English are *Adventures of Maya the Bee, Heaven Folk,* and *An Indian Journey.*

Boone, Daniel (1734-1820), American frontiersman, was born near the present city of Reading, Pa. With no formal schooling, he became proficient in the use of the rifle and in woodcraft. In his 16th year he removed with his parents to the Yadkin Valley of North Carolina. In 1755, he was a volunteer in Braddock's unsuccessful expedition against Fort Duquesne and later fought in the French and Indian wars. Organizing a party of "thirty guns," he cut the 200 mile Wilderness Road through the Cumberland Gap to the Kentucky River, on which, in 1775, he established a settlement called Boonesborough, one of the first in Kentucky. Surprised outside the fort, he was captured by Indians, among whom he won such respect for his skill and character that he was adopted into their tribe. Several months later, in 1778, he escaped to Boonesborough in time to warn the Kentuckians of an impending attack on that fort, which attack the small force of Kentuckians, under Boone, withstood successfully against superior numbers, Boone being advanced to the rank of major as a result.

In 1786, he removed to Maysville, Ky., and later to West Virginia, where he was appointed lieutenant colonel of the Kanawha County militia. In 1791, he was elected to the Virginia assembly. Finally, he removed to Missouri, where he took up land and served as magistrate until 1804. Elected to the American Hall of Fame, 1915.

Booth, Edwin Thomas (1833-1893), American actor, son of Junius Brutus Booth, was born in Bel Air, Md. He first appeared on the stage in 1849 in *Richard III* and speedily rose in his profession. He visited England and the continent of Europe in 1861, 1880, and 1883, and met with enthusiastic receptions. From 1886 to 1891 he appeared with Lawrence Barrett. His last appearance was in *Hamlet* in 1891. He opened Booth's theater in New York, 1869, and did more than any other individual to keep the tone of dramatic art up to a moral and literary standard. He played Hamlet, Lear, and Othello with notable distinction. In his efforts to improve the American stage, he founded and endowed the Players' club. Elected to the American Hall of Fame, 1925.

Booth, Evangeline Cory (1865-1950), Salvation Army commander, was born in England, the daughter of William Booth, who founded the organization. She was director of field operations for the Salvation Army in London for five years, commander of the Army in Canada for nine years, and, 1904-34, was commander for the United States. In 1934 she was made general of the world wide Army, retiring in 1939. She was a distinguished orator. She composed the words and music of many Salvation Army songs and wrote, among other books, *The War Romance of the Salvation Army* and *Woman.*

Booth, William (1829-1912), founder and commander in chief of the Salvation Army, was born in Nottingham, England. He was converted among the Wesleyans and became a minister of the Methodist New Connection in 1852. He resigned in 1861, began evangelistic work, and, in 1865, organized the Christian Mission in the east end of London. Out of this grew, in 1878, the Salvation Army, whose ramifications spread later throughout the world.

He wrote *Orders and Regulations for Officers and Soldiers, Letters to my Soldiers, Religion for Every Day, Salvation Soldiery Visions, In Darkest England and the Way Out,* and numerous other books and pamphlets. He also published the newspapers entitled *War Cry, Young Soldier, Social Gazette,* and *Bandsman and Songster,* some of which were issued in as many as 20 languages. He repeatedly visited the United States, Canada, Australasia, South Africa, India, Japan, and several European countries.

Borah, William Edgar (1865-1940), American lawyer and statesman, was born in Fairfield, Ill. He was educated at Southern Illinois Academy, Enfield, Ill., and at Kansas State University. He was admitted to the bar in 1889, practiced law at Lyons, Kans., 1890-91. In 1891, he removed to Boise, Idaho, and devoted himself to the practice of law until he was elected to the United States Senate in 1907. He was re-elected for succeeding terms and, during 1924-33, was chairman of the Foreign Relations Committee. In this capacity he pressed strongly for early settlement of Allied debts owing to the United States. While favoring the "outlawry" of war, he consistently opposed both the entry of the United States into the League of Nations and American adherence to the World Court. His reputation rested more on his powerful opposition to legislative measures than to his positive influence in the adoption of policies or laws.

Borchgrevink (*bôrK'grĕ-vĭngk*), **Carsten Egeberg (1864-1934),** Norwegian scientist and antarctic explorer, was born in Oslo. He was educated at Gjertsen College, Oslo, and at the Royal College, Tharandt, Saxony. Emigrating to Australia in 1888, he became a surveyor, and, later an instructor in Cooerwull College, New South Wales, where he founded the Cooerwull Museum.

Sailing from London in 1898 in command of the *Southern Cross* expedition, Borchgrevink landed in South Victoria Land early in 1899. There he spent a year in exploration, mapping the coast, studying the flora and fauna, locating the south magnetic pole, and with sledges attaining the then "farthest south," latitude 78° 50′. The results were published in 1901 in his *First on the Antarctic Continent.*

Borden, Gail (1801-1874), American inventor, was born at Norwich, N. Y. During boyhood he emigrated with his parents to Kentucky and thence to Indiana. On account of impaired health, he removed in 1822 to Mississippi, where he became a teacher and a land surveyor. In 1829, he went to Texas and engaged in land surveying; compiled topographic maps; conducted a land office; and, with his brother, established at Houston the only newspaper published in Texas during the war for the independence of that colony from Mexico. After the establishment of the republic of Texas, Borden was appointed first collector of the port of Galveston and made the first surveys for laying out the city.

At the time of the gold rush to California in 1849, Borden turned his attention to providing suitable food supplies for emigrants crossing the plains. He produced the "pemmican," which Dr. Kane took with him on his arctic expeditions of 1850 and 1853. At this time Borden invented also the "meat biscuit," a highly concentrated portable food. In 1856, he secured a patent for producing condensed milk by evaporation in a vacuum, and soon afterward he established condensed milk factories in New York and Illinois. During the Civil War, his condensed milk was widely used in the army and navy. Borden experimented extensively upon condensing various other staple foods and produced an extract of beef of superior quality and many valuable preparations of condensed coffee, cocoa, tea, and fruit juices. From his various patents Borden amassed a large fortune.

Borden, Sir Robert Laird (1854-1937), Canadian statesman, was born at Grand Pre, Nova Scotia. He was educated at Acacia Villa Academy, Horton; began the study of law, 1874; and was admitted to the bar, 1878. He had an extensive practice in the supreme court of Nova Scotia and in the supreme court of Canada. Entering the Dominion Parliament in 1896, he took a leading part in important debates. In 1901, upon the resignation of Sir Charles Tupper, he was elected leader of the Conservative party in the Dominion House of Commons. Upon the defeat of the Laurier government in the elections of 1911, he became premier of Canada, and continued in the premiership until his resignation in 1920. He followed a strong imperial policy and opposed closer trade ties with the United States. He was member of the Imperial war cabinet, 1917-18; was the representative of Canada at the Peace Conference at Versailles, 1919, and at the Washington Conference, 1921-22. From 1924 to 1929 he was chancellor of Queen's University.

Borgia (*bôr'jä*), **Cesare (1476-1507),** Italian ecclesiastic and soldier, was the fourth son of Pope Alexander VI by Rosa Vanozza. In 1493, he was created a cardinal but resigned the office in 1498. He is said to have caused the death of his brother Giovanni, who was the Duke of Gandia, in order to gain complete ascendency in the papal government. In 1498, having been sent as nuncio to Louis XII of France, he was created Duke of Valentinois and married, in 1499, the sister of Jean d'Albret, king of Navarre.

After accompanying Louis XII in his Italian campaign, Borgia conceived the idea of founding a kingdom in central Italy, and, by force, treachery, and murder, he had almost succeeded in obtaining ascendency throughout the Roman states, when the death of his father deprived him of his great source of power. His name has become a synonym for treachery, cruelty, and complete absence of scruples. In 1504, he was sent as a prisoner to Spain by Pope Julius II, but escaped and joined the king of Navarre's army against Castile. In this campaign he was killed.

Borgia, Lucrezia (1480-1519), Italian patroness of art, sister of Cesare Borgia. Her father compelled her twice to marriage and divorce before she became the wife of the duke of Bisceglie. After her third husband had been murdered by Cesare Borgia, she married Alfonso of Este, and passed her life in the court of Ferrara, cultivating and lending patronage to literature and art. Her life had been largely managed to suit the political ambitions of her brother, a fact which gave rise to legend, since proved false, that she was addicted to innumerable vices.

Borglum (*bôr'glŭm*), **Gutzon (1867-1941),** American sculptor and painter, was born in Idaho. Beginning the study of art in San Francisco, he went to Paris in 1890 and studied in the Académie Julien and in the Ecole des Beaux-Arts. After exhibiting both paintings and sculptures in Paris, London, and Spain, he returned to America and became established in New York in 1901. In painting, his works include figures, animals, portraits, and mural decorations. His sculptural works comprise figures, horses, and groups in bronze. Among these are the gargoyles of the dormitory at Princeton University, the 42-figure bronze group "Wars of America" in Military Park, Newark, N. J., and "North America," the Sheridan Monument, and the colossal head of Lincoln in the Capitol, at Washington.

Borglum was chosen as the sculptor for the Stone Mountain Memorial to the army of the Confederacy, near Atlanta, Ga., and for the colossal patriotic monument on the face of Mount Rushmore in South Dakota. Borglum reflects the influence of Whistler in his painting and of Rodin in his sculpture. Congress authorized his and his wife's burial at the foot of Mount Rushmore.

Borglum, Solon Hannibal (1868-1922), American sculptor, brother of Gutzon Borglum, was born at Ogden, Utah, and spent his early life on a cattle ranch; at 24 he began to study art with his brother Gutzon. Later, he became a pupil in the Cincinnati Art School and studied under Louis Rebisso and Frémiét, Paris. He made special study of Western life, living among cowboys and Indians. In 1899, he was awarded honorable mention at the Paris Salon for his "Lame Horse." Among his chief works are "Stampede of Wild Horses," "The Last Roundup," "On the Borders of White Man's Land," "The Bucking Broncho," "Burial on the Plains," "Just Born," and "Evening." His later works include statues and portrait busts.

Bori (*bō'rē*), **Lucrezia (1887-),** Spanish singer, was born at Valencia. Educated in convents, she made her debut in the title role of *Carmen* at Rome in 1908, where her lyric soprano voice brought assurance of an outstanding career. After appearances in France and Latin America, she joined the Metropolitan Opera Company, New York, in 1912, taking principal roles in *La Traviata, Rigoletto, Madame Butterfly,* and two score other operas.

Borodin (*bŭ-rŭ-dyēn'*), **Alexander Porfiryevich (1834-1887),** Russian composer and chemist, was born at Leningrad. He studied medicine and chemistry, practiced medicine, and was made professor of chemistry at the Medicosurgical Academy. He went to Paris, Heidelberg, and Italy to prepare for his duties in this chair, in connection with which he made important researches and wrote many valuable monographs. About 1860, he championed the cause of university education for women in Russia and from 1872 until his death gave free instruction in chemistry at the Medical School for Women.

As a recreation from professional duties, Borodin devoted himself to musical studies and composition. While studying in Germany, he met Liszt, who regarded him highly and made his compositions known. He composed symphonies, orchestral pieces, piano music, and songs, but his most important work is the opera, *Prince Igor,* which he left unfinished at his death. It was completed by Rimski-Korsakov and Glazunov, and met with great success.

Boscawen (*bŏs'kà-wĕn; -kwĕn*), **Edward (1711-1761),** English admiral, familiarly styled "Old Dreadnought," was born in Cornwall. He distinguished himself at the taking of Porto Bello, 1739, and at the siege of Cartagena, 1741. In command of the *Dreadnought,* in 1744, he captured the French *Médée,* taking 800 prisoners. He had an important share in the victory of Cape Finisterre, 1747, and, in command of the East Indian expedition, displayed high military skill in the retreat from Pondicherry. In 1755, he intercepted the French fleet off Newfoundland, capturing two 64-gun ships and 1500 men; in 1758, he was commander in chief of the successful expedition against Cape Breton. Boscawen crowned his career by his victory over the French Toulon fleet in Lagos Bay, 1759. He received the thanks of Parliament, a pension of £3000 a year, a seat in the privy council, and the command of the marines.

Bossuet (*bô'sü-ĕ'*), **Jacques Bénigne (1627-1704),** French orator and prelate, was born in Dijon, France. He became bishop of Condom and of Meaux, and tutor to the dauphin, the son of Louis XIV. He wrote several controversial works, all in defense of the Roman Catholic doctrine; but his fame rests chiefly on his *Sermons.* As an ecclesiastical orator he has had no superior in France. Several of his compositions, written for the use of the dauphin, and especially his *Discourse on Universal History,* long retained a high reputation.

Boswell, James (1740-1795), Scottish writer and biographer, was born in Edinburgh. He early showed a penchant for writing and an admiration for literary men. He fell in with Dr. Samuel Johnson on a visit to London in 1763, and conceived for him the most devoted regard. In 1773, Boswell made a tour with him to the Hebrides, the *Journal* of which he afterward published. Boswell settled in London and was admitted to the English bar. In 1782, he succeeded to his father's estate, Auchinleck, in Ayrshire, with an income of 1600 pounds a year. Johnson died in 1784. In 1791 appeared Boswell's *Life of Johnson,* a unique biography which has done more to perpetuate Johnson's fame than any of the latter's celebrated writings. See *Johnson, Samuel.*

Botha (*bō'tä*), **Louis (1862-1919),** Boer soldier and statesman, was born at Greytown in Natal. He was a member of the Transvaal Volksraad, succeeded Joubert as commander in chief of the Boer forces in the South African war, 1899-1902, and, from 1907 to 1910, was prime minister of the Transvaal colony under the new constitution. In 1907, he visited England, attended the British colonial conference and received various honors. During 1914-15, he commanded the united British and colonial forces in southwest Africa with notable success, and received the surrender of the German army.

Böttger (*bůt'gĕr*), **Johann Friedrich (1628-1719),** Saxon alchemist and inventor, was born in Schleiz. While apprenticed to an apothecary in Berlin, he became interested in the search for the philosopher's stone and later conducted extensive investigations at Dresden. He was led to make use of the chemical knowledge he had thus gained in experimenting upon clays to ascertain their suitability for the manufacture of porcelain. Factories for this purpose were built under royal patronage and the discovery of the process of making Meissen, or Saxon, porcelain was the result. In 1708, Böttger was employed to superintend the factories and soon afterward Meissen porcelain was brought out.

Botticelli (*bŏt'tê-chĕl'lē*), **Alessandro (1444-1510),** properly Alessandro Filipepi, Italian painter. He was a pupil of Fra Filippo Lippi and became one of the most important Florentine painters of the early Renaissance. In response to the invitation of Pope Sixtus IV, he went to Rome and executed some fine paintings for the chapel of the Vatican. Among his most noted works are "Allegory of Spring," "Calumny," "Adoration of the Magi," "Birth of Venus," "Mars and Venus," "Magnificat," and several frescoes and madonnas. See *Painting: The Study of Anatomy.*

Bougainville (*bōō'găn'vēl'*), **Louis Antoine de (1729-1811),** French navigator, was born in Paris. In 1755, he went to London as secretary of the French embassy. In 1756, he acted as aide-de-camp to the Marquis de Montcalm, to whom the defense of Canada was intrusted. He made a voyage around the world, 1766-69, the first circumnavigation accomplished by a French navigator. The details of this voyage are described in his *Voyage autour du monde.* The scientific and geographic discoveries made on this expedition won fame for France similar to that secured for England by Cook's circumnavigations.

Boughton (*bô'tŏn*), **George Henry (1834-1905),** English painter, was born near Norwich, England, and was brought to the United States when three years old. He studied art in New York, Paris, and London, and, after 1861, resided in London. He became an associate of the Royal Academy in 1879 and a member of the Royal Academy in 1896. Among his paintings are "The Return of the Mayflower," "Evangeline," "Milton Visited by Andrew Marvell," "Passing into Shade," "Coming from Church," "Cold Without," "Morning Prayer," "The Scarlet Letter," "The Idyl of the Birds," "Puritans Going to Church," and "Clarissa Harlowe." He died in London.

Bouguereau (*bōō'gĕ-rō'*), **William Adolphe (1825-1905),** French painter, was born at La Rochelle. After a youth of hardship, he succeeded in reaching Paris, where he obtained admission to the studio of Picot, and later to the Beaux Arts. In 1850, he won the *prix de Rome,* and went to Italy to study. His first notable success was "The Body of St. Cecilia Borne to the Catacombs," exhibited in the Paris Salon of 1854 and later placed in the Luxembourg. From that time his reputation was made. He painted some portraits, but his subjects are chiefly ideal, idyllic, and religious. Many examples of his work are found in American galleries.

Bourbon (*bōōr'bŭn; bōōr'bôN'*), **Charles (1490-1527),** French general, known as "the constable de Boubon." For his bravery at the battle of Marignano in 1515 he was made constable of France. But powerful enemies strove to undermine him in the favor of Francis I. Threatened with the loss of some of his lands and dignities, he renounced the service of France and concluded a private alliance with the emperor Charles V and with Henry VIII of England.

At the head of a force of German mercenaries, Bourbon joined the Spanish army in Lombardy in 1523, but, invading France in 1524, failed at the siege of Marseilles. The next year, however, he was chief commander at the

great victory of Pavia, in which Francis I was taken prisoner. But Charles V distrusted him, though he made him Duke of Milan and Spanish commander in northern Italy. With George of Frundsberg, he led the mixed army of Spanish and German mercenaries that stormed and plundered Rome in 1527. In this fierce struggle, Bourbon was mortally wounded by a bullet said to have been fired by Benvenuto Cellini.

Bourdaloue (*bōōr'dä'lōō'*), **Louis** (**1632-1704**), French preacher, was born at Bourges. After being educated for the Church by the Jesuits, he lectured for some time on humanity and theological ethics. In 1669, he began to preach at Paris, where his discourses brought great crowds to hear him for many years, the audiences including even Louis XIV and his court. His sermons, based chiefly on the texts of Isaiah, Saint Paul, and Saint Augustine, were marked by profound moral earnestness and great logical power. They were delivered with shut eyes and with a sonorous but unaffected voice. He advocated a return to primitive evangelicism and spoke plainly about the vices of the court.

Bourget (*bōōr'zhā'*), **Paul** (**1852-1935**), French poet, critic, and novelist, was born at Amiens. In 1873 he first showed his gifts as a critic in an article contributed to the *Revue des Deux Mondes*. In a collection of poems which followed and in his prose *Studies* he revealed the chief characteristics of his style and thought. He wrote many realistic and analytical books, chiefly studies of the scientific and pessimistic tendencies of the time. Among these are *Cosmopolis*, *Pastels of Men*, *Antigone*, and *other Portraits of Women*, *Domestic Dramas*, *Outre-Mer: Impressions of America*, *The Two Sisters*, *The Emigrant*, *A Divorce*, *The Night Cometh*, *A Saint*, *The Sense of Death*, and *Our Acts Follow Us*. In 1894, Bourget was elected to the French Academy.

Bourinot (*bōō'ri-nō'*), **Sir John George** (**1837-1902**), Canadian historian, was born at Sydney, Nova Scotia. He was educated at Trinity College, Toronto, established the Halifax *Reporter*, and, in 1880, became clerk of the Dominion House of Commons. His publications deal with both the political and the constitutional history of the Canadian dominion. Among them are *How Canada is Governed*, *Constitutional History of Canada*, *Parliamentary Practice and Procedure*, *History of Canada* (in the Story of the Nations series), and *Canada Under British Rule*.

Bourke-White, Margaret (**1906-**), American photographer, was born in New York City. Immediately after graduating at Cornell University, she began commercial photography, specializing on industrial scenes. The skill with which her photographs bring out impressions of power and colossal size won her many prizes and a leading position in her field. She made the first industrial photographs to show the progress of Russia's "five year plan," and produced the motion pictures *Eyes on Russia* and *Red Republic*. Her pictures illustrate scenes in more than 20 countries, including the Arctic regions. Her photomurals adorn the rotunda of National Broadcasting Company at Rockefeller Center, New York. She was associate editor of *Fortune* from 1929 to 1933 and of *Life* after 1936. In 1939, she married Erskine Caldwell, the novelist, with whom she published *You Have Seen Their Faces* and *North of the Danube*. They were divorced in 1942.

Bowditch (*bou'dich*), **Nathaniel** (**1773-1838**), American astronomer, was born at Salem, Mass. At an early age, he showed an inclination for mathematics, in which he attained great proficiency without attending a university. His work, *The New American Practical Navigator*, became the standard authority for the United States Navy. He published also a translation of Laplace's *Mécanique Céleste*, to which he added valuable annotations.

Bowles, Samuel (**1826-1878**), American journalist, was born at Springfield, Mass. He was the son of Samuel Bowles (1779-1851), who, in 1824, founded the Springfield *Republican*. In 1844, this became a daily newspaper, and to it Samuel Bowles Junior devoted practically all his life, serving as editor for more than 30 years. He traveled widely over the United States and was always warmly interested in political affairs, though never holding office.

As a practical editor, Bowles stood in the first rank, satisfied with nothing less than the best work, sparing neither his own nor his subordinates' strength, not hampered in his work by either fear or friendship. He was an accomplished and fascinating conversationalist, cosmopolitan in taste, and liberal in opinion. He wrote *Across the Continent*, *Our New West*, and *The Switzerland of America*, which, with his numerous editorial writings, show his mastery of clear and vigorous English. As publisher and editor in chief of the Springfield *Republican*, he was succeeded by his son Samuel Bowles (1851-1915).

Boyesen (*boi'ĕ-sĕn*), **Hjalmar Hjorth** (**1848-1895**), Norwegian American novelist, was born at Frederiksvarn, Norway. He was educated in Oslo and Leipzig, and came to America in 1869. After editing *Fremad*, a Scandinavian journal in Chicago, he was professor of German at Cornell University, 1874-80. He held a professorship in Columbia University from 1880 until 1895. He mastered English with remarkable facility and became a widely popular writer of English prose. Among his best-known works are *Gunnar*, *Tales from Two Hemispheres*, *Falconberg*, *Ilka on the Hilltop*, *Queen Titania*, *A Daughter of the Philistines*, *Social Strugglers*, and *The Golden Calf*. His *Ilka on the Hilltop* was dramatized in 1884 and met with notable success. He wrote also a play entitled *Alpine Roses*, published a volume of poems called *Idyls of Norway*, and achieved wide reputation as a lecturer.

Boyle, Robert (**1627-1691**), English physicist and chemist, was born at Lismore Castle, Waterford, Ireland. After studying at Eton and under the rector of Stalbridge, Dorset, he went to the continent for six years. On his return in 1644, he found himself in possession, by his father's death, of the manor of Stalbridge, where he devoted himself to chemistry and natural philosophy. Settling at Oxford in 1654, he experimented in pneumatics, and improved the air pump. As a director of the East India Company, he worked for the propagation of Christianity in the East, circulated at his own expense translations of the Scriptures, and by bequest founded the "Boyle lectures" in defense of Christianity.

In 1660, Boyle formulated the important law of physics that the volume of a gas varies inversely as the pressure. This is known in English-speaking countries as Boyle's law, and in most other countries as Mariotte's law, although Mariotte in France did not publish his discovery until 1676.

Bracton, Henry de, British ecclesiastic and jurist, was born at Breton Clovelly, England, and was educated in law at Oxford. He was a "justice itinerant" in 1245 and soon after became judge. In 1264, he was made archdeacon of Barnstaple and chancellor of Exeter cathedral and is said to have become chief justice of England in 1267. His *De Legibus et Consuetudinibus Angliæ* was the earliest attempt at a systematic treatment of the body of English law and had no successor until Blackstone published his celebrated *Commentaries* 500 years later. The dates of his birth and his death are unknown.

Braddock, Edward (**1695-1755**), British general. He commanded against the French in America in 1755. With a force of 2000 British regulars and provincials, he moved forward to invest Fort du Quesne, now Pittsburgh, Pa.; his troops, in passing through a deep forest ravine, fell into an ambuscade of Indians, while they were attacked in the front by the French, and half of them were slain. The survivors effected a hasty retreat under Colonel, afterward General, Washington. Braddock's aide-de-camp. Braddock, mortally wounded, was carried 50 miles to Great Meadows where he died.

Bradford, William (**1590-1657**), one of the Pilgrims and second governor of Plymouth colony, was born in Austerfield, England. He sailed from Leyden, the Netherlands, in the *Mayflower*, 1620. One of his first acts, as the successor of Governor Carver in 1621, was to confirm the treaty with Massasoit just in time to supress a dangerous Indian conspiracy. By his tact, sound judgment, and marked ability as an administrator, he contributed greatly to the success of the struggling colony. He was governor, with some brief interruptions, for 31 years. He wrote a valuable *History of Plymouth Plantation* (*from 1602 to 1647*). See *Mayflower*.

Bradlaugh (*brăd'lô*), **Charles** (**1833-1891**), English reformer and politician, was born in London. He entered a solicitor's office, and soon achieved a great influence with workingmen, as an advocate of self-organization into unions. By lectures in the Hall of Science, London, on social, political, and religious questions, he won a reputation as the leading exponent of woman suffrage, birth control, and atheism. In 1860, he started the *National Reformer*, against which a government prosecution was instituted for obscenity on account of the publication of birth-control information. After a verdict of guilty, the indictment was quashed on a technical point. In 1872, he published his *Impeachment of the House of Brunswick*.

In 1880, he was elected to Parliament, but, refusing to take the oath, he was not allowed to take his seat until after the election of 1885, although he was repeatedly returned by his constituency. Afterward he earned a high reputation in the House of Commons as a spokesman for radical causes. He opposed socialism, however.

Bradley, James (**1693-1762**), English astronomer, was born in Sherborne. He was educated at Oxford and studied with his uncle, James Pound, who was a prominent astronomer. In his 29th year, he became Savilian professor of astronomy at Oxford; in 1727, he published his theory of the aberration of the fixed stars and announced the important discovery of the aberration. His discovery that the inclination of the earth's axis to the ecliptic is not constant enabled him to explain the precession of the equinoxes and the nutation of the earth's axis. Later he

became astronomer-royal at Greenwich, doing much to lay the foundations of modern astronomy.

Bradley, Omar Nelson (1893-), American general, was born at Clark, Missouri. He graduated at West Point in 1915, pursued advanced studies, and was promoted through grades to major general. In the Tunisian campaign he commanded the 2d Corps and was made lieutenant general. His part in this campaign led to his choice as general in command of American ground forces in the reconquest of France in 1944 and in the subsequent invasion of Germany. In 1945-48 he headed the Veterans Administration. He was chief of staff of United States Army 1948-49, and chairman of the Joint Chiefs of Staff 1949-53.

Brady, Matthew (1823-1896), American photographer, was born in Warren County, New York. Utilizing as soon as available the Daguerre process of photography, he established a studio in New York about 1842 and later one in Washington. He accompanied the Union armies in the Civil War to make photographic records. His photographs, many of them taken under fire, have been the basis of all later illustrations of the war. The government purchased a part of his collection.

Bragg, Braxton (1817-1876), American general, was born in Warren County, North Carolina. He served with distinction in the Mexican War. Joining the Confederacy, he succeeded General Beauregard in command of the army in Mississippi in 1862. He was unsuccessful against General Buell at Perryville; was defeated by Rosecrans at Murfreesboro; defeated Rosecrans at Chickamauga; and was defeated by General Grant at Chattanooga. He then was appointed chief of staff to President Davis.

Bragg, Sir William Lawrence (1890-), English physicist, was born at Adelaide, South Australia, son of Sir William Henry Bragg. He was educated at Saint Peter's College, Adelaide, and Trinity College, Cambridge. In 1914, he was made fellow and lecturer in natural sciences at Cambridge; in 1919, he was appointed professor of physics at Victoria University, Manchester; in 1938, Cavendish professor of experimental physics at Cambridge. He received the Nobel prize for physics jointly with his father in 1915. He was knighted in 1941.

Brahe (*brā;* Dan., *brā'ĕ*), **Tycho (1546-1601)**, Danish astronomer, was born at Knudstrup, Denmark; studied at Copenhagen; attended law classes at Leipzig in 1562; but soon devoted himself wholly to astronomy. After some years of travel abroad, he returned to Denmark and obtained the patronage of the Danish king, who, in 1576, built for his use a commodious observatory, called Uraniborg, on the Island of Hven. On the death of the king, in 1588, Brahe's position became insecure, and, in 1597, having obtained the protection of Emperor Rudolph II, he settled at Prague, where Kepler joined him in 1600.

Brahe introduced into the study of astronomy the use of better instruments and, by the accuracy with which he observed and recorded the position of stars and planets, he paved the way for later discoveries. It was due largely to the exactness of his observations that Kepler was led to the conception of the three fundamental laws of planetary motion. Brahe did not accept the Copernican theory that the earth revolves about the sun. He considered that the planets do, however.

Brahms (*brāms*), **Johannes**, **(1833-1897)**, German composer, was born at Hamburg. Schumann early expressed the highest opinion of Brahms's genius, which, however, for many years, was not appreciated by the general public. In 1861, Brahms went to Vienna, where he acquired a high reputation and held several important musical posts. In 1868, he composed the *Deutsches Requiem*, which, after the Franco-Prussian War, was performed throughout Germany. His compositions include four great symphonies; many overtures, serenades, and other orchestral pieces and concertos; much chamber and piano music; also organ pieces, choral works and numerous songs.

His music belongs to the classical school; seeks intellectual effects, but with intense underlying feeling; is always sane, well balanced, and never commonplace. Critics since his death have agreed in ranking him with Bach and Beethoven. See *Music: Masters Since Wagner*.

Braille (*brāl*), **Louis (1809-1852)**, French teacher of the blind, was born at Coupvray. He became blind in his third year and, at the age of ten, went as a foundling to the institute for the blind at Paris. He became proficient in music and held the position of organist in a church in Paris. He began teaching the blind in 1828 and, while professor at the national institution, devised and perfected his system of point writing for literature and music, known as the Braille system. It is now widely used in institutions for the instruction of the blind throughout the world.

Bramante (*brä-män'tā*) **(1444-1514)**, otherwise known as Donato d'Agnolo and often called Lazzari, Italian architect, was born near Urbino, Italy. He was employed at Rome by Popes Alexander VI and Julius II, for the latter of whom he planned, and partly executed, the buildings connecting the Belvedere and the Vatican. He later designed the great Church of Saint Peter's, completed by Michelangelo. Bramante first introduced Raphael at the court of Rome. See *Architecture*.

Brandeis (*brăn'dīs*), **Louis Dembitz (1856-1941)**, American jurist and publicist, was born in Louisville, Ky. He was educated in Louisville; at Dresden, Germany; and at Harvard Law School, where he was graduated in 1877. Although a successful lawyer, he became more widely known by reason of his active interest in social, economic, and political questions.

He was one of the first advocates of a radical policy of conservation of natural resources by the government. He acted as counsel for the people throughout proceedings testing the constitutionality of the Oregon and Illinois ten-hour laws for women. He was chairman of the arbitration board for the New York garment-workers' strike in 1910. In 1916, he was appointed justice of the United States Supreme Court. For many years he was usually in dissent when the court, having a conservative majority, decided questions of a social significance. In later years the court adopted many principles expressed in his earlier dissents. He retired in 1939. He was the author of numerous articles on wage-earners' life insurance, public franchises, and labor problems.

Brandes (*brän'dĕs*), **Georg (1842-1927)**, Danish literary critic, was born of Jewish parentage, in Copenhagen, where he graduated at the University in 1864. He taught at the University of Copenhagen, 1872-77, and lived in Berlin, 1877-82, where he wrote biographies of Lasalle, Tegner, and Beaconsfield. In 1882, he resumed residence in Copenhagen as a public lecturer with a subscribed guarantee.

Brandes ranks as one of the great systematic literary critics of modern times. As a disciple of Comte, Taine, and Spencer, he provoked much controversy by the boldness of his views and became the leader of the more aggressive thinkers of northern Europe. In his work *Main Currents in Nineteenth Century Literature*, he clearly depicts the chief tendencies in European literature from the beginning of the past century. His excellent sympathetic study of *William Shakespeare* has been translated into English. Among his other works are *French Romanticism*, *Impressions of Poland*, and *A Study of Ibsen*.

Brangwyn, Sir Frank (1867-), English painter, was born at Bruges, Belgium. His family brought him to England where he studied in the studio of William Morris and then traveled in the Orient, the decorative art of which had a continuing influence on him as seen in his harmonious designs and coloring of sumptuous richness. His works include the mural "King John Signing the Magna Charta," in the Cleveland, Ohio Courthouse; decorative panels in Rockefeller Center, New York; "Trade on the Beach," a painting in the Luxembourg Gallery, Paris; and an etching "The Bridge of Sighs." He applied his skill also to stained glass, furniture, books, metalwork, and pottery. He was knighted in 1941.

Brant, Joseph (c. 1742-1807), Indian chief of the Mohawk nation, was born in Ohio; held a commission in the British service; and fought against the American colonists in the Revolution. After the war, he was influential in preserving peace between the whites and the Indian tribes, spending much effort in instructing Indians in the methods of agriculture. He afterward went to England, where he became acquainted with Burke and Sheridan. He translated the gospel of Saint Mark into Mohawk. According to John Fiske, "he was perhaps the greatest Indian of whom we have any knowledge."

Branting, Hjalmar (1860-1925), Swedish socialist. At an early age, engaged in journalism. As the editor of the *Social Democrat*, of Stockholm, he acquired wide influence. During and immediately following the close of World War I, he was a leading figure at socialist conventions and took a prominent part in discussions of international policy. At the Peace Conference at Versailles, in 1919, he was a strong advocate of peace in accordance with the plans proposed by Woodrow Wilson. In 1920, Branting was made prime minister of Sweden, being the first socialist to be chosen for that office. Jointly with Christian Lange of Norway, Branting was awarded, in 1921, the Nobel prize for peace.

Braque (*brăk*), **Georges (1882-)**, French abstract painter, was born at Argenteuil, France. With Pablo Picasso, he launched the cubist movement in art at Paris about 1910. It was one of the first manifestations of modern abstract art. Geometrical forms were used to produce a definite aesthetic effect. From cubism Braque developed his own individual style of painting. Although in later years he has been less purely cubist than formerly, he has remained an abstractionist. He has been the recipient of many prizes in the United States and France.

Brassey, Thomas (1805-1870), English engineer and railroad contractor, was born at Buerton, England. After

receiving a common school education, he was, at the age of 16, apprenticed to a surveyor, whom he succeeded in business. After building part of the Grand Junction and also the London and Southampton railroad, he contracted. 1840, in partnership with another, to build a railroad from Paris to Rouen. In a few years, he held ten railroads under contract in England and France, his contracts involving a capital of $175,000,000 and giving employment to 75,000 men. In partnership with Betts and Peto, he undertook to build the Grand Trunk railroad of Canada, 1100 miles in length, including a great bridge at Montreal, His army of men was employed in Europe, South America, Australia, and India.

Brauchitsch (*fôn brou'kĭch*), **Walther von (1881-1948)**, German general, was born in Berlin. Receiving a military education, he became a lieutenant in 1900. Twelve years later he was made a member of the general staff of the German army, serving in this capacity in World War I. After Hitler came to power, Brauchitsch was made inspector of artillery in 1932, commander of the East Prussia army district in 1935, and commander in chief of the Germany army in 1938. With the outbreak of the European war in 1939, he put to trial for the first time on a large scale the Blitzkrieg method for rapidly breaking an enemy's power by coordinated use of mechanized weapons. Within six weeks, the German army subjugated Poland, except the part assigned to Russia. In early May, 1940, the army under his leadership broke the power of France in four weeks. He failed, however, to destroy the British army in Belgium. He was less successful against the Russians in 1941. At the surrender he was sent as a prisoner to England.

Braun, Karl Ferdinand (1850-1918), German physicist, was born at Fulda. He was educated in the universities of Marburg and Berlin. In 1895, he became professor of physics at the University of Strasbourg. In 1902, he discovered a method of increasing at will the energy of the sending station and gained control of effective radiation by the arrangement of the antennæ. He also made important investigations concerned with the electromagnetic theory of light and invented a cathode ray tube. In 1909, he was awarded the Nobel prize for physics jointly with Marconi.

Braun, Wernher von (1912-), engineer, was born at Wirsitz, Germany, and received his technical education mainly in Berlin, Germany. As a rocket expert, he was one of the creators of the long-range German V-2 rocket used in World War II. Since coming to the United States in 1945, he has worked with the U.S. Department of Defense as a specialist in rocket design and controls, development of liquid fuel rockets and rocket power for planes, and guided missiles. Dr. Braun, who is a citizen of the United States, is now chief of the Guided Missile Development Division at Redstone Arsenal, Huntsville, Ala. Among the books he has written are *The Mars Project* and *Conquest of the Moon*.

Breasted, James Henry (1865-1935), American Oriental scholar and archeologist, was born at Rockford, Ill.; he was educated at North Central College, Chicago Theological Seminary, Yale University, and the University of Berlin. He became a member of the faculty of the University of Chicago in 1894, rising, by 1915, to be chairman of the department of Oriental languages there. He was the director of archeological expeditions to Egypt, Iraq, and Palestine. His ability to explain clearly and interestingly the bearing of archeology on modern knowledge gave him a place in the public eye seldom occupied by a worker in his chosen field. His *History of Egypt* has been translated into a number of foreign languages. Among his other publications are *Development of Religion and Thought in Early Egypt* and *Survey of the Ancient World*.

Breckinridge, John Cabell (1821-1875), American politician and soldier, was born near Lexington, Ky.; entered Congress in 1851; and, in 1856, was elected vice president under Buchanan. In 1860, he was the presidential candidate of the extreme proslavery Democrats, but was defeated by Lincoln. He denounced Lincoln's address as a declaration of war and was expelled from the House of Representatives. He was immediately elected United States senator, but resigned to accept a command in the Confederate army, where he rose to the rank of major general. In 1865, he was Confederate secretary of war.

Bremer (*brē'mĕr*), **Fredrika (1801-1865)**, Swedish novelist, was born in Finland, but was brought up near Stockholm, Sweden. Her novel *The Neighbors* was published in 1937 and gave her wide fame. She traveled through many countries and wrote descriptions of the people for her *Homes of the New World, Life in the Old World*, and many other works. She spent two years in the United States. She has been called the "Jane Austen" of Sweden. Among her best books are *The Diary, The President's Daughters*, and *Brothers and Sisters*.

Brennan, William Joseph (1906-), American jurist, was born at Newark, N. J. and was educated at the University of Pennsylvania (1928) and Harvard Law School (1931). He practiced law in New Jersey until 1942, when he joined the U.S. Army, for which he did legal work in the ordnance division. He entered the service as a major and left in 1945 as a full colonel. He returned to the practice of law in Newark, remaining there until 1949, when he was appointed to the New Jersey Superior Court. The following year he was named to the New Jersey Supreme Court. In 1956 he was appointed Associate Justice of the United States Supreme Court by President Eisenhower.

Brent, Charles Henry (1862-1929), American clergyman, was born at Newcastle, Ont.; was graduated from Trinity College, Toronto, 1884; and was ordained deacon of the Protestant Episcopal Church in 1886 and priest in 1887. After a distinguished ministry in Buffalo and Boston, he was elected, 1901, bishop of the Philippine Islands, where he later became actively identified with the antiopium crusade. In 1918, he was elected bishop of western New York and, in 1918-19, was head of the chaplain service of the American army in France. In 1927, he was chairman of the World Congress on Religions, held at Lausanne, Switzerland. His publications include *With God in the World, The Consolations of the Cross, The Splendor of the Human Body*, and *The Sixth Sense*.

Breton (*brē'tôN'*), **Jules Adolphe (1827-1906)**, French painter and author. His reputation greatly increased after the extraordinary sale of one of his pictures, "The First Communion," which brought $45,000 in 1886. His pictures usually represent scenes from rural life and are much admired for their sweet, pathetic sentiment. Among the most noted of his works are "Blessing the Grain," "Return of the Gleaners," and "The Reaper," in the Luxembourg; "The Pardon of Kergoat," in the Metropolitan Museum, New York; and "The Song of the Lark," in the Art Institute, Chicago.

Bretón de los Herreros (*brā-tôn' dā lōs ĕr-rā'rōs*), **Don Manuel (1796-1873)**, Spanish poet, was born at Quel, in Logrono. As early as his 17th year he wrote a comedy entitled *A la vejez viruelas*, which, in 1824, was staged with great success. From that time, he furnished theatrical managers with over 150 pieces, some of which were original, while others were adaptations from the older Spanish classics or translations from Italian and French. Most of them were highly popular.

Brewster, Sir David (1781-1868), Scotch physicist, was born at Jedburgh, Scotland. He was educated for the Church of Scotland, but undertook instead the editorship of the *Edinburgh Encyclopædia*. He invented the kaleidoscope in 1816 and shares with Wheaton the honor of inventing the stereoscope. In 1817, in conjunction with Professor Jameson, he established the *Edinburgh Philosophical Journal;* in 1831, he was one of the chief originators of the British Association for the Advancement of Science.

In 1819, the Royal Society awarded him the Rumford gold and silver medals for his discoveries on the polarization of light; in 1832, he was knighted and had a pension conferred upon him; in 1849, he was elected one of the eight foreign associates of the French Institute, the highest scientific distinction in Europe. He presided over the British Association and, in 1851, over the Peace Congress held in London. In 1859, he was chosen vice chancellor of Edinburgh University. See *Polarization of Light*.

Brian Boroihme (*bō-roim'*), or **Brian Boru** (*bô-rōō'*), **(926-1014)**, king of Ireland; ascended the throne of both Munsters—answering to Tipperary and Clare—in 978. Some time afterward, he became supreme ruler of Ireland. The vigor of his reign brought prosperity to his country. He defeated the Danes in many pitched battles and greatly restricted their influence. In the battle of Clontarf, 1014, in which he was killed, he gained a signal victory over a united army of revolted natives and Danes, the power of the latter receiving a shock from which it never recovered.

Briand (*brê-ăN'*), **Aristide (1862-1932)**, French statesman, was born at Nantes. He was educated for the law, which he abandoned for journalism and politics. In 1902, he was elected to the Chamber of Deputies as a socialist Radical. By his brilliant handling of difficult governmental problems, he advanced rapidly, becoming prime minister in 1909-11, and again in 1913. He settled a railroad strike in 1910 by calling the workmen to the colors. In October 1915 he became prime minister and minister of foreign affairs and held these posts again in 1921, when he represented France at the Washington disarmament conference. His part in negotiating the Locarno treaties in 1925 won him the award of one-half of the Nobel peace prize for 1926. In 1930 he set forth a proposal for forming a United States of Europe. He narrowly missed election to the presidency of France in 1931.

Bricker, John William (1893-), American politician, was born on a farm in Madison County, Ohio, and

was educated at Ohio State University, where he received his academic degree in 1916 and his law degree in 1920. He served as a chaplain during World War I. He has practiced law in Columbus since 1920, except when holding public office. He served two terms as attorney general of Ohio and three terms as governor. He was the unsuccessful Republican candidate for vice president in 1944. In 1946 he was elected to the United States Senate and was re-elected in 1952.

Bridges, Robert (1844-1930), English poet, was born at Walmer, England; was educated at Eton and Oxford; studied medicine in London and practiced in hospitals until 1882, after which he devoted himself to literature, writing numerous plays, poems, and essays on English verse. The list of his plays includes *Ulysses, Christian Captives, Achilles in Scyros, Humours of the Court, Feast of Bacchus, Demeter,* and *Nero,* the last of which is perhaps most widely known. Of his poems, *Prometheus* and *Eros and Psyche* are ranked among the best produced in the late Victorian period. In 1913, he was appointed poet laureate of England, succeeding Alfred Austin. See *English Literature: Contemporary Poetry.*

Brieux (*brē'ē'*), **Eugène (1858-1932),** French dramatist, was born in Paris. At the age of 21, he produced a one-act play in verse entitled *Bernard Palissy.* He entered journalism but his deep interest in social reform led him to resume play writing.

In 1892, he scored his first great success with *Blanchette,* following which he became one of the most prolific of modern French dramatists and the leader of the naturalistic school. He was elected to the French Academy in 1909. Many of his plays have become well known throughout the world. Nearly all of them deal with social problems which he treats with marked seriousness of purpose and notable insight. The list of his plays includes *Les bienfaiteur, L'Evasion, La robe rouge, Maternité, La française, La femme seule,* and *Les Américains chez nous.* Translations of several of his plays have appeared in English.

Briggs, Henry (1561-1631), English mathematician, was born in Warley Wood, Yorkshire. He was educated at Cambridge University, where he was made lecturer in 1592. In 1596, he became professor of geometry in Gresham college, London, and, in 1619, was appointed professor of astronomy at Oxford. While he made other interesting contributions to mathematics and astronomy, his great gift to the world was his invention of the decimal system of logarithms now in use. He devoted many years to the calculation of logarithmic tables and published several books on the subject. See *Logarithms.*

Bright, John (1811-1889), English orator and statesman, was born at Rochdale, of Quaker parentage. After receiving a limited schooling, he entered his father's business at the age of 15. In 1835, he went abroad, visiting Palestine, and, after his return, began to lecture on travel and economic subjects. With his friend Cobden, he first became prominent in the agitation for the repeal of the corn laws; entered Parliament for Durham, afterward for Manchester, but lost his seat through his opposition to the Crimean War. In 1857, he was returned for Birmingham and held that seat until his death.

Bright joined Gladstone's government which disestablished the Irish Church, but opposed his home rule policy in 1886, dying in the unshaken conviction that it was a fatal error. By his notable eloquence and burning moral appeal, he rendered inestimable service to the cause of the North during the American Civil War, although the continuance of hostilities was disastrous to his interests as a cotton spinner. As a master of pure Saxon English in all its power and pathos, Bright has seldom been surpassed.

Bright, Richard (1789-1858), English physician, was educated at Edinburgh; and practiced with great success in London. He discovered that an albuminous condition of the urine accompanied with dropsical effusions is often dependent on a peculiar degeneration of the kidneys. The disease in which these conditions occur was called after him, "Bright's disease." His first publications on this subject were made in 1827.

Brillat-Savarin (*brē'yà' sà'và'răN'*), **Anthelme (1755-1826),** French lawyer, judge, and gourmet, was born at Belley, Ain, France. He was famous for his classic work on the art of dining, *Physiologie du gôut* (1825), translated into English under the title *Physiology of Taste.* Brillat-Savarin spent several years of enforced exile in New York during the French Revolution. He has been called the "poet laureate of gastronomy."

Brisbane, Arthur (1864-1936), American newspaper editor, was born at Buffalo, N. Y. He was educated in the public schools and devoted five years to study in France and Germany. He began newspaper work in 1883, as a reporter for the New York *Sun,* later being made its London correspondent. He then became editor of the *Evening Sun* and, later managing editor of the *World.* In the years following 1896, he became editor of the new York *Evening Journal,* the Chicago *Herald and Examiner,* and other newspapers of the Hearst group. His comments on events were widely published. The popularity of his forcible and direct style notably affected the form of American newspaper editorials.

Britten, (Edward) Benjamin (1913-), English composer, was born at Lowestoft, England, and began composing music before the age of ten. He studied at the Royal Academy of Music, and privately with Frank Bridge and Harold Samuel. After finishing at the Royal Academy he became a free lance composer and concert artist, writing much music for radio, theater, and screen. From 1939 to 1942 he worked in America. He has collaborated a number of times with W. H. Auden, the poet. Following the success of his opera, *Peter Grimes,* in 1945, he has been chiefly a composer of this form of music, writing such operas as *The Rape of Lucretia* (1946), *Albert Herring* (1947), *Let's Make an Opera* (written for young people, 1949), *Billy Budd* (1951), *Gloriana* (1953), which was written for the coronation of Queen Elizabeth and had a royal premiere at Covent Garden, and *The Turn of the Screw* (1954). Other works by Britten include *Simple Symphony* (1934), and *Variations on a Theme of Frank Bridge* (1937), which within two years was performed more than fifty times in Europe and America.

Brock, Sir Isaac (1769-1812), British officer, was born in Guernsey. In the War of 1812, when an American army under General Hull invaded Canada, the measures adopted by Brock were so effectual that the Americans surrendered at Detroit without striking a blow. He did not long enjoy the fame he had won. He was killed leading a charge up Queenston Heights, 1812. A monument to his memory stands on this eminence, on the western bank of the Niagara river.

Brockhous (*brŏk'hous*), **Frederick Arnold (1772-1823),** German publisher, was born in Dortmund. He was the founder of the Leipzig firm bearing his name, chiefly associated with the encyclopedia entitled *Brockhaus's Konversations-Lexikon.* This work has been the pattern for nearly all modern encyclopedias. In 1808, he purchased this work in an unfinished form. He completed the first edition in Altenburg in 1811 and began the second edition in 1812. In 1818, he removed the business to Leipzig, where his descendants carried the *Konversations-Lexikon* through many editions, and also published Ersch and Gruber's *Universal Encyclopædia.*

Broglie, Louis, Prince de (1892-), French physicist, writer, university professor. Although he is identified officially as secretary of the *Academie des Sciences,* he is perhaps more widely known for his work in atomic physics and particularly for his important discovery of the wave nature of the electron, which earned for him the Nobel prize in 1929. Besides teaching at the University of Paris, he has done much writing on scientific subjects. His books include *Selected Papers on Wave Mechanics, Matter and Light,* and *The Revolution in Physics; a Non-mathematical Survey of Quanta.* His work has been chiefly in theoretical physics, but he is also much interested in peacetime uses of atomic power.

Broglie (*brô'y'*) **Maurice, Duc de, (1875-),** French physicist, was born at Paris of a distinguished aristocratic family. After a brilliant career at Stanislas college and the French naval academy, he devoted himself to research in radiations and atomic physics. He was elected to the French Academy in 1934.

Bromfield, Louis (1896-1956), American novelist, was born at Mansfield, Ohio. He studied at Cornell and Columbia universities, the latter giving him an honorary degree because of his war service. After several years in journalism, he became advertising manager of G. P. Putnam's Sons, publishers. He spent much of his time in France and traveled in India and other countries but settled on a farm "Malabar," near Lucas, Ohio, after World War II broke out. His novels and several plays reveal a keen interest in social problems and show familiarity with many countries, folklore, and the psychology of sex. They include *The Green Bay Tree, Early Autumn, A Modern Hero, The Rains Came,* and *Until the Day Break.* Partly autobiographical books dealing with country life are *Pleasant Valley* and *Malabar Farm.*

Brongniart (*brôN'nyàr'*) **(1801-1876), Adolphe Théodore,** French botanist, son of Alexandre Brongniart, was born at Paris. He studied medicine and received his doctor's degree in 1826, but soon turned his attention exclusively to plant physiology and paleobotany. In 1834, he was elected to the Academy of Sciences. In 1839, he became professor of botany at the Museum of Natural History in Paris. His work on fossil plants, entitled *Histoire des végétaux fossiles,* gave him wide fame. His catalogue of the genera of the plants cultivated at the Paris Museum of Natural History had a marked influence on modern systems of classification.

Brongniart, Alexandre (1770-1847), French naturalist, was born in Paris. After serving for a time on the medical staff of the army, he devoted his attention to porcelain manufacture, making a scientific examination of mines and pottery works in Derbyshire, England. In 1797, he was made professor of natural history in the Ecole Centrale. In 1800, he became director of the noted porcelain manufactory of Sèvres, where he revised and developed the art of painting on glass. His *Classification of Reptiles* and his *Elementary Treatise on Mineralogy* were long considered authoritative works. He published also a *Treatise on Ceramic Arts and Pottery.*

Brontë (*brŏn'tē*), **Charlotte (1816-1855),** English novelist, was born at Thornton, England. She was the eldest of three sisters, all of whom were notable as writers. After some experience as a governess, she published in 1846, with her sisters Emily and Anne, a small volume of poems under the names of Currer, Ellis, and Acton Bell. In 1847, she published the story *Jane Eyre.* Its success was instantaneous. Although adversely and severely criticized, it is admitted to be one of the most remarkable of English novels. Her second story, *Shirley,* was published in 1849, and her third and last, *Villette,* in 1853. Another story, *The Professor,* which had been refused by the publisher before *Jane Eyre* had made its author famous, was published after her death. In 1854, she married Arthur Bell Nicholls. The Brontë novels show an extraordinary intensity of feeling. They shocked contemporaries by depicting women loving, instead of merely being loved as the Victorian tradition called for. See *English Literature.*

Brooke, Rupert (1887-1915), English poet and writer, was born at Rugby. He was educated at Rugby School and Cambridge University. He manifested marked poetic talent at an early age and, while residing in the vicinity of Cambridge, wrote a volume of verse, which appeared in 1911. At the outbreak of World War I, he enlisted in the British army. His premature death in the Dardanelles campaign removed one of the most promising literary figures in England.

Brooks, Phillips (1835-1893), American preacher and orator, was born at Boston, Mass.; was graduated from Harvard, 1855; was rector of Episcopal churches in Philadelphia and Boston, 1859-91; and became bishop of Massachusetts in the latter year. He was celebrated as a pulpit orator and as a vigorous and independent thinker. His freedom from the usual sectarian limitations, his liberal ideas concerning doctrine, together with his profound convictions as to vital Christian truths and his spiritual yet intensely practical preaching, gave him a wide popularity. He was elected to the American Hall of Fame, 1910.

Brooks, Van Wyck (1886-), American author and literary critic, was born at Plainfield, N. J. After being graduated from Harvard in 1907, he worked at different times for the publishing firms of Doubleday, Page and Company and the Century Company and taught English at Leland Stanford University. He was associate editor of *The Freeman,* 1920-24, revealing himself as one of America's outstanding literary critics. Among his published works are *The Wine of the Puritans, America's Coming-of-Age, Emerson: a Portrait,* and *The Flowering of New England (1815-1865).* He was elected in 1937 to the American Academy of Arts and Letters. His later books include *The World of Washington Irving* (1944), *The Writer in America* (1953), *Scenes and Portraits* (1954), and *John Sloan: A Painter's Life* (1955).

Brougham (*brōō'ăm; brōōm*) **and Vaux, Henry Peter Brougham, Baron (1778-1886),** British jurist, philosopher, and statesman, was born at Edinburgh. After being graduated at Edinburgh University, he was called to the Scottish bar and, in 1802, became one of the founders and editors of the *Edinburgh Review.* In 1808, he joined the English bar and speedily acquired a high reputation.

In 1810, Brougham entered Parliament, where he became a chief of the Liberal party. In 1820-21, he was engaged as attorney general for Queen Caroline and succeeded in obtaining her acquittal. In 1830, he became the acknowledged champion of parliamentary reform; was called to the House of Lords; and was appointed lord high chancellor of England, which office he resigned in 1834. He devoted the remainder of his life almost exclusively to science and literature at his chateau at Cannes, France. His fame rests principally upon his achievements in the cause of popular education and political and legal reform.

Broun (*brōōn*), **Heywood Campbell (1888-1939),** American newspaper columnist, was born at Brooklyn, N.Y. He attended Harvard University, 1906-10, and then entered newspaper work in New York as a reporter. He was connected with the *Morning Telegraph, Tribune,* and *World* in New York, contributing to the *World* a column "It Seems to Me," which was widely syndicated. In 1928, he was discharged from the *World* for criticizing its editorial policy in an article in the *Nation,* but was hired by Scripps-Howard Newspapers, and his column reappeared. In 1930, he ran as Socialist candidate for Congress. He organized the American Newspaper Guild in 1933 and provided it with militant leadership until his death.

Brown, Charles Brockden (1771-1810), American novelist, was born at Philadelphia, Pa. His two best-known stories are *Wieland, or the Transformation* and *Arthur Mervyn.* His other novels are *Ormond, Edgar Huntley, Jane Talbot, Philip Stanley,* and *Clara Howard.* While his stories are morbid, sentimental, and improbable, they contain scenes of great power and were immensely popular in their time. He is considered the chief American writer of fiction before Cooper and Hawthorne.

Brown, Ford Madox (1821-1893), English historical painter, was born at Calais, France, where his parents were temporarily residing. In 1835, he was placed in the academy at Bruges; studied also at Ghent and Antwerp and later in Paris and Rome; settled in London in 1845. He was associated with Rossetti, Millais, and the rest of the pre-Raphaelite brotherhood. He is credited with producing the first plein-air picture with figures. Among his best pictures are the famous "King Lear," "The Last of England," "Work," and an aggregation of pictures illustrating the general subject of labor.

Brown, Henry Kirke (1814-1886), American sculptor and painter, was born in Leyden, Mass. He is the author of the colossal statue of General Washington in Union square, New York; "The Angel of the Resurrection," in Greenwood Cemetery, Brooklyn; the statue of Governor Clinton at Washington; and numerous other sculptures. Although he spent four years, 1842-46, in Italy, his entire artistic life was a protest against Italian influence. To this end he studied distinctively American subjects, producing, among other works, his widely known "Indian and Panther," probably the first bronze sculpture cast in the United States.

Brown, John (1800-1859), American abolitionist, was descended from a Puritan carpenter, one of the *Mayflower* emigrants, and was born at Torrington, Conn. In 1855, he went to Kansas, where he took a conspicuous part in the border warfare. Later he traveled through the southern and eastern states, declaiming against slavery and endeavoring to organize an armed attack upon it. Plans were laid, in a convention at Chatham, Ont., for establishing an armed refuge in which fugitive slaves might protect themselves and where revolts might be fostered.

In 1859, at the head of 17 white men and 5 blacks, Brown commenced active hostilities by a descent upon Harpers Ferry, where there was an arsenal containing from 100,000 to 200,000 stand of arms. The arsenal was easily captured, and 40 or 50 of the principal inhabitants were made prisoners; but, instead of retreating to the mountains with arms and hostages in accordance with his original design, Brown lingered in the town until evening. By this time, 1500 militiamen had arrived. He was captured, tried for treason, and executed. See *John Brown's Raid.*

Brown, Robert (1773-1858), Scottish botanist, was born at Montrose. He was educated at Marischal College, Aberdeen, and studied medicine at the University of Edinburgh. In 1801, he was employed as naturalist for the survey expedition in charge of Captain Flinders to the Australian coasts, where he collected and brought to England in 1805 nearly 4000 species of Australian plants, most of which were new to science. In 1810, he published the first volume of his great work on the plants of Australia and Tasmania.

Brown was the first English botanical author who adopted the natural system of Jussieu for classification of plants and led the way to its universal substitution for the Linnæan method. By making the microscope and the study of development the basis of classification, he notably advanced the scientific knowledge of plants. He discovered gymnospermy and made the separation of gymnosperms and angiosperms that is now universally recognized. He also first detected the so-called Brownian movements in pollen grains.

Browne, Charles Farrar (1834-1867), American humorist, known by the pseudonym of "Artemus Ward," was born at Waterford, Maine. His first literary effort was that of writing as a showman to an imaginary traveling menagerie. He later traveled over America lecturing, carrying with him a whimsical panorama which afforded texts for his numerous jokes. His humor depended in considerable part on misspelled words and quaint or surprising turns of language. In 1866, he undertook a highly successful tour of England, where he died. See *American Literature: Humor.*

Browne, Sir Thomas (1605-1682), English physician and philosopher, was born at London. After studying at Winchester, at Oxford, and on the continent, he settled as a physician at Norwich, where he spent the rest of his life. During the civil wars and the protectorate, he remained in the seclusion of his study, indifferent to either party. He was knighted in 1671. His chief works are *Religio*

Medici; Pseudodoxia Epidemica, or Inquiry into Vulgar and Common Errors; Hydriotaphia or the Urn Burial; and *The Garden of Cyrus.* He possessed a wonderful charm of style. In richness and majesty of diction, the concluding chapter of his *Urn Burial* is ranked with the finest passages of Jeremy Taylor and Milton.

Brownell, Herbert, Jr. (1904-), lawyer, was born in Peru, Nebraska, and was educated at the University of Nebraska and the Yale Law School. He practiced law in New York City, 1929-53. Beginning in 1932 he served five terms in the New York State legislature. He also served in the nineteen forties as chairman of the National Republican Committee from which he resigned in 1946. In 1953, President Eisenhower appointed him Attorney General of the United States.

Browning, Elizabeth Barrett (1806-1861), English poet, was born in Durham County. Her first important essay in authorship was a translation of the *Prometheus* of Æschylus in 1833. *The Seraphim and Other Poems* appeared in 1838. In 1846, she married Robert Browning, with whom she resided in Italy throughout the remainder of her life. In 1850, Mrs. Browning published her collected works together with several new poems, including *Sonnets from the Portugese,* which rank among the finest love poems in English. In 1851 appeared the *Casa Guidi Windows,* a poem whose theme was the struggle made by the Tuscans for freedom in 1849. *Aurora Leigh,* her longest production, was published in 1856. *Poems Before Congress* appeared in 1860. Her poetry is distinguished by its depth of feeling and generous sentiment.

Browning, John Moses (1855-1926), American inventor, was born in Utah, the son of a gunsmith. He obtained numerous patents for rapid fire guns, including the machine rifle which bears his name and which was adopted for army use by the governments of the United States and several other countries. Associated for many years with the Colt Firearms Co., he designed the Colt automatic pistol and the Colt machine gun.

Browning, Oscar (1837-1923), English historian and critic, was born at London; was educated at Eton and at Cambridge University; and taught at Eton, 1860-75, and at Cambridge from 1876 to 1909. Works edited or written by him include *Modern England, Modern France, History of Educational Theories, Life of George Eliot, Milton's Tractate on Education, Guelphs and Ghibellines, Life of Peter the Great, The Fall of Napoleon, General History of the World,* and *General History of Italy.*

Browning, Robert (1812-1889), English poet, was born at Camberwell, London. His education was informal, largely under private tutors, until he entered University College, London, for the session of 1829-30. His boyhood foreshadowed exceptional intelligence and literary qualities, though his first poem, *Pauline,* written at the age of 19, did not evince extraordinary powers. The most important event of his youth was his sojourn in Russia and in Italy, 1833-34.

Earlier Work. After the appearance of his *Paracelsus* in 1835, Browning determined to devote himself to the art of poetry and ordered his life to this calling. His drama *Strafford* was produced, but without success, in 1837, *Sordello,* appearing in 1840, illustrated Browning's delight in erudition at the expense of clarity. It abounds in involutions of thought and obscure allusions to medieval history. For the next six years, Browning was engaged in writing a series of plays, tragedies, and lyrics, issued, at irregular intervals, under the title *Bells and Pomegranates.* This series contained his famous *Pippa Passes, A Blot on the 'Scutcheon,* and "The Pied Piper of Hamelin." Some of the lyrics in this group are the most popular of Browning's works.

Marriage. In 1846, Browning married, in London, Elizabeth Barrett, herself a gifted poet, and with her he went to Florence, where they lived for 15 years and where, in 1849, their only son was born. After the death of his wife in 1861, Browning settled permanently in London.

Later Poems. In 1850, Browning published *Christmas Eve and Easter Day* and, in 1855, his volume entitled *Men and Women,* which contains some of his finest works. These poems, which included "Fra Lippo Lippi," "Childe Roland," "Andrea del Sarto," and "Evelyn Hope," are unsurpassed in the English language for their profound analysis of character. In 1864, he issued the volume entitled *Dramatis Personæ,* which attested his dramatic gifts in monologue and unfolded his views upon higher questions affecting life and immortality. His generally accepted masterpiece, the product of stupendous intellectual labor, *The Ring and the Book,* was written in epic form and published four years later. It is based on legal records in a trial for murder motivated by jealousy.

From that time, works by Browning appeared in rapid succession; among them was *Fifine at the Fair,* in 1872, which handled a question in morals very powerfully. In 1879-80 came the two volumes of *Dramatic Idyls,* which may be described as vigorous character sketches. His last volume of poems, *Asolando: Fancies and Facts,* was published December 12, 1889.

Qualities. Browning is distinguished for the depth of his spiritual insight, his dramatic energy, his power of psychological analysis, and his capacity to create real men and women. Besides being one of the most erudite of poets, he has intense human sympathies, high imaginative gifts, and a profound and vigorous faith. On the other hand, his style is frequently obscure and difficult, his versification hard and rugged, and his rimes forced or fantastic. He died while visiting his son in Venice. His remains were placed in Westminster Abbey.

Bruce, James (1730-1794), Scottish traveler and explorer, was born in Kinnaird, Stirlingshire. He received his education at Harrow and at Edinburgh University. In 1763, he became consul at Algiers, resigning in 1765 to travel in Tunis, Tripoli, Cyprus, and Asia Minor, where he studied, and secured drawings of the ruins of Palmyra, Baalbek, and other noted remains of antiquity. In 1768, he began a journey of exploration through Abyssinia. In 1770, he discovered the sources of the Blue Nile, then supposed to be the main stream, and, after great hardships, reached Egypt late in 1772. His interesting *Travels to Discover the Source of the Nile,* in five massive volumes, has been translated into several languages.

Bruce, Robert (1274-1329), king of Scotland, did homage for a time to Edward I, king of England, but joined the Scottish national party and became one of a regency of four, with Comyn for rival; stabbed Comyn in a quarrel at Dumfries, 1306; and was that same year crowned king at Scone. He was defeated by an English army sent against him and was obliged to flee to Ireland; returned and landed in Carrick; cleared the English out of all the fortresses except Stirling and, in 1314, defeated them under Edward II at Bannockburn, after which, in 1328, Scotland's independence, as well as Bruce's right to the crown, was acknowledged. Suffering from leprosy, Bruce spent his last two years at Cardross Castle on the Clyde, where he died.

Bruce, Stanley Melbourne, 1st Viscount Bruce of Melbourne (1883-), Australian statesman, was born in Victoria. He was educated at the Melbourne Grammar School and at the University of Cambridge, England. Upon leaving the university, he studied law; was admitted to the bar; and practiced in London. He devoted considerable time also to the London branch of the mercantile business of which his father was a founder.

At the outbreak of World War I, Bruce joined a British regiment and fought side by side with his fellow countrymen, the Anzacs, at Suvla bay and Gallipoli. He was wounded twice.

In 1917, Bruce was elected to the Australian Parliament; in 1921, he represented Australia at the League of Nations in Geneva; and, in 1922, he was appointed treasurer of the Commonwealth of Australia. Following the success of the National party in the Australian elections held early in 1923, he was prime minister until 1929, when he appealed unsuccessfully to the country on the issue of abolishing Federal arbitration of trade union disputes. His views favoring association short of federation among British self-governing countries were substantially written into the Westminster statute in 1931. From 1933 to 1945 he was High Commissioner for Australia in London.

Bruch (*brōōk*), **Max (1838-1920)**, German composer, was born in Cologne, of Jewish parents. He manifested early a great talent for music, producing a symphony at the age of 14. From 1853 to 1857, he studied under Hiller, Reinecke, and Breuning and later became musical director successively at Coblenz, Berlin, Liverpool, and Breslau. In 1883, he visited the United States and conducted his oratorio *Arminius* in Boston. His four concertos for the violin and orchestra are classed among the greatest works of their kind; he is also pre-eminent as a composer of the epic cantata. His works include the operas *Jungfrau von Orleans* and *Hermione;* the cantatas *Frithjof, Salamis, Beautiful Ellen, Odysseus,* and *Achilleus;* also orchestral works, concertos, and chamber music.

Bruckner (*brōōk'nĕr*), **Anton (1824-1896)**, Austrian organist and composer, was born at Ansfelden. Although an orphan and largely self-instructed, in 1855, in open competition, he won the post of organist at Lienz. He then frequently visited Vienna. There he studied under Sechter, whom he succeeded in 1867 as court organist at Vienna, at the same time he was also made professor in the Conservatory. In 1869, he made a concert tour of France and, in 1871, toured England, establishing his fame as one of the leading organists of his time. Bruckner was also one of the greatest recent masters of counterpoint.

The large plan and serious purpose of his compositions entitle him to a high rank among modern composers. In his works, chiefly instrumental, he attempts to adapt Wagner's principles of dramatic art for the opera to the orchestral symphony. The result is a certain lack of coherence and unity in Bruckner's works, notwithstand-

ing their notable brilliancy and power. His reputation rests chiefly upon eight important symphonies. He composed a masterly *Te Deum* in 1886 and wrote masses, a requiem, and choral works.

Brueghel (*brû'gĕl*), **Pieter (c. 1525-1569),** Flemish painter, called "The Elder" or "The Droll," was born at Brueghel in the Netherlands and spent most of his productive years in Antwerp and Brussels. He was of peasant extraction and is noted for his colorful landscapes and his lively detailed depictions of peasants at work and at play. Modern reproductions of his paintings of the peasantry in festive mood, eating, drinking, dancing, courting, and marrying, are extremely popular.

His oldest son, Pieter Brueghel (1564-1637), called "The Younger," and nicknamed "Hell Brueghel" because of his penchant for painting Stygian scenes, some of them rather terrifying, is also admired as a Renaissance painter.

The Elder Brueghel's younger son, Jan Brueghel (1568-1625), called "Velvet Brueghel" because of his addiction to painting people in that fabric, seems, like his father, to have possessed a sense of humor.

Brummell (*brŭm'ĕl*), **George Bryan (1778-1840),** "Beau Brummell," an Englishman of wealth and fashion, was born at London. He was educated at Eton and Oxford, where already he posed as the prince of dandies. He was patronized by the Prince of Wales, afterward George IV. During the heyday of royal favor, he was immensely popular as a story-teller and wit, and became the recognized arbiter of fashion. At length, his means were exhausted; he quarreled with the prince; and fled from his creditors to Calais, where, reduced to destitution, he yet lived some years in the same reckless fashion. He settled at length in Caen, where he died insane. He is the subject of the successful comedy, *Beau Brummell*, by Clyde Fitch, in which Richard Mansfield starred.

Brunelleschi (*brōō'nĕl-lĕs'kē*), **Filippo (1377-1446),** Italian architect, was born at Florence. He is reckoned the first who established on a sound basis the theory of perspective. When still a young man, he went to Rome, where he acquired a profound knowledge of ancient architecture. In 1407, he returned to Florence. In 1420, it was proposed to complete the structure of the Cathedral of Santa Maria del Fiore, founded in 1298 and then wanting only a dome. The work was intrusted to him and was finished in his lifetime with the exception of the lantern designed to crown the whole. This lantern was later added according to his plans. Brunelleschi's dome, measured diametrically, is one of the largest in the world and served as a model to Michelangelo for that of Saint Peter's. His final masterpiece was the Pitti Palace in Florence. See *Architecture*.

Brunhilde (*brŭn'hĕld'*) **(c. 550-613),** (Brunehaut, Brunhilda or Brunhildis), daughter of the Visigothic king, Athanagild; married King Sigebert of Austrasia; and was afterward regent for her two grandsons—Theodebert II, king of Austrasia, and Theodoric II, king of Burgundy. She divided the government of the whole Frankish world with her rival Fredegond, who governed Neustria for the youthful Clotaire II. On Fredegond's death in 598, Brunhilde seized Neustria and, for a while, united under her rule the whole Merovingian dominions. She was overthrown, however, in 613 by the Austrasian nobles under Clotaire II and was put to death by being dragged at the heels of a wild horse.

Bruno, Saint (c. 1030-1101), founder of the Carthusian order, was born at Cologne; became rector of the cathedral school at Reims; but, oppressed by what he considered the wickedness of his time, withdrew in 1084 to the wild mountain of Chartreuse, near Grenoble. Here, with six friends, he founded the austere order of the Carthusians. In 1094, he established a second Carthusian monastery, at Della Torre in Calabria, where he died.

Bruno (*brōō'nō*), **Giordano (1548-1600),** Italian philosopher, was born at Nola, near Naples; was trained as a Dominican; but, doubting the Christian dogmas, fled to Geneva, whence Calvinist suspicion of his skepticism drove him to Paris. Here the zeal of the orthodox Aristotelians forced him to withdraw to London in 1583 and to Oxford, where he repeatedly gave lectures. In 1585, he was in Paris again; in 1586, in Wittenberg; in 1588, in Prague; then in Helmstedt, Frankfort, Padua; in 1592, in Venice, he was arrested by the officers of the Inquisition and was conveyed in 1593 to Rome, where he was imprisoned and condemned to death as a heretic.

Bayle styled him "the knight-errant of philosophy." His teachings embodied the essentials of pantheism later expressed by Spinoza. His published writings display throughout a strong, courageous soul, susceptible of deep enthusiasm and laboring to attain the truth.

Brush, George de Forest (1855-1941), American portrait painter, was born in Shelbyville, Tenn. He was a pupil of Gérôme in Paris and first became known to the American public in 1883 by "The Silence Broken," "The Indian and the Lily," "The Moose Chase," and other pictures of Indian life. After returning from further study in Paris, he devoted his efforts chiefly to figure composition, particularly to the portrayal of mother and child, producing many family groups and portraits which won much popularity. He was elected to the National Academy of Design and to the American Academy of Arts and Letters. Examples of his work are found in the Boston Museum, Metropolitan Museum of Art, New York, Pennsylvania Academy of Fine Arts, Philadelphia, and the Corcoran Art Gallery, Washington.

Brutus, Marcus Junius (c. 85 B. C-42 B. C.), was born about 85 B. C. He joined Pompey in his war against Cæsar; but, after Pompey's defeat, he was kindly treated by Cæsar and was made governor of Cisalpine Gaul. In 44 B. C., in his eagerness to preserve the republic, he was persuaded by Cassius to join a conspiracy against Cæsar, who had become virtually an emperor. Brutus aided in the assassination of Cæsar. The people, instead of rejoicing at Cæsar's death, were enraged, and Brutus fled from Rome. Soon after, he and Cassius were defeated at Philippi by Antony and Octavius. Feeling their cause was lost, Brutus fell upon his sword and died. He was an earnest student and something of a philosopher.

Bryan, Ruth (1885-1954), American politician and the first American woman to be appointed minister to a foreign country, was born at Jacksonville, Ill., the daughter of William Jennings Bryan. She was secretary to her father in the presidential campaign of 1908. Two years later she married Major Reginald Owen, a British engineer, who died in 1927 after a long period as an invalid. She was a popular platform lecturer on political subjects and, from 1929 to 1933, served as a Democratic member of Congress from Florida. In 1933, President Roosevelt appointed her minister to Denmark. She served until 1936, in which year she married Borga Rohde, gentleman in waiting to King Christian X of Denmark.

Bryan, William Jennings (1860-1925), American political leader and orator, was born in Salem, Ill.; was graduated at Illinois College, Jacksonville, and at Union College of Law, Chicago; practiced at Jacksonville, Ill., 1883-87; then at Lincoln, Nebr. He was a member of Congress, 1891-95; received the Democratic vote for United States senator in Nebraska legislature, 1893; and edited the Omaha *World-Herald*, 1894-96.

He was a delegate to the national Democratic convention, 1896; wrote the "silver plank" in its platform; and was nominated for president of the United States after delivery of a stirring address known later as the "Cross of Gold" speech. He received 176 electoral votes against 271 for William McKinley. In May 1898, he raised the 3d regiment of Nebraska volunteer infantry for the war against Spain, becoming its colonel. He was nominated for president in 1900 by the Democratic, Populist, and Silver Republican conventions, but was again defeated by William McKinley. After the election, he established a weekly political magazine, *The Commoner*. He was again nominated for president in 1908, but was defeated by W. H. Taft.

In 1913, President Wilson appointed Bryan secretary of state, in which office he negotiated 30 treaties of arbitration. He resigned in 1915 in protest against the administration's attitude toward Germany. In 1921, he identified himself with the Fundamentalist movement and with popular efforts to prevent the teaching of Darwinian evolution in the schools. He died suddenly at Dayton, Tenn., while assisting at the prosecution of J. T. Scopes, charged with violating an anti-evolution law in that state. See *Free Silver Movement*.

Bryant, William Cullen (1794-1878), American poet and journalist, was born at Cummington, Mass. At the age of 10, he published translations from Latin poets; at 13, he wrote a terse and vigorous political poem, entitled *The Embargo;* and, at 18, he composed the popular poem *Thanatopsis*. He established *The New York Review*, to which he contributed many of his best works. In 1826, he became principal editor of *The Evening Post*, a leading paper of New York. The first collected edition of his poems appeared in 1832 and was regarded as the highest effort of the American muse up to that time. In 1842, he published *The Fountain, and Other Poems*. He visited Europe several times and recorded his observations in *Letters of a Traveler in Europe and America*. In 1870 appeared his metrical translation of the *Iliad*, followed in 1871, by that of the *Odyssey*. Bryant was elected to the American Hall of Fame in 1910.

Bryce (*brīs*), **James, Viscount (1838-1922),** British historian, diplomat, and statesman, was born at Belfast, Ireland; was educated at Glasgow University and Oxford. He was admitted to the bar, 1867; became regius professor of civil law at Oxford University in 1870; and sat in Parliament, 1880-1907. He also served successively as chancellor of the Duchy of Lancaster, president of the British Board of Trade, chief secretary for Ireland, and ambassador to the United States. In 1913, he was ap-

pointed member of the Permanent Court of Arbitration at The Hague and was created viscount, 1914. He was a conspicuous advocate of home rule for Ireland and of international copyright, supporting the Liberal party throughout his parliamentary career.

While a prominent figure in political affairs, he became still more widely known as a writer, notably for his *American Commonwealth*, a valuable treatise on the political institutions of the United States. His other works include *The Holy Roman Empire* and *Modern Democracies*.

Buchanan (*bŭ-kăn'ăn; bū-kăn'ăn*), **James (1791-1868)**, 15th president of the United States, was born near Mercersburg, Pa.; was graduated at Dickinson College, 1809; was admitted to the bar, 1812; and was a member of Congress, 1821-31. He also served successively as minister to Russia, United States senator, secretary of state, and minister to England. He became president in 1857. In his last message, President Buchanan censured the Northern people for the imminent disruption of the Union, holding that neither the executive nor Congress had power to coerce a state. In 1866, he wrote a book to defend his administration.

Buchman, Frank Nathan Daniel (1878-), American religious leader, was born at Pennsburg, Pa. Educated at Muhlenberg College and Mount Airy Lutheran Theological Seminary, he was ordained a Lutheran minister in 1902; had a pastorate at Overbrook, Pa., until 1905; after a period in which he organized Lutheran hospices, foreshadowing the "house parties" of his later career, entered Y. M. C. A. work, traveling widely; and, in 1921, visited Oxford University, where he founded a new religious movement known first as Buchmanism and later as the Oxford Group movement. Religious experiences were shared at "house parties," the participants holding that, by following what they felt to be the Divine will, they would solve their personal problems and collectively solve national and social problems. The movement spread through most countries of the world by means of conferences and personal contact evangelism.

Buchner (*bōōk'nĕr*), **Eduard (1860-1917)**, German chemist, was born in Munich. He was educated at the universities of Munich and Erlangen. In 1893, he became professor at Kiel; in 1896, at Tübingen; and, in 1898, at the Agricultural College in Berlin. He was appointed professor at Breslau in 1909 and was made privy councilor in 1910. He made the remarkable discovery that the alcoholic fermentation of sugars is not caused by the physiological processes going on in living yeast plants but by the purely chemical action of an enzyme. In recognition of this contribution to science, he received the Nobel prize for chemistry in 1907.

Buck, Dudley (1839-1909), American organist and composer, was born in Hartford, Conn.; studied at Trinity College; then at Leipzig Conservatory of Music and at Dresden and Paris. For several years, he was organist at Music Hall, Boston; was organist at Holy Trinity Church, Brooklyn, and director and organist at the Apollo Club for 25 years, retiring in 1903. Among his compositions are the *Centennial Cantata, Golden Legend, Light of Asia, Deseret, Marmion*, and *The Christian Year*. He wrote *Illustrations in Choir Accompaniment*.

Buck, Frank (1884-1950), American wild animal hunter and motion picture producer, was born at Gainesville, Tex. Educated in the public schools, he evinced great interest in animals at an early age. After working on newspapers in Chicago until 1911, he made the first of many expeditions for the purpose of capturing wild animals in Malaya, Borneo, India, and Africa. He worked out successful techniques for taking the animals alive and capitalized on his success by the production of motion picture films which, together with his books, brought him a wide reputation as an intrepid and skillful hunter. He wrote, in collaboration, *Bring 'Em Back Alive* and *Fang and Claw*. His other writings include *On Jungle Trails* and *Animals Are Like That*.

Buck, Pearl Sydenstricker (1892-), American novelist, was born at Hillsboro, W. Va., while her parents, who were missionaries to China, were on furlough. Her childhood was spent in China, and she was educated at home and later in Shanghai, Europe, and Randolph-Macon Woman's College, Va., where she graduated in 1914. Returning to China, she married a missionary, John L. Buck, who taught at Nanking University, where she also lectured.

Mrs. Buck's first novel, *East Wind: West Wind*, was followed in 1931 by *The Good Earth*, a story in Chinese setting which, by its evident fidelity to life and its moving biblical simplicity of language, conveys a sense of the universal drama of mankind. Her other works include *Sons, The Young Revolutionist, Fighting Angel*, and *The Patriot*. Her unorthodox views on Christian missions aroused a controversy, as a result of which she resigned her mission post in 1933. In 1935, she married Richard J. Walsh, having divorced her previous husband. The 1938 Nobel prize in literature was awarded to her. She has written a number of books for children, examples of which are *Water Buffalo* and *The Big Wave*. Important recent books are *Come, My Beloved* (1953), *My Several Worlds* (1954), and *Imperial Woman* (1956).

Budæus, or **Budé** (*bū'dā'*), **Guillaume (1467-1540)**, French scholar was born in Paris. He was educated in Paris and Orléans. Beginning with his 24th year, he devoted himself to belles-lettres, philosophy, and Greek. As a Greek scholar, he attained notable fame, and he was held in great esteem as a citizen and man of affairs. He became royal librarian, and, at his suggestion, Francis I founded the Library at Fontainebleau which, upon being removed to Paris, became the celebrated Bibliothèque Nationale, the National Library. Likewise at his suggestion, Francis established the corporation of the royal readers, out of which grew the Collège de France. His *Commentarii Linguæ Græcæ* greatly stimulated the study of Greek literature in France, and his *Annotationes in XXIV Libros Pandectorum* marked an era in the study of Roman law.

Buddha (*bōōd'ä*) is the title of the Hindu sage Gautama, or Siddhartha, the founder of Buddhism. The term signifies "the wise, or enlightened" and is applied in the East as an analogue of our word "saint." Oriental scholars concur in fixing the time of the great Buddha in the 6th century B. C. He was the son of a king, named Suddhodana. His father, fearing lest his son should desert his high station and take to a religious life, had him early married to a charming princess and surrounded with all the splendor and dissipation of a luxurious court. Twelve years spent in this environment only deepened his conviction that all life could offer was vanity, and he therefore resolved to learn whether a life of austerity would lead to peace.

Search for Spiritual Peace. Gautama escaped from the palace and entered on the life of a religious mendicant when about 30 years of age. He began by studying all that the Brahmans could teach him, but, finding their doctrine unsatisfactory, he turned to asceticism. He resolved to conquer the secret of peace by sheer force of thinking. He arrived at the conclusion that ignorance is the ultimate cause of existence and that, therefore, with the removal of ignorance, existence and all its anxieties would be cut off at their source. Passing through successive periods of contemplation, he realized this truth in his person and attained the perfect wisdom of the Buddha, "the Enlightened."

Ministry. Having acquired the knowledge of the causes of misery and the means by which these causes are to be counteracted, the Buddha was now ready to lead others on the road to salvation. He first preached at Benares; but the most important of his early converts was the sovereign of Magadha, whose dynasty continued for many years to encourage the new faith. Buddha traversed a great part of northern India, combating the teaching of the Brahmans and everywhere making numerous converts.

Spread of Buddhism. His disciples, well trained and organized, continued his work after him. The doctrines and rules of discipline were settled in general councils, the most important of which convened about 250 B. C. in the reign of Asoka. Buddhism was carried into Ceylon, Burma, and Thailand. By the beginning of the Christian era, it had become the religion of the northwesterly parts of India and adjacent regions. It was adopted in China in 62 A. D., whence it extended into Korea and Japan.

Doctrines. Buddha was one of the first religious leaders to proclaim universal brotherhood. It was this doctrine of equality which gave Buddhism so strong a hold in caste-ridden India. He taught that salvation came to all through self-denial and charity. Purity of conduct, suppression of desire, and continuous contemplation were sufficient to raise one to the highest state of bliss, or Nirvana, which amounted eventually to the extinction of consciousness.

The three main doctrines of Buddhism are: the transmigration of souls, the desirability of Nirvana, and the chain of cause and effect. As a result of this last doctrine, the idea of sin has little place in the religion. Buddhism is highly philosophic, yet, modified and combined with other systems, it is today one of the great religions of the world. Buddha died at Kusinagara, India, at the age of 80.

Buffon (*bŭf'ŭn; bü'fôN'*), **Georges Louis Leclerc, Count de (1707-1788)**, French naturalist, was born in Montbard. He was educated for the law but after traveling for a time, devoted himself to science. In 1739, he was elected a member of the Academy of Sciences and was appointed director of the Royal Garden. His *Natural History*, in 44 volumes, was the first attempt to collect all the facts of natural history and bring them together in a popular and intelligible form. It may, therefore, be considered one of the stepping stones which led to the formulation of the theory of evolution. Rousseau is said to have kissed the steps of the pavilion in which the book was written.

Bulfinch, Charles (1763-1844), American architect, was born in Boston, Mass. He was graduated from Harvard,

1781, and was the first American to prepare himself for his profession by careful study abroad. His chief works are the Massachusetts State House, Boston; McLean Hospital, Somerville; Massachusetts General Hospital, Boston; and the west porticoes of the Capitol at Washington.

Bulganin (*bŏŏl-gä'nyĕn*), **Nikolai A.** (**1895-**), was born in Gorki (formerly Nishni-Novgorod), Russia. In 1917, he joined what is now the Communist party, serving the revolutionary cause as a member of the secret police. Five years later he was transferred to the economic administration, where he distinguished himself by his ability to get things done ahead of schedule. He was mayor of Moscow from 1931 to 1936. In 1934 he was made a member of the central committee of the Communist party, and in 1937 rose to be vice premier of the USSR. He was also made head of the commission on foreign affairs and head of the state bank. He served during World War II as commissar to the army and assistant minister of defense, emerging with the title of marshal. He became a member of the Politburo (now the Presidium) while serving as minister of defense. After the death of Stalin in 1953, he was appointed first vice premier of the USSR, and succeeded Malenkov as premier in 1955.

Bull, Ole Bornemann (**1810-1880**), violinist, was born in Bergen, Norway, in 1810. Largely self-taught, he specialized as a virtuoso, his rendering of difficult works evoking great enthusiasm, which was heightened by his expressive playing of national airs. He amassed a fortune, which he lost in a scheme to found a colony of his countrymen in Pennsylvania. He afterward settled at Cambridge, Mass., and had also a summer residence in Norway, where he died.

Bulwer, Sir Henry (**1801-1872**), is the name commonly applied to William Henry Lytton Earle Bulwer, Baron Dalling and Bulwer, English diplomatist and author, an elder brother of Bulwer-Lytton, the novelist. He was born in London. In 1837, he became secretary of the British embassy at Istanbul, where he negotiated and concluded a treaty that became the foundation of the commercial system of England in the East. In 1843, he was made minister plenipotentiary to the court of Madrid and negotiated peace between Spain and Morocco the following year. In 1849, he came to Washington, where he evinced equal art in negotiating the Clayton-Bulwer Treaty. Among his works are *An Autumn in Greece; France: Social, Literary, and Political; Life of Byron;* and *Historical Characters.*

Bunche, Ralph J. (**1904-**), American diplomat, political scientist, and educator, was born at Detroit, Michigan, the grandson of an American slave. His studies at the University of California and later at Harvard University were mainly in the field of political science, a subject which he taught for several years at Howard University. During World II he was co-ordinator of information for the U. S. Government in Africa and the Near East. In 1946 he was "loaned" by the State department to the United Nations. His most notable service for that organization was in taking over the task of mediator in Palestine following the assassination of Count Bernadotte in 1948. As a result of protracted negotiations, Dr. Bunche finally succeeded in bringing about a peaceful settlement of the dispute between Israeli and the Arabs. He was awarded the Nobel peace prize, 1950.

Bunin (*bōō'nyĕn*), **Ivan** (**1870-1953**), Russian novelist, was born at Veronezh, in an impoverished family of the aristocracy. Early honors came to him for his poetry and, after 1892, for his novels, which, with little plot, depicted chiefly Russian peasants and the declining landed class, adolescence, and Oriental tales. He traveled widely. His style imparts a sense of universality to local themes. After the Russian revolution, he lived in exile, although the personal dislocation involved produced little visible effect either on his themes, spirit, or productivity. Award of the Nobel prize in literature for 1933 brought official recognition for a series of novels that include *The Village, The Well of Days, Grammar of Love,* and *Tolstoy's Liberation.*

Bunner, Henry Cuyler (**1855-1896**), American humorist and short-story writer, was born in Oswego, New York, and was educated in New York City. He began journalism as a reporter and, in 1877, joined the editorial staff of *Puck,* which soon after, under his editorship, assumed a dignity and influence unusual in the comic press. His satirical editorials became a powerful social and political force.

In 1886, he published a novel, *The Midge,* followed in 1887 by *The Story of a New York House,* but his permanent fame rests upon his mastery of the short story. The best of his short stories are included in volumes entitled *Short Sixes, Zadok Pine, Love in Old Cloathes,* and *Made in France,* which are models of story-telling and character drawing. His verses, *Airs from Arcady and Elsewhere, Rowen,* and *Poems,* display imagination and facile workmanship. The best of his several plays is *The Tower of Babel,* published in 1883. He was editor of *Puck* until his death.

Bunsen, Robert Wilhelm (**1811-1899**), German chemist, was born at Göttingen. He was the first to produce magnesium in large quantities, and, in 1860, he invented the magnesium light, important in photography. His greatest discovery was that of spectrum analysis, made in conjunction with Kirchhoff. Bunsen will always be remembered by physicists and chemists for the much-used photometer and gas burner which bear the Bunsen name. The principle of the Bunsen burner is now widely utilized in gas stoves for cooking purposes. He also made valuable discoveries in organic chemistry and invented the ice calorimeter, a filter pump, and other apparatus.

Bunyan, John (**1628-1688**), English writer, was born at Elstow, near Bedford. For some years, he followed his father's trade of traveling tinker. After a short service in the parliamentary army, he married at the age of 19. His marriage was followed by his conversion, or religious "awakening." In 1655, he became a member of the Baptist congregation at Bedford and subsequently its pastor.

After the Restoration, he was convicted in 1660 under the act forbidding divine services other than those of the Anglican Church and was thrown into Bedford jail, where he remained for more than 12 years, supporting his family by making tagged laces. There he wrote his most famous book—*The Pilgrim's Progress.* He was released from prison in 1672 and again became pastor of the Bedford congregation. Of Bunyan's other works, the chief are his *Grace Abounding to the Chief of Sinners,* an autobiography, and the allegorical *Holy War.* He wrote also a volume of verse entitled *Divine Emblems.* Died in London.

Burbank, Luther (**1849-1926**), American plant breeder and horticulturist, was born in Lancaster, Mass.; was educated at Lancaster Academy; and early devoted himself to the study of plant life. He removed to Santa Rosa, Cal., 1875, where he established experiment farms and was later appointed special lecturer at Leland Stanford University. His success in developing valuable new forms of plant life aroused wide interest in plant breeding. These new varieties include the Burbank potato introduced in 1872; a spineless opuntia, for feeding cattle in the desert; gold, Wickson, apple, October purple, chalco, America, and climax plums; giant, splendor, sugar, and stoneless prunes; a new fruit, the plumcot; peachblow, Burbank, and Santa Rosa roses; gigantic forms of amaryllis; the Shasta daisy; giant and fragrance callas; and various new apples, peaches, nuts, and berries. He wrote *How Plants are Trained to Work for Man.*

Burchfield, Charles Ephraim (**1893-**), artist, was born in Ashtabula, Ohio. He studied at the Cleveland School of Art, and in 1921 became a wallpaper designer in Buffalo, New York. Since 1929 he has been a landscape painter mainly in water colors. He is represented by pictures in the leading art museums of the country, including the Boston Museum of Fine Arts, and the Metropolitan Museum and the Museum of Modern Art in New York.

Burgess, Frank Gelett (**1866-1950**), American humorous writer and illustrator, was born in Boston; graduated at Massachusetts Institute of Technology, 1887; and became a draftsman with the Southern Pacific railway in 1887. He was instructor in topographical drawing at the University of California, 1891-94. In the latter year, he became designer and associate editor of *The Wave* and later was editor of the *Lark* in San Francisco and writer for various magazines in New York. In 1898, he removed to London and resided later successively in San Francisco, Boston, and New York. He is the author and illustrator of many delightfully whimsical books, among which are *Goops and How to Be Them, The Purple Cow, Burgess Nonsense Book, The Rubaiyat of Omar Cayenne, The Cat's Elegy,* and *Short Words Are Words of Might.*

Burgoyne (*bûr-goin'*), **John** (**1722-1792**), British general. He early entered the army and, in 1762, displayed much talent and enterprise in command of British troops in Portugal. In the American war, he led the army which was to penetrate from Canada into the revolting provinces. At first he was successful, but was ultimately compelled to surrender at Saratoga, 1777. Displeased by the conduct of the ministry after his return to England, he retired and devoted himself to writing, producing several successful books and a comic opera.

Burke, Billie (**1886-**), American actress, was born at Washington, D. C. She was educated in France; appeared for the first time on the regular stage in London, 1902, and made her debut at New York in 1907, playing the role of Beatrice Dupre in *My Wife.* Other dramas in which she appeared with conspicuous success include *Mrs. Dot, The Amazon, Intimate Strangers,* and *Happy Husbands.* She married Florenz Ziegfeld, Jr., in 1914.

Burke, Edmund (**1729-1797**), British statesman and orator, was born at Dublin and was educated at Trinity College in his native city. Going to London, he attracted attention by his essays on the *Sublime and Beautiful,* and devoted himself to literature, founding, in 1759, *The*

Annual Register. In 1761, he became private secretary to Hamilton, the chief secretary for Ireland, and served Lord Rockingham in the same capacity when that nobleman became prime minister. In 1766, Burke entered Parliament, where his speeches on American affairs created a deep impression.

In 1782, Burke became paymaster in Lord Rockingham's government. He again took office in the Duke of Portland's coalition ministry, when he made a famous speech on the India bill. In the impeachment of Warren Hastings, Burke played a leading part, his opening speech extending over four days. The outbreak of the French Revolution was the occasion of one of his finest efforts of oratory. Burke's hostile attitude to the Revolution severed many of his political friendships, and he seceded from the Whig party. In 1794, he retired from parliamentary life, though he continued to produce pamphlets on political affairs. His other chief works are *A Vindication of Natural Society, Thoughts on the Causes of Present Discontents, Reflections on the Revolution in France*, and *Letters*.

Burleigh (*bĕr'lĭ*), **William Cecil, Baron (1520-1598)**, English statesman, was born at Bourne. Entering Gray's Inn at the age of 21, he devoted himself assiduously to the study of law. His manifold abilities recommended him to the notice of Henry VIII, who presented him with an office in the common pleas. In 1547, he was appointed master of requests, and his talents soon procured for him the office of secretary of state. When Queen Mary ascended the throne, Burleigh, being a Protestant, resigned his official employment, but, as a private gentleman, he maintained amicable relations with the Roman Catholic party. Elizabeth made him secretary of state upon her accession in 1558, and, for 40 years, he was responsible for the wise constructive policy that made her reign famous.

Burne-Jones, Sir Edward (1833-1898), English painter, was born of Welsh ancestry at Birmingham, England. He was educated at Exeter College, Oxford, where William Morris, the poet, was his friend. In 1856, they left Oxford to devote themselves to art and settled in London, where they studied together under the guidance of Rossetti until 1859. In 1860, Burne-Jones married Georgiana McDonald; in 1862, traveled in Italy with John Ruskin; and, in 1865, removed from London to Fulham.

He is properly classed with the pre-Raphaelite group of English painters. His pictures, which are half-classic, half-romantic in character, are highly decorative and notably excellent in color. He furnished striking designs for stained glass at Christ Church, Oxford, and elsewhere, and powerfully influenced decorative art in England.

Burnett (*bûr'nĕt*), **Frances Hodgson (1849-1924)**, née Frances Eliza Hodgson, author and playwright, was born in Manchester, England, and, at 7 years of age, was brought to Knoxville, Tenn. In 1873, she married Dr. L. M. Burnett, from whom she obtained a divorce in 1898, and, in 1900, married Stephen Townesend, an English author who died in 1914. Her story, *Surly Tim's Trouble*, in *Scribner's Magazine*, 1872, attracted attention and, in 1877, she won wide literary recognition by *That Lass o' Lowrie's*. Her most successful book *Little Lord Fauntleroy*, which she later dramatized, appeared in 1886.

Burnham, Daniel Hudson (1846-1912), American architect, was born in Henderson, N. Y. He received his education in Chicago and under tutors at Waltham, Mass. In 1872, he formed a partnership with John W. Root, a designer of taste and ability and, upon the death of the latter, in 1891, was joined by C. B. Atwood.

The planning of the World's Columbian Exposition at Chicago, 1893, was commissioned to this firm. The excellent administrative generalship, professional skill, and artistic taste which he displayed in this vast project, as well as in the various other undertakings of his firm, won him a world-wide reputation, and his influence upon contemporary architects was great. He designed many notable public and commercial structures such as the Rookery, Masonic Temple, and Railway Exchange in Chicago, the Flatiron Building in New York, the Pennsylvania Railway station, Pittsburgh, and the Union passenger station at Washington. He also gained great fame as a city planner and was chairman of the national committee for beautifying Washington.

Burns, John (1858-1943), English labor leader, was born in London; was educated at Battersea and at night schools; led a notable strike of London dock laborers in 1892; and in the same year was elected to the House of Commons. He became member of the British cabinet, 1905, acting as president of the Local Government Board. By resisting a policy of doles, he drew upon himself much criticism from the Labor party. In 1914, he resigned in protest against the government's declaration of war on Germany. His published works include *The Unemployed, Municipal Socialism*, and *Labor and Free Trade*.

Burns, Robert (1759-1796), Scottish poet, was born at Alloway, near Ayr, Scotland, 1759. He was the son of a small farmer and was brought up amidst indigence and adversity. He received, however, the advantages of a common school education, though his chief advances in general knowledge he owed to the books he read, among which were *The Spectator*, the works of Pope, and the poems of Allan Ramsay. He was familiar also with songs and ballads, mostly of unknown authorship, which then circulated in that part of Scotland.

When 16 years of age, he fell in love, and his feelings, as he tells us, at once burst into song. His first volume of poetry was issued in 1786, and it at once became popular. The success of this volume, which was speedily republished in Edinburgh, induced him to take the farm of Ellisland, near Dumfries, where he married his "bonny Jean" in 1788. Farming proving a failure, he removed to Dumfries in 1791 and, having been appointed to a position as exciseman which had been obtained for him by a friend, he subsisted entirely upon his income from that office, which yielded approximately £70 a year. In 1792, he wrote about 100 songs as accompaniments to the melodies of Scotland, and for these, which are now among the world's priceless possessions, he received the sum of £5.

Disappointment now embittered him; in his office, a dangerous one to men of his tendencies, intemperance gradually gained upon him, while want threatened him, and, in his 38th year, he sank into an untimely grave. During his short and sad life, he wrote some of the finest poems in the language, the appreciation of which has become world-wide and has made sure his lasting fame.

Burnside, Ambrose Everett (1824-1881), American soldier, was born at Liberty, Indiana; served an apprenticeship to a tailor; but was graduated from West Point in 1847. He left the army as first lieutenant in 1852, but returned as colonel of volunteers for the Federal cause in 1861; commanded a brigade at Bull Run; and, in February 1862, captured Roanoke Island. Having rendered important service at South Mountain and Antietam, he, in November, reluctantly superseded McClellan as general of the army of the Potomac. In December 1862, he crossed the Rappahannock and attacked Lee near Fredericksburg, but was defeated with a loss of over 10,000 men. In 1863, he successfully held Knoxville and, in 1864, led a corps under Grant through the battles of the Wilderness and Cold Harbor. He resigned in April 1865; was governor of Rhode Island, 1866-68; and was elected United States senator in 1875. Died at Bristol, R. I.

Burr, Aaron (1756-1836), American statesman, was born at Newark, N. J. He was a lieutenant colonel in the Revolutionary War; became attorney general of New York in 1789 and was United States senator, 1791-97 and vice president of the United States, 1801-05. In a duel, the culmination of bitter political animosity, he mortally wounded Alexander Hamilton, 1804. In 1807, he was charged with treason on the ground that he intended to subdue and rule Mexico, but was acquitted. After unsuccessful attempts to raise money in Europe for various ambitious schemes, he returned in poverty to New York and practiced law there until shortly before his death.

Burritt, Elihu (1810-1879), "the learned blacksmith," was born at New Britain, Conn. He worked as a blacksmith in his native place and at Worcester, Mass., but devoted all his leisure to mathematics and languages—Latin, Greek, Hebrew, Arabic, and most of the modern European languages. He was best known to the world as an earnest apostle of peace, through his *Christian Citizen*, and by lectures given in Europe and in the United States. Among his works are *Sparks from the Anvil, Olive Leaves, Peace Papers, Walks in the Black Country*, and *Chips from Many Blocks*. He took a prominent part in advocating an ocean penny-postage. For many years he lived in England, and from 1865 to 1870 he was United States consul at Birmingham. Died in his native city.

Burroughs (*bŭr'ōz*), **John (1837-1921)**, American essayist and naturalist, was born in Roxbury, N. Y.; received an academic education and taught school about eight years; became a treasury clerk in 1864; and was a national bank examiner, 1873-84. In 1874, he retired to a farm at Esopus, N. Y., where he devoted his time to literature and fruit culture. Besides numerous essays, studies of nature and animal life contributed to magazines, he wrote many books. Among his writings are *Birds and Poets, Locusts and Wild Honey, Indoor Studies, Squirrels and other Fur Bearers, Literary Values, Bird and Bough, The Breath of Life*, and *Field and Study*. In 1904, by an article in *The Atlantic Monthly*, he criticized sham natural history and precipitated a widespread controversy over "nature fakers." He was a member of the American Academy of Arts and Letters.

Burton, Harold Hitz (1888-), American jurist, was born at Jamaica Plain, Mass. A graduate of Bowdoin College and of Harvard Law School, he began the practice of law in Cleveland, Ohio, in 1912. From 1935 to 1940, he

was mayor of Cleveland. In 1941 he became a Republican senator from Ohio. In 1945 President Truman appointed him an associate justice of the Supreme Court.

Burton, Sir Richard Francis (1821-1890), English traveler, was born in Hertfordshire. He entered the Indian army in 1842. Having mastered Hindustani, Persian, and Arabic, he disguised himself as an Afghan pilgrim, and made the daring journey described in his *Pilgrimage to El Medinah and Meccah.* In 1858 he, with Speke, discovered Lake Tanganyika. He afterward traveled in America. He was British consul at Damascus, Trieste, and elsewhere. He was knighted in 1886. Among Burton's many works are *First Footsteps in East Africa, City of the Saints, The Nile Basin, Vikram and the Vampire,* and a celebrated translation of the *Arabian Nights.* Died at Trieste.

Bush, Vannevar (1890-), American administrator, was born in Everett, Mass., and studied at Tufts College, Massachusetts Institute of Technology, and Harvard. He was professor and later dean of engineering at Massachusetts Institute of Technology, 1919-38. He became president of the Carnegie Institution of Washington in 1939. After directing defense research during World War II he was made chairman of the joint research and development board in 1946. He took part in work on the atomic bomb.

Bushnell, Horace (1802-1876), American theologian, was born at New Preston, Conn. He was graduated at Yale, 1827; was for some time an editor of the New York *Journal of Commerce,* and, in 1833, was ordained to the Congregational ministry. He preached with distinction at Hartford, Conn., from 1833 to 1839, resigning because of ill health. His influence grew rather from his spiritual earnestness and the force of his thought than from his theological teaching. His works include *God in Christ, Christ in Theology,* and *Vicarious Sacrifice.*

Butler, Benjamin Franklin (1818-1893), American politician and general, was born in Deerfield, N. H. He studied law and settled in Massachusetts, where he became recognized as one of the leading Democrats of New England. In 1860 he took a prominent part in the movement which nominated Breckinridge and split the Democratic party. In the Union army during the Civil War he commanded the departments of the Gulf and of the South Atlantic. His reputation came chiefly from his civil regulations.

In 1866 and again in 1868, he was elected to Congress by the Republicans of his district in Massachusetts. Defeated in 1874, he deserted the Republican party, and, in 1882, was elected governor by the Democrats. In 1884, after bitterly opposing the nomination of Grover Cleveland for the presidency by the Democratic party, he became the presidential nominee of the Greenback party. He was an able but erratic administrator and soldier.

Butler, Joseph (1692-1752), English theologian, was born at Wantage, in Berkshire. After being graduated from Oriel College, Oxford, in 1718, he was appointed preacher at the Rolls chapel, where he delivered a series of remarkable sermons. In 1738, he was made bishop of Bristol; in 1740, he became dean of Saint Paul's; and, in 1750, he was appointed bishop of Durham. In 1736, he published *Analogy of Religion,* which long stood as the principal answer to the school of deism in theology.

Butler, Nicholas Murray (1862-1947), American educator and publicist, was born at Elizabeth, N. J. He was graduated from Columbia College in 1882, was fellow in philosophy, 1883-84, and spent a year in advanced study in Berlin and in Paris. Returning to Columbia in 1885, he became assistant in philosophy and, later, professor of philosophy and education. Upon the reorganization of Columbia College as Columbia University in 1890, he was chosen dean of the faculty of philosophy, ethics, and psychology. In 1887, he organized the New York College for the training of teachers, now Teachers College, affiliated with Columbia University. Butler was made acting president of Columbia University in 1901 and, in 1902, was chosen president. His administration was characterized by marked interest in the broader relations of the university. He retired in October, 1945.

In 1911, he was elected member of the American Academy of Arts and Letters, becoming president in 1928. In 1912, Butler was selected by the Republican national committee as candidate for vice president of the United States. He was awarded one-half the Nobel prize for peace in 1931. Intimacy with people in public life both in the United States and other countries gave his opinion weight in public affairs. His writings include *The Meaning of Education, The Faith of a Liberal, Between Two Worlds, Across the Busy Years,* and *The World Today.*

Butler, Samuel (1612-1680), English satirist, was born at Strensham, Eng.; in his 17th year, he became attached to the household of the Earl of Kent, when he frequently attended meetings at the house of a Sir Samuel Luke, a strict Puritan and Parliamentarian. The experiences of this time furnished him with the material for his famous work *Hudibras,* a kind of Don Quixote in verse, in which the Puritans were the subject of ridicule.

Butler, Samuel (1835-1902), English author, was born at Langar. Refusing to enter the Church as his father wished, he went to New Zealand and successfully operated a sheep ranch for five years. Returning to England he took up painting and musical composition with moderate success. His pen, however, was destined to bring him fame. *Erewhon* appeared in 1872, an account of a visit to an imaginary country by means of which he satirized his contemporaries. His one novel, *The Way of All Flesh,* largely autobiographical, is an attack on the pattern of middle class family life of the day. Butler wrote in criticism of Darwin's theory of evolution, holding that unconscious memory and conscious striving for adaptation to environment constitute the mechanism of biological evolution.

Byng (*bĭng*), **Julian Hedworth Byng, Viscount (1862-1935),** British general, son of the earl of Strafford. He served in the Sudan expedition, 1884, and in the South African War, 1899-1902. For services at the Dardanelles, 1915, he was made lieutenant general and, in 1916, had command of the Canadian division on the western front.

In November 1917, Byng won a signal victory at Cambrai, breaking through the strongest trench systems by means of tanks, which he was the first to employ on a large scale. In March 1918, after the disaster to Gough's army in Picardy, Byng thwarted the efforts of the Germans to extend their gains, crushing their most powerful attacks against Arras and Vimy Ridge. For this and his subsequent service, he was made, in 1919, earl of Vimy and of Thorpe le Soken. He served as governor general of Canada, 1921-26, and was head of Scotland Yard, 1928-31.

Byrd, Harry Flood (1887-), American statesman, newspaper publisher, and farmer, was born at Martinsburg, W. Va., and was educated in the public schools and Shenandoah Valley Academy, Winchester, Virginia. At the age of fifteen, he went to work for the *Winchester Star.* He is now publisher of that paper and also the Harrisonburg (Va.) *Daily News and Record.* He was elected to the Virginia Senate in 1915, in which he served until elected governor of the Commonwealth for the term 1926-30. He has been United States Senator since 1933. Through continuous service as a member of the Senate Finance Committee and, since 1941, as chairman of the Joint Committee on Reduction of Non-essential Federal Expenditures, he has come to be regarded as the foremost advocate of the pay-as-you-go principle in government financing. In this way he earned the nickname of "Mr. Economy." He is a brother of Commander Richard E. Byrd. His farming interests include apple growing and peach culture.

Byrd, Richard Evelyn (1888-), American aviator, was born at Winchester, Va. At the age of 12 he made a trip alone around the world. He entered the Navy and, although retired in 1916 on account of an injury, he continued the service of an officer on active duty, organizing the Navy department's commission on training camps and, in 1918, commanding the U. S. air forces in Canada. He learned to fly and, after World War I, devoted himself to aviation. The rank of commander was conferred on him by special act of Congress. In 1926, he made the first flight over the North Pole and, on June 29-30, 1927, he flew from New York to France. In 1928-30 and in 1933-35, he led successful expeditions to Antarctica for polar exploration. In 1934, Byrd spent about 5 months in isolation making meteorological observations, his experience being recorded in *Alone.* In the course of his first expedition, he flew over the South Pole. Returning again to Antarctica in 1939 and 1946-47, he continued his explorations. His works include *Skyward, Little America,* and *Alone.*

In 1955-56 he led an expedition to Antarctica to establish observation bases for American participation in the International Geophysical Year, 1957-58.

Byrnes, James Francis (1879-), American jurist, was born at Charleston, S. C. Employed in a law office, he became a court reporter and was admitted to the bar in 1903. After 14 years' service as representative and 11 years as senator from South Carolina, he was, in 1941, appointed an associate justice of the Supreme Court. In 1942 he resigned to become director of economic stabilization. In the following year he was made head of the office of war mobilization. He was secretary of state, 1945-47. His book, *Speaking Frankly,* gives an account of his administration. He was governor of South Carolina, 1951-55.

Byron, George Gordon Byron, Baron (1788-1824), English poet, was born in London. In his 11th year, he succeeded his great-uncle, William, Lord Byron. He was sent to Harrow and, in 1805, to Trinity College, Cambridge. Two years later he published his first volume of verse, *Hours of Idleness.*

This volume was fiercely assailed by Lord Brougham in the *Edinburgh Review,* and his sarcasms stung Byron into writing *English Bards and Scotch Reviewers.* In the babble of praise that immediately arose, Byron withdrew from

England, visited the shores of the Mediterranean, and sojourned in Turkey and Greece. On his return in 1812, he published the first two cantos of *Childe Harold*, which met with immediate success, and its author was at once enrolled among the great poets of his country. Six months' stay at Geneva resulted in the third canto of *Childe Harold* and *The Prisoner of Chillon*. *Manfred* and *The Lament of Tasso* were written in 1817. The next year, he was at Venice and finished *Childe Harold* there.

In the next three years, he produced the first five cantos of *Don Juan* and a number of dramas of differing merit, *Cain* and *Werner* being at opposite poles. In 1822, he removed to Pisa and worked there at *Don Juan*, which poem, with the exception of *The Vision of Judgment*, occupied his pen almost up to the close of his life.

In the summer of 1823, Byron sailed for Greece, to aid in that country's struggle for independence. His health, however, began to fail and he died at Missolonghi.

Cabell, James Branch (1879-), American novelist, was born at Richmond, Va. He was graduated from William and Mary College in 1898, worked for various newspapers, operated coal mines, and, during 1916-29, was engaged in genealogical and historical investigations. He wrote a series of novels presenting a central conception of human life fitted chiefly to an imaginary medieval country, Poictesme. Among his books are *The Soul of Melicent*, *The Cream of the Jest*, *Jurgen*, and *Hamlet Had an Uncle*. Later books written by him are *Let Me Lie* (1947), *Devil's Own Dear Son* (1949), *Quiet, Please* (1952), and *As I Remember It* (1955).

Cabet (*kȧ'bĕ'*), **Etienne (1788-1856)**, French communist, was born at Dijon. In 1848, he went to Texas to found an "Icarian community," so named after his *Voyage en Icarie*, a "philosophical and social romance" describing a communistic utopia. The Texas project was soon abandoned, but the colony was successfully re-established at Nauvoo, Ill., in 1852. In 1856, Cabet was deprived of the directorship of the colony and withdrew to Saint Louis. He was the founder and inspirer of modern communism in its voluntary form. See *Icarian Community*.

Cable, George Washington (1844-1925), American author, was born in New Orleans; was educated in the public schools; served in the fourth Mississippi cavalry of the Confederate army, 1863-65; and was clerk in a cotton factor's office. He was a reporter on the New Orleans *Picayune*, 1865-79, and, from the latter year, devoted himself to literature. Among his writings are *Old Creole Days*, *Madame Delphine*, *The Creoles of Louisiana*, *The Negro Question*, *Gideon's Band*, and *The Amateur Garden*. Cable founded, 1887, the home culture clubs, now called the Northampton People's Institute, for the educational and æsthetic improvement of wage earning people. He was elected a member of the American Academy of Arts and Letters in 1908.

Cabot, John (1450-c. 1498), Italian navigator in English service, was born at Genoa. Being compelled by his business to reside much in Bristol, England, he was appointed by Henry VII, 1496, to the command of a squadron of five vessels on a voyage of discovery in the Atlantic Ocean. In this expedition, he is said to have been accompanied by his sons—Ludovico, Sebastian, and Sanzio. In June 1497, Cabot landed on the North American coast, probably near Cape Breton Island. He is, therefore, entitled to be called the discoverer of North America.

Cabot, Sebastian (1474-c. 1558), Italian navigator, was born at Genoa; was a cartographer of repute; and is said to have accompanied his father, John Cabot, on the latter's voyage of discovery to North America. In 1526, he headed an expedition to South America, where he discovered and named the Rio de la Plata. He spent three years in an unsuccessful attempt to find large silver deposits near this river.

Cabrini, Saint Frances Xavier (1850-1917), first American citizen to be canonized, was born near Lodi, Italy. From her efforts grew the order of Missionary Sisters of the Sacred Heart of Jesus, which, at her death, numbered 3000 religious with 70 houses. Her greatest activity was in the United States, but she traveled extensively in Latin America. She was canonized in 1946.

Cadman, Charles Wakefield (1881-1946), American composer, was born at Johnstown, Pa. He received his musical education in harmony, organ playing, and orchestration in Pittsburgh. He became musical critic on the Pittsburgh *Dispatch* and later an organist in the city and the conductor of the Pittsburgh male chorus. His first published compositions appeared in 1904. He wrote many popular Indian songs as well as several Indian operas. These include *The Land of the Misty Water*, *The Garde nof Mystery*, and *Shanewis*. His works include *The Vision of Sir Launfal*, *From Wigwam and Tepee*, and *A Witch of Salem*.

Cadorna (*kȧ-dôr'nȧ*), **Count Luigi (1850-1928)**, Italian general, member of a famous noble family, was born at Pallanza. After distinguished military service, he was placed in command of the Italian armies when Italy entered World War I. He conducted the Gorizia campaign with success, but after the defeat of Caporetto gave up the chief command to become a member of the Allied supreme war counsel. He was made a field marshal in 1924.

Cædmon (*kȧd'mŭn; kȧd'-*) **(?-c. 680)**, "the father of English song," was the first Anglo-Saxon who composed in his own language works that are extant. Born in the early 7th century, he was originally a cowherd, attached to the monastery of Whitby. According to a legend, he was commanded in a dream to sing "the beginning of created things." He accordingly produced metrical paraphrases of *Genesis* and other parts of the Bible. Other religious verses have been credited to him, but their authorship is uncertain.

Cæsar, Caius Julius (100 B. C.-44 B. C.), Roman general and statesman. The marriage of his aunt to Marius, an outstanding popular leader, probably helped to determine Cæsar's sympathies in favor of the democratic faction. At the age of 17, he married Cornelia, the daughter of Lucius Cinna. This alliance with Cinna, who headed the popular party, brought upon Cæsar the anger of Sulla, the leader of the victorious oligarchic party. Sulla, who, by 81 B. C., had become dictator of Rome, proceeded to offer rewards for the death of his political enemies. Cæsar was called on to divorce Cornelia. With characteristic intrepidity, however, he refused, preferring to sacrifice his rank and property and even to risk his life rather than to submit. He escaped death only by flight.

Political Career. On his return to Rome after the death of Sulla, 78 B. C., Cæsar found the popular party in a state of great ferment, but he took no part in the attempts of Lepidus to overthrow the oligarchy. To improve his eloquence, Cæsar went to Rhodes to study under the rhetorician Apollonius Molo. In 74 B. C., once again in Rome, he was elected pontifex maximus, and, for the first time, he threw himself earnestly into public life.

In the year 70 B. C., Cæsar first attached himself to Pompey, whose political actions at this time were extremely democratic. In 68 B. C., Cæsar obtained a quæstorship in Spain. In 67 B. C., having divorced Cornelia, he married Pompeia, a relative of Pompey, with whom he was daily becoming more intimate. Two years later, Cæsar entered upon the office of curule ædile and greatly increased his popularity by lavishing money on games and public buildings. In 63 B. C., he was elected pontifex maximus and, shortly afterward, prætor. At the expiration of his prætorship, he was assigned the governorship of Hispania Ulterior.

By rare tact and sagacity, Cæsar effected a reconciliation between the two strongest statesmen of Rome, Pompey and Crassus, and, in 60 B. C., he made with them an alliance, known in history as the First Triumvirate. Both of these men aided him in carrying an agrarian law, by which he consolidated his position in the popular favor. In 59 B. C., Cæsar was elected consul. On the expiration of his term of office, he obtained for himself, by popular vote, the governorship of the province of Gallia Cisalpina and Illyricum for five years, to which the senate added the province of Gallia Transalpina. The term was later extended to ten years.

Military Campaigns. When Cæsar took up his duties as governor of Transalpine Gaul, the province was a small strip of territory north of Italy. Nine years later, it consisted of the whole of what is now France. He had also twice invaded Britain and had received the submission of the principal British tribes. The German migrations, which, for several generations, had intimidated the Gauls and beaten against the walls of Rome itself, were so effectively checked that Italy was never again invaded by a barbarian leader until the 5th century A. D. Moreover, Gaul was so completely pacified that, after the last desperate revolt under Vercingetorix in 52 B. C., the province never renewed its effort to separate its fortunes from those of Rome.

Meanwhile, Pompey, partly from jealousy of Cæsar's growing power, turned to the aristocracy. The senate carried a motion that Cæsar should disband his army by a certain day or else be regarded as an enemy of the state. Perceiving that the time for decisive action had come, Cæsar led his army across the little river Rubicon, by which act he stepped over the boundary between his province and Italy. He then moved swiftly toward Rome amid the acclamations of the people. Pompey fled to Greece, 49 B. C., and in three months Cæsar was master of all Italy.

He next subdued Pompey's legates in Spain, and then, on the plains of Pharsalia in Thessaly, August 9, 48 B. C., Pompey's army was utterly routed. Cæsar was appointed dictator for a year and consul for five years. He did not at once return to Rome, however, but went to Egypt, where he established Cleopatra on the throne of Egypt. Then followed victories in Africa against Scipio and Cato, and Cæsar was received in triumph on his return to Rome.

Character and Achievements. Like all the greatest military leaders, Cæsar inspired in his army and his

officers the most absolute devotion to himself. Always daring and decisive in action, he nevertheless showed, particularly in the war with Pompey, a magnanimity in victory which contrasted strongly with the implacable hatred exhibited by his enemies. Besides being one of the greatest generals, Cæsar was, after Cicero, the greatest orator of his day. His *Gallic War* and *Civil War* are models of clear and vigorous historical narrative. He was known also as a mathematician, philologist, jurist, and architect.

When he became head of the state, he effected, besides many other improvements, the reform of the calendar. He did not live, however, to carry out the vaster designs of his statesmanship—the codification of Roman law, the founding of libraries, the draining of the Pontine marshes, the enlargement of Rome's harbor, the construction of a canal through the Isthmus of Corinth, and the suppression of inroads made by the barbarians on the eastern frontiers. He was assassinated on the Ides (15th) of March by a conspiracy of nobles.

Cagliari (*kāl 'yā-rē*), **Paolo Veronese (1528-1588),** Italian painter, was born at Verona. He was a contemporary of both Titian and Tintoretto and was held in equal admiration with these famous painters. The church of San Sebastiano in Venice contains many of his productions, which are reckoned the most important of his earlier period, before he became acquainted with the masterpieces of Raphael and Michelangelo. The influence of these artists on his style was so happy that, on his return, he received the honor of knighthood from the doge. Among his celebrated productions are the "Marriage of Cana," in the Louvre, Paris; "Feast of the Levite," Venice Academy; "The Feast of Simon," Brera Gallery, Milan; "Family of Darius," National Gallery, London; and "Mars and Venus," Metropolitan Museum, New York.

Cailletet (*kā'yĕ-tā'*), **Louis Paul (1832-1913),** French chemist, was born at Chatillon sur Seine. He studied at the school of mines in order to prepare himself to conduct an iron industry in his native town. In connection with his business as ironmaster, he devoted himself to chemical researches, particularly to metallurgy and the liquefaction of gases. In 1877, he succeeded in liquefying oxygen and nitrogen. For this work, he was made a member of the French Academy of Sciences in 1884 and an officer of the Legion of Honor in 1889. A few days after Cailletet's success, Raoul Pictet, a Swiss chemist, liquefied the same gases by another method.

Caine, Sir Thomas Henry Hall (1853-1931), British novelist and dramatist, was born at Runcorn, Cheshire, of Manx and Cumberland parentage; was educated at schools in the Isle of Man and Liverpool; was brought up as an architect, but never practiced; became a journalist; and was, for six years, an editorial writer on the Liverpool *Mercury*. He went to London at the invitation of D. G. Rossetti and lived with the poet-painter until the latter's death in 1882. He began his literary career in that year, publishing *Sonnets of Three Centuries, Recollections of Rossetti, Life of Coleridge,* and *Cobwebs of Criticism*. His first novel was the *Shadow of a Crime*. Later ones include *Son of Hagar, The Bondman, The Christian, The Eternal City, The Prodigal Son, The Woman Thou Gavest Me, The Master of Man,* and *The Woman of Knockaloe*. He wrote a *Life of Christ* which was published after his death. He made his home in the Isle of Man, where, in 1901, he was returned by a large majority to the legislature of the island.

Calder, Alexander (1898-), American sculptor born at Philadelphia, is chiefly known for his abstract sculptures called "mobiles" and "stabiles." The former composed of wire, metal, or other materials when suspended in space move in response to the action of the air, while the latter are static. His mobiles were first exhibited at Paris in 1932. Both the Museum of Modern Art and the Metropolitan Museum of Art in New York possess examples of his sculptures.

Calderón (*kŏl'dĕr-ŏn*) **de la Barca, Pedro (1600-1681),** Spanish dramatist, was born at Madrid. He was educated at the University of Salamanca. He entered the army and served in several campaigns in Italy and in Flanders, gaining a knowledge of men and things which he afterward made use of in his plays, the first of which was written when he was 14. He became a priest and royal chaplain, devoting his leisure hours to literary labors. He wrote about 500 dramas, of which the greater ones include *The Constant Prince, Love Is No Joke, Life Is a Dream,* and *The Physician of His Own Honor*. In later life, he wrote many religious plays. His imagination was brilliant, and his writings abound in beautiful passages. See *Spanish Literature: The Drama*.

Caldwell, Erskine Preston (1902-), American novelist, was born at Whiteoak, Ga., in 1902. He was without formal education until he was 14 years old because his father, home mission secretary of the Presbyterian Church, was obliged to travel. After studying at the universities of Virginia and Pennsylvania, he worked at a succession of occupations, including journalism, cotton picking, professional football, and writing for motion pictures.

Caldwell became the novelist of "poor whites" of the South. His *Tobacco Road*, depicting the slow starvation and degeneration of people trying to subsist on submarginal land, was dramatized, the play breaking all records for length of run. *God's Little Acre* and volumes of short stories including *We Are the Living* and *South-Ways* further document his observations. With Margaret Bourke-White, the photographer, whom he married in 1939, he wrote *You Have Seen Their Faces* and *North of the Danube. Trouble in July* is a fictional study of the relation of the races in the South. His later books include *The Years of Learning How to Write* (1951), *Lamp for Nightfall* (1952), and *Love and Money* (1954).

Calhoun (*kăl'hōōn'*), **John Caldwell (1782-1850),** American statesman, was born in Abbeville district, South Carolina. He was graduated at Yale, 1804, and became a successful lawyer. He was elected to Congress, 1811, where he supported the measures that led to the War of 1812 with Great Britain. He also supported the protective tariff. In 1817, he entered Monroe's cabinet as secretary of war, and did valuable work in reorganizing the war department. He was vice president under John Q. Adams, 1825-29, and then under Jackson.

Calhoun declared in 1829 that a state can nullify unconstitutional laws, and his *Address to the People of South Carolina* in 1831 set forth this theory of state sovereignty. On the passing of the nullification ordinance by South Carolina in 1832, he resigned the vice presidency and entered the United States Senate, becoming a leader of the state rights movement and a champion of the slaveholding states. In 1844, as secretary of state, he signed a treaty annexing Texas, but he strenuously opposed the war of 1846-47 with Mexico. Calhoun, Henry Clay, and Daniel Webster are often called "the great triumvirate" of American political orators of their time.

Caligula (*kă-lĭg'ū-lă*), **Caius Cæsar Augustus Germanicus (12 A. D.- 41 A. D.),** Roman emperor, 37-41 A. D., was born at Antium. He was educated in the camp, where the soldiers gave him the by-name Caligula, from the *caligæ*, "military shoes," which he wore. On the death of Tiberius, 37 A. D., it was found that Caligula had been appointed coheir with the grandson of Tiberius, but the senate and the people allowed Caligula supreme and sole authority. The first eight months of his rule was marked by lavish generosity, but, after a serious illness, he displayed the most barbarous cruelty. Among other extravagant absurdies, he had his favorite horse raised to the consulship. He was assassinated by his soldiers.

Calkins, Earnest Elmo (1868-), advertising executive and author, was born in Geneseo, Ill., and received his education at Knox College. He is credited with organizing the first advertising agency to operate along modern lines. Besides conducting the business of his firm, he has done much writing and lecturing on art, printing, and various aspects of advertising and commerce. Among his books are *The Advertising Man, Printing for Commerce, Business the Civilizer,* and *On the Care and Feeding of Hobby Horses*. How he overcame the handicap of impaired hearing is told in *Louder, Please!;* other biographical data are found in his more recent book *And Hearing Not—Annals of an Adman*.

Calles (*kăl'yās*), **Plutarco Elias (1877-1945),** Mexican statesman, was born at Guaymas, Sonora. He taught school and farmed in his younger days. His sympathies with the lower classes led him to join in the revolution which overthrew Porfirio Diaz in 1911. In 1915 he served under Obregon against Villa. Two years later he was made governor of Sonora, where he secured legislation favorable to labor and improving education. Heading the labor party in national politics, he was elected president of Mexico in 1924. He pressed toward the objectives in the constitution of 1915—separation of church and state, division of large landed estates, and national ownership of subsoil rights. The result was a diplomatic controversy with foreign governments whose nationals had obtained mineral rights in Mexico. Calles stood firm, as he did also in the face of opposition from the Catholic Church, and brought cohesion to the revolutionary party, which was able to force continuation of Calles' policies through succeeding administrations. He retired to private life in 1928. He was banished by President Cardenas in 1937 but later was allowed to return and died at Mexico City.

Callicrates, Greek architect, lived at Athens in the 5th century B. C. In conjunction with Ictinus, he constructed the famous Parthenon, the sculptures and decorations of which were the work of Phidias. The exact date of his birth and of his death are unknown. See *Parthenon*.

Callimachus (*kă-lĭm'ă-kŭs*), Greek artist, a native of Corinth, flourished toward the end of the 5th century B. C. and was celebrated as an architect, sculptor, and painter. To him is ascribed the invention of the Corin-

thian column, or capital, and he is said to have been the first to use the running drill in cutting folds of drapery and other deep lines in sculpture. He made a famous gold lamp for the Erechtheum in the Acropolis at Athens and produced a noted group of dancing maidens.

Calvert, George, Lord Baltimore. See *Baltimore, George Calvert, First Lord.*

Calvin, John (1509-1564), religious reformer, was born at Noyon, France. He entered the Collège de la Marche at Paris in 1521 and there laid the foundation of a mastery of Latin which enabled him to make this international language a vehicle for the ideas he was later to spread. He was then sent to Orleans University to study law under Peter de Stella, but religion began to claim his chief interest. Later he continued his studies at Bourges. He learned Greek, began to preach the reformed doctrines, and, in 1528, openly avowed himself a disciple of the Reformation. The next year, he preached at Noyon, and, shortly afterward, he proceeded to Paris, whence he was obliged to flee because of a sermon which he preached on justification by faith.

Religious persecution forced Calvin to betake himself to Basel, where, in 1536, he published in Latin the first edition of the *Institutes of the Christian Religion.* In this work, he elaborated a system of theology based upon the sovereignty of the will of God and including as integral parts the doctrines of predestination, election, and reprobation.

From Basel, Calvin went to Ferrara. Driven thence by the Inquisition, he returned to Paris, and, as he still found no security there, he went to Geneva in August 1536, intending to proceed shortly to Basel. In Geneva, he was constrained to join Farel in his struggle to establish over that city a theocratic government, in which license and frivolity should be replaced by a strict moral severity. Calvin and Farel were successful for a time; but a rebellion broke out in 1538, and Calvin was expelled from the city. He went to Strasbourg, where, the next year, he married Idelette de Bure.

In 1541, Calvin was recalled by the Genevans and established a thoroughly theocratic rule under his own direction. It was marked by controversies with various heretics, one of whom, named Servetus, was burned at the stake in 1553. The party opposed to Calvin, known as the Libertines, was expelled two years later. The power of Calvin, thus firmly established, was used vigorously for the defense of Protestantism throughout Europe.

The amount of Calvin's literary work seems incredible, when considered with his other labors. He established an academy at Geneva in 1559, where he taught theology. His zeal brought into one body of doctrine the scattered and unsystematized reformed opinions of Europe. As a religious teacher, social legislator, and writer, Calvin's fame is second to none in his age.

Cambacérès (*kăN'bä'sā'rĕs'*) **Jean Jacques (1753-1824),** duke of Parma, French statesman and jurist, was born in Montpellier. He was educated for the legal profession and became president of the French convention in 1792. He voted for pronouncing Louis XVI guilty, but denied the right of the convention to execute the king, wishing that the unfortunate monarch might be detained in prison and put to death only in case of invasion. He was afterward president of the committee of public safety and of the council of five hundred. When Napoleon Bonaparte was named first consul, Cambacérès was made second consul. During the hundred days after Bonaparte's return, he was president of the chamber of peers. He left France when the Bourbons were a second time restored, but was permitted to return later. His *Projet de code civil* formed the basis of the *Code Napoleon.*

Cambyses (*kăm-bī'sēz*) **(?-521 B. C.),** king of the Medes and Persians, succeeded his father Cyrus in 529 or 528 B. C. He put his brother Smerdis to death and, in 527 or 525, invaded and conquered Egypt. He meditated a conquest of Carthage, but the Phœnician mariners refused to serve against their kindred. An army sent to seize the temple of Ammon perished in the desert, and one which Cambyses led in person to Nubia purchased some conquests at the price of myriads of lives. According to Herodotus, the king then gave himself up to drunkenness and hideous cruelties. In 522, news came that Gaumata, a Magian, had assumed Smerdis's character and usurped the Persian throne. Cambyses marched against him from Egypt, but died on the way.

Camillus (*kă-mĭl'ŭs*), **Marcus Furius (c. 445 B. C.-c. 365 B. C.),** Roman soldier and statesman; took Veii, a rival town, after a ten-years' siege; and retired into voluntary exile at Ardea on account of the envy of his enemies in Rome. Recalled from exile, he saved Rome from destruction by the Gauls under Brennus; was five times elected dictator; and gained a succession of victories over rival Italian tribes. He died of the plague, at 80 years of age, lamented by the whole nation, and remembered for generations as one of the noblest and most heroic figures in Roman history.

Cammaerts (*kă'märts*), **Emile (1878-),** Belgian poet, was born at Brussels. His first literary work was the translation of Ruskin into French. In 1908, he removed to England and became professor of Belgian institutions and studies at the University of London. After Belgium was invaded by Germany in 1914, he wrote a series of poems of his country's misfortunes which attained wide circulation both in French and in English translations. Later works published by him include *Poèms intimes, The Poetry of Nonsense, The Laughing Prophet, The Child of Divorce,* and *The Keystone of Europe.*

Camoëns (*kăm'ō-ĕns*), **Luiz Vaz de (c. 1524-1580),** Portuguese poet, was born of an illustrious family at Lisbon. He studied the ancient classics at Coimbra. Youthful rashness, brought him into disfavor with the authorities and with the court. Rejected by Catherina de Ataide, who was destined to become in his life what Beatrice was to Dante, he joined the army. After campaigning two years and losing an eye, he sailed in 1553 for further service in India. Offended by certain abuses of the Portuguese authorities at Goa, he ventured to expose them in a satire entitled *Follies in India,* which led to further clashes with officials.

In 1556, Camoens went to Macao, where he lived several years while engaged in writing *Os Lusiadas,* "The Lusitanians," generally styled the *Lusiad,* an epic masterpiece which celebrates the feats of Portuguese explorers and heroes. Returning to Spain about 1770 after many years of hardships, which included shipwreck and imprisonment, he dedicated the *Lusiad* to the young king Sebastian, who granted him a small pension and permission to remain at the court of Lisbon. Besides his epic, which has an assured place in the world's literature, he wrote numerous sonnets, odes, elegies, satires, and comedies. See *Lusiad.*

Camp, Walter (1859-1925), athletic specialist and author, was born at New Haven, Conn.; was graduated from Yale, 1880; became active in the management of Yale's athletics; and was made a member of the Yale University council. His role in establishing rules for football brought him the title of "father" of this sport. He also took a prominent part in the direction of athletics in training camps. His publications include *Book of College Sports, American Football,* and *Drives and Puts* (with Lillian Brooks). He was also editor in chief of the *Library of Young People.*

Campanella (*kăm'pä-nĕl'lä*), **Tommaso (1568-1639),** Italian poet and philosopher, was born in Stilo, Calabria, and was educated in Naples and Cosenza. He published his first work on philosophy in 1591, exhibiting a mingling of scholasticism with the new scientific thought. He taught at Naples and at Rome. In 1599, he was accused of heresy and of conspiracy against the Spanish rule. In consequence, he was imprisoned at Naples for 27 years, during which time he wrote the *City of the Sun,* other philosophic writings, and numerous sonnets. Through the intervention of Pope Urban VIII, he was set free and found refuge in France. In his *City of the Sun,* a utopia modeled somewhat after Plato's *Republic,* he advocated education as the best guarantee of capacity. While he devoutly accepted the authority of faith in theology, he considered philosophy to be based on perception. Died in Paris.

Campbell, Alexander (1788-1866), American theologian, was born at Shane's Castle, Ireland; attended Glasgow University; came to the United States; and served as pastor of a Presbyterian church in Washington County, Pa. He later became a Baptist. In 1810, he adopted the Bible as the sole recognized creed of his church and, in 1827, founded the Disciples of Christ, a sect that grew rapidly, especially in Virginia, Tennessee, and Kentucky, and now numbers over a million members. His followers are known also as Christians, Church of Christ, and Campbellites. In 1841, Campbell founded and became the first president of Bethany College, West Virginia. He was an ardent believer in the imminent second coming of Christ.

Campbell, Sir Colin. See *Clyde, Baron.*

Campbell, Mrs. Patrick (1867-1940), née Beatrice Stella Tanner, English actress, was born in London. In 1884, she married Patrick Campbell, who was killed in the South African war, 1900. After much amateur encouragement, she made her professional entrance upon the stage in 1888. She achieved notable success in *The Second Mrs. Tanqueray,* 1893, following which she played in *The Masqueraders* and *John-a-Dreams,* 1893, and in *The Notorious Mrs. Ebbsmith,* 1895. She appeared with Forbes-Robertson in the roles of Ophelia, Juliet, and Lady Macbeth, 1895-98; also in *Fédora* and *Little Eyolf.* Subsequently she made several visits to the United States, playing with marked distinction in *Magda, The Joy of Living, The Whirlwind, The Bondman, Hedda Gabler, The Thunder-*

bolt, Bella Donna, Lady Patricia, Pygmalion, and *The Matriarch.* In 1904, she appeared with Sarah Bernhardt in *Pelléas et Melisande.* In 1914, she married George Cornwallis West.

Campbell, Thomas (1777-1844), British poet, was born in Glasgow. His first poem, *The Pleasures of Hope,* was published in 1799 and went through four editions within a year. His *Gertrude of Wyoming* and the short poem *The Last Man* are well known; but it is for his war lyrics, such as *Hohenlinden, Ye Mariners of England,* and *The Battle of the Baltic,* that Campbell will be best remembered. He was buried in Westminster Abbey.

Campbell, William Wallace (1862-1938), American astronomer, was born in Hancock County, Ohio; and was graduated at the University of Michigan. After teaching successively at the University of Colorado and the University of Michigan, he became associated in 1891 with the Lick Observatory, of which he was appointed director 10 years later. Campbell was president of the University of California from 1923 to 1930. He conducted many expeditions to different parts of the world in order to observe solar eclipses, and his scientific work brought him numerous marks of distinction in his own country and abroad. His publications include *The Elements of Practical Astronomy* and *Stellar Motions.*

Canby, Henry Seidel (1878-), American editor and literary critic, was born at Wilmington, Del. After being graduated from Yale University, he taught there from 1900 to 1922 and thereafter acted as university lecturer with professional rank, leaving most of his time free for literary activities. In 1924 he became editor of the newly established *Saturday Review of Literature,* through whose columns he evaluated literary trends for the public for many years. He relinquished the active editorship in 1936, but continued as contributing editor. His publications include *Definitions, Classic Americans, The Age of Confidence,* and *Thoreau: A Biography.* To these he has added *Walt Whitman, An American* (1943), *American Memoir* (1947), and *Turn West, Turn East* (1951).

Candler, Asa G. (1851-1929), American capitalist, was born near Villa Rica, Ga. He was educated in the common schools and learned the drug business in Carterville. In 1873, he located in Atlanta and, in 1878, became a member of the firm of Hallman and Candler, laying the foundation for his large fortune by the manufacture of Coca-Cola. In addition to extensive interests in connection with banking, warehousing, and investment companies, he became active in movements to improve the public school system. He contributed a million dollars toward establishing Emory University at Atlanta and made many donations to other philanthropic enterprises.

Candler, Warren A. (1857-1941), American preacher, was born in Carroll County, Ga.; was educated at Emory University; and entered the North Georgia conference of the Methodist Episcopal Church in 1875. He was president of Emory University from 1888 to 1898 and, in the latter year, was made a bishop. His publications include *History of Sunday Schools, High Lives, Practical Studies in the Fourth Gospel,* and *Christ and the Creed.*

Canfield, Dorothy. See *Fisher, Dorothy Canfield.*

Canisius (*kă-nē'sē-ŭs*), **Petrus (1521-1597),** Dutch Jesuit missionary and scholar, was born at Nimwegen, Netherlands. He was the first provincial of the Jesuits in Germany; distinguished himself at the council of Trent, 1545; and was appointed Court preacher to Ferdinand I. He wrote the celebrated Cathechism entitled *Summa Doctrinæ Christianæ.* He was beatified in 1869.

Canning, George (1770-1827), British statesman and orator, was born in London. He entered the House of Commons for Newport, Isle of Wight, in 1793 as the protégé and supporter of the minister Pitt. In 1796, he was appointed as undersecretary of state. In 1801, Pitt resigned office, and Canning joined the opposition against the Addington ministry. When Pitt again became premier, in 1804, Canning was made treasurer of the navy, an office which he held until Pitt's death, in 1806. When the Portland ministry was formed, in 1807, Canning was appointed minister of foreign affairs.

In the course of his public life, he arranged the relations of Brazil and Portugal; drew the French cabinet into agreement with the British respecting Spanish American affairs; was the first to recognize the free states of Spanish America; promoted the treaty by which England, France, and Russia undertook to settle the affairs of Greece in 1827; protected Portugal from Spanish invasion; contended earnestly for Catholic emancipation; and prepared the way for the repeal of the Corn laws.

Cannizzaro (*kăn-nē-tsä'rō*), **Stanislao (1826-1910),** Italian chemist, was born in Palermo. He was educated in chemistry and medicine at Palermo and Pisa and was made professor of chemistry at Alexandria in 1851, at Geneva in 1855, at Palermo in 1861, and at the University of Rome in 1871. He defined with notable clearness the difference between atomic and molecular weights and thereby became one of the most influential agents in establishing Avogadro's law as a working rule in chemical science. He discovered benzyl alcohol and cyanamid.

Cannon, Annie Jump (1863-1941), American astronomer, was born at Dover, Del. After being graduated from Wellesley College in 1884, she pursued special studies in astronomy at Radcliffe College. In 1897, she became assistant astronomer at Harvard College Observatory and, in 1911, was made also curator of astronomical photographs. For a long period she carried on extensive observations of variable stars, of which she discovered 300. She discovered also 5 new stars and numerous stars having variable spectra. She completed a bibliography of variable stars comprising 200,000 references, and a catalog of about 300,000 stellar spectra.

Cannon, Joseph Gurney (1836-1926), American politician, was born in Guilford, N. C.; was admitted to the Illinois bar; and became state's attorney for the 27th judicial district of Illinois in 1861. He became a Republican member of Congress in 1873, and, with two interruptions, continued to sit until 1923, thereby spending nearly 46 years as a Federal legislator. Speaker of the House of Representatives from 1903 to 1911, he used his power of appointing legislative committees to support the "Old Guard," the most conservative branch of the party. This policy of "Cannonism" was terminated in 1910, when the House assumed the power of appointing the rules committee and disqualified the speaker from sitting on it. He was popularly known as "Uncle Joe" Cannon.

Canova (*kä-nō'vä*) **Antonio, (1757-1822),** Italian sculptor, was born at the Venetian village of Possagno and studied at Venice and Rome. His "Theseus," 1782, was one of the most important works in modern sculpture and marked the return from the baroque to the classic style. Other noted works followed, and Canova soon became the foremost sculptor of his day and one of the greatest of modern times. His "Cupid and Psyche" was produced soon after he had completed, in 1787, the monument of Pope Clement XIV. Among his most widely known works are "Winged Cupid," "Venus and Adonis," "Psyche Holding a Butterfly," and "Penitent Magdalen." In 1802, he was called to Paris to model a colossal statue of Napoleon. He was created Marquis of Ischia. He died in Venice. See *Sculpture.*

Canute (*kä-nūt'*), or **Cnut** (*k'nōōt*) **(c. 995-1035),** king of the English, Danes, and Norwegians. On the death of his father, Sweyn, king of Denmark, he proclaimed himself king of England. After a struggle with the Saxon king Ethelred and, later, with Ethelred's son Edmund, Canute agreed to divide the sovereignty of all England with Edmund. On the subsequent death of the latter, Canute became king of England and administered the country in an enlightened spirit. In 1019, he went to claim the kingdom of Denmark and, in 1028, extended his rule also over Norway, becoming one of the most powerful rulers of Europe. To moderate his subjects' exaggerated views of his power, he is said to have sat on the shore when the tide was coming in and to have commanded it (in vain) to recede.

Capper, Arthur (1865-1951), American editor and publisher, was born at Garnett, Kans. Upon graduation from Garnett High School in 1884, he entered newspaper work as a compositor on the Topeka *Daily Capital,* of which he became, at different times, reporter, city editor, Washington correspondent, publisher, and proprietor. He also became publisher and proprietor of the *Farmers' Mail and Breeze, Household Magazine,* and *Capper's Weekly,* of which the last named attained, under his management, a wide influence and a total circulation exceeding a million. He published other agricultural and household periodicals of local importance. He was governor of Kansas from 1915 to 1919 and United States senator, 1919 to 1948, affiliated with the Republican party.

Caracalla (*kăr'ä-kă,'ä*), **Marcus Aurelius Antoninus Bassianus (188-217),** Roman emperor, the son of the emperor Septimius Severus, was born at Lyon. By his father he was playfully named Caracalla from his wearing of a long-hooded tunic, so called in the Gallic language. After his father's death, 211, he ascended the throne as coregent with his brother Publius Septimius Antoninus Geta, whom he afterward caused to be murdered. Having bribed the pretorians to make him sole emperor, Caracalla next directed his cruelty against all the friends and adherents of Geta, of whom 20,000 of both sexes—including the great jurist Papinianus—were put to death. He bestowed Roman citizenship on all free inhabitants of the empire, probably in order to levy a greater amount of taxes. He was assassinated.

Cardan (*kär'dăn*), **Jerome (1501-1576),** Italian mathematician, naturalist, physician, and philosopher, was born at Pavia, and was graduated in medicine at Padua. In 1534,

he was made professor of mathematics at Milan. In 1559, he became professor of medicine at Pavia and later at Bologna, where he remained from 1562 until 1570. While in Bologna, he was imprisoned for heresy or debt, or both. Having regained his liberty in 1571, he went to Rome, where Gregory XIII pensioned him. He wrote a large number of treatises on mathematics, astronomy, astrology, rheotoric, history, ethics, natural history, music, and medicine. His *Ars Magna*, 1545, contains the solution of the cubic equation, the greatest mathematical discovery of the century. This was first discovered by Tartaglia in 1541 but Cardan published it as his own, precipitating a controversy which remained unsettled at Tartaglia's death.

Cardenas, Lazaro (1897-), Mexican political leader, was born at Jiquilpam de Juarez, Michoacan. Leaving school at 11, he learned the printer's trade and followed it for some years before turning to soldiering. He saw service under Madero, Carranza, and Obregon, rising to the rank of divisional commander.

Cardenas became governor of Michoacan in 1928 and, in 1930, was made president of the executive committee of the Revolutionary party. After serving as minister of war under President Calles, he was elected president of Mexico with the backing of Calles, whose policies of land distribution and weakening of the Church as a political and economic force he vigorously prosecuted. He later broke with Calles and had him deported. He retired from office in 1940.

Cardozo, Benjamin Nathan (1870-1938), American jurist, was born in New York. After being graduated from Columbia University in 1889, he was admitted to the bar in New York two years later. He was a judge of the Supreme Court of New York from 1914 to 1928; was made associate judge of the New York Court of Appeals in 1917 and chief judge in 1927; and, in 1932, was appointed by President Hoover to the United States Supreme Court. He was one of the liberal group of justices during the period of split decisions under the "New Deal." By his decisions and his writings Cardozo showed himself to be one of the ablest jurists of recent times. His published works include *The Nature of the Judicial Process, The Growth of the Law,* and *The Paradoxes of Legal Science.*

Carducci (*kär-dōōt'chē*), **Giosuè (1836-1907),** Italian poet, was born at Valdicastello in the province of Pisa. In 1861, he became professor of Italian literature at Bologna; in 1876, was returned to the Italian Parliament as a Republican; and, in 1890, was made a senator. As a poet, he rejected romanticism for classical ideals and forms; as a thinker, he sought to inspire an appreciation of paganism. A complete edition of his poems in 20 volumes appeared at Bologna. He was awarded the Nobel prize for literature in 1906.

Carew, Mrs. James. See *Terry, Ellen.*

Carissimi (*kä-rēs'sē-mē*), **Giacomo (c. 1604-1674),** Italian composer, was born at Marino. He was Kapellmeister at Assisi from 1624 to 1628 and at Saint Apollinaris in Rome from 1628 until his death. He was the originator of the chamber cantata and developed the instrumental accompaniment. He composed many cantatas, masses, motets, and even comic music. His works mark the transition from the polyphonic style of the Palestrina school to the monodic style of the originators of opera, and he is regarded as one of the chief founders of the oratorio. His published works include "Jephthah," "Judicium Salomonis," "Baltazar," and "Jonas," in Chrysander's *Denkmäler der Tonkunst; Arie de Camera;* and *Ars Cantandi.*

Carlyle (*kär-līl'*), **Thomas (1795-1881),** British essayist, historian, and philosopher, was born at Ecclefechan, Scotland. Having acquired an elementary education from his parents, he entered Annan Academy in 1805. Eight years later he completed indifferently well his academic course at Edinburgh University. He subsequently taught in several small schools; but, considering this occupation intolerable, he removed to Edinburgh in 1818. Here he studied law and theology. During this period, he was harassed by religious problems and was absorbed in the study of Schiller and of Goethe.

Carlyle now formed the intention of making literature his life work. He planned a history of England under Cromwell and a translation of Goethe's *Wilhelm Meister.* Writing a *Life of Schiller,* he went to London in 1824 to superintend its publication. The following year he spent on a farm near Hoddam Hill translating German romances.

Carlyle married Jane Welsh in October 1826. They settled in Edinburgh, where he completed several translations from German and contributed to the *Edinburgh Review.* In 1828, they removed to a small estate at Craigenputtoch, which Mrs. Carlyle had inherited. Here Carlyle wrote his *Specimens of German Romance.*

Carlyle's chief work, *Sartor Resartus,* occupied him in 1833-34. Bearing evidence of inward agonies, and tortured speculations, its theme may be described as the thesis that all creeds, rituals, and systems of philosophy are only the successive garbs in which the human intellect has been clothed. In 1834, Carlyle removed to London, where he published his fiery prose epic, *The French Revolution,* in 1837. Then followed, in 1839, an arraignment of contemporary society, entitled *Chartism.*

Henceforth, Carlyle dedicated himself to his largest work, the highly laudatory *History of Frederick the Great,* which was completed in 1865. This same year, he was elected lord rector of Edinburgh University. Carlyle wrote no important work after his wife's death in 1866; he lived quietly in London, devoting himself to various reminiscences and articles.

Carlyle exercised an unrivaled influence on British literature during the mid-19th century and on the contemporary moral, religious, and political beliefs. The power of his eruptive, ejaculatory style is thoroughly individual. His critical biographical essays were the first to place the riches of modern German thought before the English-reading world but his influence waned when the name "German" came to be associated with political conquest. See *English Literature: Victorian Age.*

Carman (*kär'mən*), **William Bliss (1861-1929),** journalist and poet, was born at Fredericton, New Brunswick, and was graduated at the University of New Brunswick, 1881; studied also at Edinburgh and Harvard. At different times, he taught school, practiced engineering, and, beginning in 1890, was an editor on the New York *Independent.* By his first book of verse, *Low Tide on Grand Pré,* 1893, he won wide recognition, which was extended by many subsequent volumes. Among them are *Behind the Arras, Songs from Vagabondia* (with Richard Hovey), *By the Aurelian Wall, Pipes of Pan, The Friendship of Art, The Poetry of Life, Sappho, The Rough Rider, Daughters of Dawn, April Airs,* and *Far Horizons.*

Carmer, Carl (1893-), American writer and folklorist, born at Cortland, New York, and educated at Hamilton College and Harvard. After teaching English in several American universities, including the University of Alabama (1921-27), he spent a number of years in magazine editorial work in New York (1928-33). His successful book *Stars Fell on Alabama* was published in 1933. Among his other works are *Listen for a Lonesome Drum* (1936), *Genesee Fever* (1941), and *Dark Trees to the Wind* (1950). He is editor of the American Rivers Series to which he has contributed *The Hudson* (1939) and *The Susquehanna* (1955).

Carnegie (*kär'nē-gī*), **Andrew (1835-1919),** capitalist, manufacturer, philanthropist, and author, was born in Dunfermline, Scotland; came with his family to the United States in 1848, settling in Pittsburgh; and first worked as a weaver's assistant in a cotton factory. He became a telegraph messenger boy in 1851; learned telegraphy; entered the employ of the Pennsylvania Railroad; and became a telegraph operator, advancing by promotions until he became superintendent of the Pittsburgh division of the Pennsylvania system. He joined Woodruff, the inventor of the sleeping car, in organizing the Woodruff Sleeping Car Company and thereby gained the nucleus of his fortune.

After the Civil War, he developed iron works of various kinds and established at Pittsburgh the Keystone Bridge Works and the Union Ironworks. He introduced into the United States the Bessemer process of making steel, 1868, and, a few years later, was the principal owner of the Homestead and Edgar Thomson steelworks and other large plants, which were consolidated, 1899, in the Carnegie Steel Company. In 1901, this company was merged in the United States Steel Corporation.

Carnegie then retired from business and devoted himself to philanthropic and literary activities. He gave libraries to many towns and cities in the United States, Canada, and Great Britain, and contributed large sums to other benefactions, the total exceeding $300,000,000. He built, also, the Peace Palace at The Hague and, in Washington, a home for the International Bureau of American Republics, later known as the Pan-American Union. At the close of 1912, his philanthropic gifts exceeded those of any other American, his gifts for that year alone amounting to $130,000,000. In 1912, he announced that he had given all his remaining fortune except $25,000,000 to the Carnegie Corporation, organized in New York in 1911. His writings include *Triumphant Democracy, The Gospel of Wealth,* and *The Life of James Watt.*

Carnot (*kär'nō'*), **Lazare Nicolas Marguerite (1753-1823),** French revolutionary leader, was born at Nolay, France. In 1791, he became a member of the National Assembly and voted in the Convention for the death of Louis XVI. After taking command of the army of the North and gaining the victory of Wattignies, he was made a member of the committee of public safety; was intrusted with the chief direction of military affairs; and contributed greatly to the successes of the French army.

In 1797, having opposed the extreme measures of Barras, his colleague in the Directory, Carnot was suspected of favoring the Royalists and was sentenced to deportation. He escaped into Germany and wrote his defense, which conduced to the overthrow of his colleagues in 1799. On his return to Paris, he was made minister of war, 1800. He succeeded so brilliantly in this office that he was called the "organizer of victory." He was also a noted mathematician and was the author of numerous writings on mathematics and military tactics.

Carnot, Nicolas Leonard Sadi (1796-1832), French scientist, was born at Paris. In his *Reflexions sur la Puissance motrice du feu,* he described a cycle and reversible engine and announced important principles of thermodynamics. He stated that motive power is invariable in nature and that, accurately speaking, it is never produced or destroyed. He thus made clear that he appreciated the great law now known as the conservation of energy. His pioneer work was extended and adapted to modern theories by Lord Kelvin.

Carpaccio (*kär-pät'chō*), **Vittore (c. 1455-c. 1525),** Italian painter, was born in Venice. Showing the influence of Vivarini and Gentile Bellini, his works, though sometimes faulty in drawing, are harmonious in color and abound in charming pictorial qualities. Among his most noted paintings are "The Presentation in the Temple," and scenes in the life of Saint Ursula, now in Venice; "Death of the Virgin," in Ferrara; and "Enthroned Madonna," in London.

Carpenter, John Alden (1876-1951), American composer, was born at Park Ridge, Ill. He was graduated from Harvard in 1897 and studied music under Bernard Ziehn and Sir Edward Elgar. He then entered business in Chicago, devoting his leisure time to music. With his wife, he is the coauthor of *When Little Boys Sing* and *Improving Songs for Anxious Children.* In 1912, he published a sonata for violin and piano, and, in 1914, he produced a large orchestral suite entitled *Adventures in a Perambulator,* picturing the impressions of an infant, in six movements for the full modern orchestra. This work, which displays remarkable mastery of orchestral technique and decided originality and inspiration, placed Carpenter in the forefront of American composers. His publications include a concertino for piano and orchestra, numerous songs, *The Birthday of the Infanta,* the jazz opera *Skyscrapers,* and the symphonic poem *Sea Drift.*

Carracci (*kär-rät'chē*), or **Caracci, Agostino (1557-1602),** Italian painter and engraver, was born at Bologna. He became a pupil of his uncle Lodovico, the painter, continuing to work with him and Annibale Carracci, a brother, with interruptions for most of his life. Among his greatest paintings are the "Communion of Saint Jerome" and "Celestial, Terrestrial, and Venal Love." With his brother Annibale, he executed the celebrated frescoes in the Farnese Palace, Rome. He died in Parma.

Carracci, Annibale (1560-1609), was born at Bologna. He was brought up as a tailor, but under the instruction of Lodovico Carracci he rapidly became a great painter. The influence of Correggio and of Raphael largely molded his style. His fame reached Rome, where he was employed with his brother to execute the frescoes in the Farnese palace. One of his most celebrated easel pictures is the "Three Marys," now in Castle Howard, Yorkshire, England. He is considered the greatest painter of the Carracci family. He was buried near Raphael in the Pantheon at Rome.

Carracci, Lodovico (1555-1619), Italian painter, the son of a butcher was born at Bologna. He studied at Venice and Parma and, with his two nephews, Agostino and Annibale, established in Bologna an "eclectic" school of painting. Some of his finest works are preserved at Bologna. They include the "Madonna and Child Throned," "Madonna and Child Standing," the "Transfiguration," and the "Nativity of Saint John the Baptist."

Carranza (*kär-rän'sä*), **Venustiano (1859-1920),** Mexican statesman, was born in Cuatro Cienegas, Coahuila, of an old Mexican family of pure Spanish blood. He became a senator from Coahuila and resided in Mexico City for many years.

He was a lifelong friend and supporter of Felix Madero, after whose assassination in 1913 he published the plan of Guadalupe, which disavowed the newly established Huerta government. In July 1914, Huerta was forced to resign and Carranza was made minister of foreign relations under Carbajal as president.

Carranza soon openly took the position of leader, but differences among his associates led to the open revolt of Villa and Zapata. Nevertheless, Carranza's government was recognized late in 1915 by leading nations, and, in March 1917, Carranza was elected president of Mexico by an overwhelming majority. A new constitution was adopted nationalizing subsoil rights, calling for breaking up of large estates, and restraining the power of the Church. Carranza made a beginning in enforcing the program despite friction with foreign governments whose nationals found their property interests adversely affected. A successful revolt led by Obregon resulted in the flight and death of Carranza.

Carrel (*kä-rĕl'*), **Alexis (1873-1944),** American biologist and surgeon, was born in France, and was educated at the University of Lyon, where he received his medical degree in 1900. He came to America in 1905 and took charge of laboratory investigation first at McGill University and later at the University of Chicago. In 1912 he became a member of the Rockefeller Institute for Medical Research in New York, where his brilliant discoveries in experimental surgery won world-wide recognition.

His investigations proved that life in tissues may be prolonged after removal from the body and, with Col. Charles A. Lindbergh, in 1935, he devised a machine in which animal organs can be made to live indefinitely. He proved also that certain arteries, organs, and even limbs may be successfully transplanted. In 1912, he received the first Nobel prize for medicine bestowed upon an American. During 1915-19, he was engaged in medical work in France, where he assisted in devising the Carrel-Dakin solution for antiseptic treatment of wounds. He returned there in 1939 and remained during the German occupation. Among his most valuable publications are *Anastomosis and Transplantation of Blood Vessels, The Preservation of Tissues, The Transplantation of Limbs, The Transplantation of Veins and Organs,* and *Man the Unknown.*

Carrère (*kä'rär'*), **John Merven (1858-1911),** American architect, was born of American parents in Rio de Janeiro, Brazil. He received his early education in Switzerland and studied architecture four years at the Ecole des Beaux-Arts, Paris. After two years' work in the office of McKim, Mead, and White in New York, he entered into partnership with Thomas Hastings.

Among the first noteworthy buildings designed by this firm were the Ponce de Leon Hotel and the Alcazar, both at Saint Augustine, Fla. These were followed by many fine buildings, the most important of which was the Public Library of New York, built, at a cost exceeding eight million dollars, from their designs, which received the award in open competition with leading architects. They jointly designed notable buildings for the Saint Louis Exposition of 1904 and the marble office building for the Senate at Washington. In 1911, Carrère died and his body was placed in state in the then unfinished Public Library, New York.

Carroll, Charles (1737-1832), of Carrollton, American patriot, was born at Annapolis, Md. When the Revolutionary War began, he was one of the richest men in the English colonies; but, though he had much to lose, he made the most daring speeches and helped the patriot cause in every way. He was elected a member of Congress, 1776, and was among the first signers of the Declaration of Independence. When he wrote his name, some one said: "There are many Charles Carrolls, and the British will not know which one it is." He at once added to his name "of Carrollton," and was ever afterward known by that title. He outlived all the other signers of the Declaration of Independence.

Carroll, Lewis (1832-1898), is the pseudonym of Rev. Charles Lutwidge Dodgson, English humorist and author. He was graduated at Christ Church, Oxford, 1854; took orders in the Anglican Church, 1861; and was a lecturer at Oxford, 1855-81. He wrote *Alice in Wonderland, Through the Looking-glass, The Hunting of the Snark,* and other classic juvenile works with an adult interest.

Carson, Christopher (1809-1868), popularly known as Kit Carson, American frontiersman, was born in Kentucky. He was successively a saddler's apprentice, trapper, hunter, guide in Frémont's explorations, lieutenant in the rifle corps of the army, and Indian agent. During the Civil War he rendered important services in the territories and was brevetted brigadier general. He was everywhere regarded as a typical frontiersman, fearless in danger, unerring with the rifle, and excelling even the Indians in woodcraft.

Carson, Rachel (1907-), scientist and writer, was born at Springdale, Pennsylvania. She was educated at the Pennsylvania College for Women (1929) and Johns Hopkins (1932). Specializing in marine biology, she joined the staff of the Bureau of Fisheries (now the Fish and Wild Life Service) as a biologist in 1936. It was while she was editor in chief of the Fish and Wild Life Service in 1951 that her best known book, *The Sea Around Us,* was published. It quickly became a non-fiction bestseller and brought her many honors. *Under the Sea* (revised edition) was published in 1952, and *The Edge of the Sea* in 1955.

Cartier (*kär'tyā'*), **Jacques (1491-c. 1557),** French explorer, was born at Saint Malo, Brittany. Employed by Francis I of France to make explorations on the North American coast, he completed, in three successive expedi-

tions, 1534-43, the discovery and the exploration of the Gulf of Saint Lawrence and the river as far as Quebec, Montreal, and Lachine rapids.

Cartwright, Edmund (1743-1823), English inventor, was born at Marnham, England. He was educated at University College, Oxford. In 1779, he became rector of Goadby Marwood, Leicestershire, where he made improvements in agriculture. A visit in 1784 to Arkwright's cotton-spinning mills posed in his mind the problem which he solved by invention of the power loom. Attempts to employ it at Doncaster and Manchester met with fierce opposition, and it was not until the 19th century that it came into practical use. Cartwright took out patents also for combing wool and for various other inventions; he even joined Robert Fulton in his efforts toward steam navigation. All these labors brought him no direct gain, but, in 1809, the government made him a grant of 10,000 pounds. He died at Hastings.

Caruso (*kä-ōōr'zō*), **Enrico (1873-1921),** Italian tenor, was born at Naples and began life as an engineer with no thought of singing until a friend assured him that there was a fortune in his voice. He studied under Lamperti and Concone and sang at Naples in 1896 with great success in *Traviata*, following which he made engagements in leading cities of the world. His first appearance at the Metropolitan Opera House, New York, was in 1904 and met with immediate and extraordinary success. His voice was one of unusual beauty and power, and his repertoire included more than 40 operas. He originated roles in *Fédora, Germania, La Bohême, Madame Butterfly,* and *The Girl of the Golden West.*

Carver, George Washington (c.1864-1943), American Negro scientist, was born of slave parents near Diamond Grove, Mo. Stolen and ransomed for a $300 racehorse, he attended public schools and Iowa State College. In 1896, he was appointed to the faculty of Tuskegee Institute, where he became director of agricultural research. With laboratory equipment originally constructed from scrap-heap oddments, he developed from the peanut more than 300 synthetic products and from the sweet potato over 100, including cheese, soap, and shoe polish. He was collaborator in the United States Bureau of Plant Industry.

Carver, John (c. 1575-1621), the first governor of Plymouth colony, was born in England. He was one of the Pilgrims who came over in the *Mayflower* and was chosen governor soon after landing. He assisted in settling his people in their new homes, but died within a few months.

Cary, Alice (1820-1871), American poet and prose writer, was born near Cincinnati, O. She began writing at 18. Jointly with her sister Phœbe, she published her first volume in 1850, in which year the two sisters removed to New York. Her publications include *Lyra and Other Poems, The Lover's Diary,* and *The Adopted Daughter.* Both sisters died in 1871.

Cary, Henry Francis (1772-1844), English writer, was born at Gibraltar. He was educated at Oxford and, in 1796, took holy orders. In 1805, he published a translation of Dante's *Inferno* and, in 1814, of the whole *Divine Comedy,* a translation remarkable for fidelity, force, and expressiveness. He afterward translated Pindar's *Odes* and Aristophanes' *Birds,* and wrote memoirs in continuation of Johnson's *Lives of the Poets.* He was buried in Westminster Abbey.

Cary, Phœbe (1824-1871), American poet, sister of Alice Cary, born near Cincinnati. She wrote about a third of the *Poems of Alice and Phoebe Cary,* published in 1850, and many other poems, including the well-known hymn beginning "One sweetly solemn thought." Her death quickly followed that of her sister.

Casanova de Seingalt (*kä'sä-nō'vä dȧ sin'gält*), **Giovanni Jacopo (1725-1798),** Italian adventurer, was born at Venice. From the time when, at 16 years of age, he was expelled from a seminary in Venice for immoral conduct, until late in life, when he recounted his adventures in his *Memoirs,* his career was a succession of intrigues, daring seductions, and narrow escapes which made his name a synonym for amorous roguery. He was, however, able and possessed of a magnetic personality, by reason of which he was received by kings and the pope. He was at different times a preacher, prisoner, director of state lotteries in France, police spy for Venetian inquisitors, and a librarian.

Cass, Lewis (1782-1866), American statesman, was born at Exeter, N. H.; was admitted to the Ohio bar in 1802; and became brigadier general in the War of 1812. He was then for 18 years governor of Michigan, which, under his skillful administration, became a settled state. In 1831-36, he was secretary of war and, in 1836-42, minister at Paris. He sat in the United States Senate, 1845-57; was an unsuccessful candidate for the presidency in 1848; and was secretary of state, 1857-60. In the controversy over slavery, he stood with Webster and Clay for conciliation, for union, and for the Constitution as then established. Called a "Northern man with Southern principles" he reservedly supported the slaveholding party.

Cassini (*kȧs-sē'nē*), **Giovanni Domenico (1625-1712),** Italian astronomer and savant, was born at Perinaldo, near Nice. In 1650, he was appointed to the astronomical chair in the University of Bologna and later became director of the Paris Observatory. He discovered four of Saturn's satellites; determined the rotations of Jupiter, Venus, and Mars; and determined the parallax of the sun and the eccentricity of the earth's orbit.

Cassiodorus, Flavius Magnus Aurelius (490 A. D.-580), Roman statesman and writer, was born at Scylaceum in southern Italy. He held many public positions under the reigns of Odoacer and Theodoric. About 450, he retired from public life and devoted himself to literature. The extant fragments of his *History of the Goths* and his *Letters* mark him as the most profound scholar of his age. In a monastery which he founded, he required the monks to copy manuscripts as part of their duty. The practice thus instituted resulted in the preservation of most of the classical literature.

Cassius (*kȧsh'ĭ-ŭs*), or, in full, **Gaius Cassius Longinus (?-42 B. C.),** Roman general and politician, was quæstor to Crassus in the Parthian war, 54-53 B. C., and saved the credit of Roman arms after the commander's disastrous defeat and death. As tribune of the people in 49 B. C., he attached himself to Pompey. After the battle of Pharsalus, he was taken prisoner and pardoned by Cæsar. In 44 B. C., he organized the conspiracy which resulted in Cæsar's assassination. Driven from Rome by the enraged populace, Cassius fled to the East; united his forces with those of Brutus; and, being routed at Philippi, compelled his freedman to kill him.

Castelar (*kȧs'tȧ'lär'*), **Emilio (1832-1899),** Spanish-orator, statesman, and writer, was born at Cadiz; was for some years professor of history and philosophy in the University of Madrid; and took part in several political uprisings, including that which brought about the downfall of King Amadeus in 1873. He became dictator, but, when Alfonso XII was crowned in 1874, Castelar went into voluntary exile. He returned to Spain in 1876 and continued to work for republican government, but through evolutionary rather than revolutionary means. He was a strong advocate of universal suffrage.

Castlereagh (*kȧs'l-rā'; kȧs''l-rā*), **Robert Stewart, Viscount (1769-1822),** British statesman, eldest son of the Marquis of Londonderry. At an early period he entered public life. Becoming secretary of war in 1805, he gained rapidly in influence through measures for combatting Napoleon. In 1812, he became foreign secretary and leader of the House of Commons. In this dual capacity he kept together the alliance against Napoleon until the achievement of ultimate victory and then took measures to dissociate England from the reactionary Holy Alliance for the suppression of liberal movements throughout the world. His mind gave way and he committed suicide.

Cather, Willa Sibert (1876-1947), American author, was born at Winchester, Va. She graduated at the University of Nebraska in 1895 and began literary work by serving on the staff of the Pittsburgh *Daily Leader,* 1897-1901. She was associate editor of *McClure's Magazine,* 1906-12. Turning to fiction, she excelled in delineation of prairie life and the recreation of earlier periods in historical novels. The list of her works includes *April Twilights, O Pioneers, The Bohemian Girl, The Song of the Lark, Death Comes for the Archbishop, Not Under Forty,* and *One of Ours,* the last being a war novel which won the Pulitzer prize for 1922. She was elected in 1938 to the American Academy of Arts and Letters.

Catherine II, the Great (1729-1796), empress of Russia, was born at Stettin, Prussia. She was married in 1745 to the prince who, in 1762, ascended the Russian throne as Peter III. Threatened with repudiation by the emperor, she seized the reins of government and had Peter III put to death. She gave the country a strong administration and furthered the process of "westernization." During her reign, Russian territory was extended at the expense of the Turks, and she took a leading part in the three partitions of Poland. Her court was one of the most brilliant in Europe, due to her liberal patronage of art and literature. It was also the most immoral, her ministers being openly her lovers.

Catherine, Saint (c. 1347-1380), of Siena, Italian saint. She is said to have been favored with extraordinary revelations, and the wounds of Christ were believed to have been impressed upon her body. She attained influence in public life by her force of character, which was directed toward healing the schism that divided the Church in her day. It was through her persuasion that Pope Gregory XI was induced to return his seat from Avignon to Rome in

1377. She wrote many devotional works, letters, and poems, which rank among the classics of the period.

Catherine de' Medici (*dā mā'dē-chē*) **(1519-1589),** was born in Florence, Italy. She was a great-granddaughter of Lorenzo the Magnificent, niece of Pope Clement VII, and queen to Henry II of France. She acted as regent during the minority of her second son, Charles IX. Her policy was to play off the parties of the Catholic Guises and the Protestant Condés against each other. She entered into a plot with the Guises which led to the massacre of Saint Bartholomew. Three of her sons became kings of France.

Catherine of Aragon (1485-1536), queen of England, the daughter of Ferdinand of Aragon and Isabella of Castile. She married Arthur, Prince of Wales, and subsequently his brother, afterward Henry VIII. She was beautiful and virtuous, yet the king in 1527 sought a divorce on the ground that the marriage was uncanonical. After much temporizing on the part of the pope, the marriage was in 1533 pronounced invalid by Cranmer, archbishop of Canterbury, and his sentence was ratified by act of Parliament. Catherine spent her last years in Kimbolton castle.

Catiline (*kăt'ĭ-lĭn*), or **Lucius Sergius Catilina (c. 108 B. C.-62 B. C.),** Roman politician. During his youth, he attached himself to the party of Sulla. He is known chiefly as the leader of a conspiracy against the republic which was discovered and crushed by Cicero while consul in 63 B. C. Catiline, a man of great bodily endurance and boldness of mind, was a senator who apparently chose to stake all on an overthrow of the republic and seizure of the reins of power. Unsuccessful in his candidacy for consul in 63 B. C., he allied himself with the discontented elements of the population and planned a *coup d'etat* involving murder of the elected consuls.

On discovery and frustration of the plot by Cicero, Catiline fled from Rome and took refuge with Manlius, who was in command of the conspirators' army in Etruria. In 62, the army of the senate encountered that of Catiline near Pistoia, and after a desperate battle, in which Catiline displayed extraordinary courage, he was defeated and slain.

Cato, Marcus Porcius (234 B. C.-149 B. C.), Roman statesman, surnamed the Elder to distinguish him from his later namesake, was born at Tusculum. Induced by Lucius Valerius Flaccus to remove to Rome when that city was in a transition epoch from severe frugality to the luxury and licentiousness of Grecian manners, Cato severely denounced the degeneracy of the philhellenic party and set for Rome a pattern of sterner character.

In 184 B. C., he was elected censor, and discharged so rigorously the duties of his office that the epithet *Censorius*, formerly applied to all persons in the same station, was made his permanent surname. He repaired the watercourses, paved the reservoirs, cleansed the drains, raised the rents paid by the publicans for the farming of the taxes, and diminished the contract prices paid by the state to those who undertook public works.

In 175 B. C., Cato was sent to Carthage to negotiate on the differences between the Carthaginians and the Numidian king, Masinissa; but, having been offended by the Carthaginians, he returned to Rome, where ever afterward he described Carthage as the most formidable rival of his country and concluded all his addresses in the senate—whatever the immediate subject might be—with the well-known words: "*Ceterum censeo Carthaginem esse delendam.*" ("For the rest, I vote that Carthage should be destroyed.")

Cato, Marcus Porcius (95 B. C.-46 B. C.), often called Cato the Younger, Roman statesman. He entered the army and, in 72, served with distinction in the campaign against Spartacus. From Macedonia, where he was military tribune in 67, he went to Pergamum, whence he brought the Stoic philosopher Athenodorus to Rome. In 63, as tribune, he delivered a famous speech on the Catiline conspiracy, in which he denounced Cæsar as an accomplice of that political desperado and determined the policy of the senate. Fearing the effects of unrestrained greatness, he steadily opposed Pompey, Cæsar, and Crassus. Upon the rupture between Cæsar and Pompey, Cato joined Cæsar's opponents and became governor of the Pompeians in Africa. When Cæsar finally defeated the Pompeian army under Scipio at Thapsus, Cato committed suicide.

Catt, Carrie Chapman (1859-1947), American suffrage leader and lecturer, was born at Ripon, Wis. She was educated at the State College of Iowa and took a special course in law. She became principal of the High School and superintendent of schools, Mason City, Iowa. In 1884, she was married to Leo Chapman, who died in 1886, and, in 1890, to George William Catt, who died in 1905.

In 1890-92, she was lecturer and organizer of the Iowa Woman Suffrage Association. In 1892, she began similar service for the National Woman Suffrage Association, of which she was president in 1900-04 and after 1915. She also became president of the International Woman Suffrage Alliance and, in 1913, attended the International Woman Suffrage Congress at Budapest. She was a leader in the campaign that resulted in the adoption of the 19th amendment to the Federal Constitution. According to this amendment, ratified in 1920, women were granted the suffrage on the same terms as men.

Cattell (*kă-tĕl'*), **James McKeen (1860-1944),** American educator and psychologist, was born in Easton, Pa.; was graduated from Lafayette College and the University of Leipzig; and studied also at Göttingen, Paris, Geneva, and Johns Hopkins University. He was the first professor of psychology in America, holding a chair at the University of Pennsylvania, 1888-91. He then taught at Columbia University until 1917, when he was dismissed for opposing compulsory military service. Thereafter he was active as editor of scientific publications, including *Science*, the *Scientific Monthly*, and the *American Naturalist*, serving also as president of Science Service, Washington, D. C.

Catullus (*kă-tŭl'ŭs*), **Gaius Valerius (c. 87 B. C.-54 B. C.),** Roman lyric poet, was born at Verona. He wrote over 100 poems, chiefly lyric and elegiac, which rank among the most original and imaginative in Latin literature. A large number of them record phases of his love for "Lesbia," which became the consuming passion of his life. He is intensely personal in his poetry and utterly without reserve. His poems breathe the deepest affection for his friends, with the most bitter invective for his enemies.

Cauchy (*kō'shē'*), **Augustin Louis, Baron (1789-1857),** French mathematician and founder of the theory of functions, was born in Paris. His *Mémoire sur la théorie des ondes* helped to establish the undulatory theory of light. At Prague he published his *Mémoire sur la dispersion de la lumière.* He was professor of astronomy at Paris, 1848-52, but refused the oath of allegiance to Napoleon III and went into voluntary exile. His works, which have been collected and published in 27 volumes, occupy a leading place in mathematical science.

Cavalieri (*kä'vä-lyā'rē*), **Emilio del (c. 1550-1602),** Italian composer, was born in Rome. In 1589, he was made inspector general of art and artists at the court of the Medici in Florence. In 1590, he wrote *Disperazione di Filene* and *Il satiro* and, in 1595, *Guioco della cieca*, which are among the very earliest operas. His chief work, *Rappresentazione di anima e di corpo*, performed in Rome in 1600, is regarded as the first oratorio. He developed the monodic style by supplying an accompaniment in figured bass and emphasized the melody, which he ornamented with trills. Died in Florence.

Cavalli (*kä-väl'lē*), **Francesco (c. 1600-1676),** Italian composer, was born in Crema. His musical talent gained him the patronage of the podestà of Crema, whose support enabled him to study under Monteverde. He later became Monteverde's most noted pupil and follower. In 1665, he was appointed organist in San Marco, Venice, and, in 1668, became *maestro di cappella*, holding this post until his death. While he wrote much Church music, he is most noted as a dramatic composer. He introduced solos and set numbers into his operatic compositions and was thus the forerunner of Scarlatti and the modern opera.

Cavell, Edith (1865-1915), English nurse, was born in Norfolkshire, the daughter of a clergyman. In 1907, she was appointed matron of a training school for nurses in Brussels which, in 1914, became a Red Cross hospital. In August 1915, under the German occupancy of the city, she was arrested, charged with facilitating the escape of Belgian and British men of military age. She admitted the charge and was sentenced to be shot immediately along with a Belgian named Baucq. In spite of the most earnest representations of Brand Whitlock, the American minister to Belgium, the sentence was carried out. This precipitate execution of a Red Cross nurse was a powerful psychological factor in creating hostility to the German cause. In 1919, Edith Cavell's body was taken to England and was interred in Norwich cathedral after a service in Westminster Abbey.

Cavendish (*kăv'ĕn-dĭsh*), **Henry (1731-1810),** English chemist and physicist, was born at Nice, France. His most important work included the discovery of the composition of water, the composition of nitric acid, and the determination of the mean density of the earth. Since the discovery of argon by Rayleigh and Ramsay, it has become evident that Cavendish in his studies on the composition of air had, at that early date, isolated argon without knowing it. He was a man of great wealth, lived in retirement, and devoted his entire life to scientific experiment.

Cavour (*kä'vōōr'*), **Count Camillo Benso di (1810-1861),** Italian statesman, was born at Turin. He was educated for a military career, but, as liberal sympathies appeared likely to prove an insuperable barrier to his promotion, he retired and devoted himself to agriculture.

While a resident in England, he made himself intimately acquainted with the political and industrial organization of the country. With Count Cesare Balbo, in 1847, he established a daily political journal, in which he advocated a representative system somewhat after the pattern of the English constitution.

On Cavour's suggestion, the King of Sardinia was petitioned for a constitution, which was granted in February 1848. Cavour became a member of the Chamber of Deputies and served successively as minister of agriculture and commerce, minister of marine, and minister of finance; in 1852, he was made premier. From this time, he directed Sardinian policy and devoted himself to securing the independence and unification of all Italy. He made an alliance with Napoleon III of France, but when war broke out between Sardinia and Austria and Austrian forces were all but driven from the Italian peninsula, Napoleon deserted his ally and made peace in 1859. Cavour resigned in chagrin. He was recalled in the next year to direct the government and, with the help of Garibaldi, enabled various Italian states to throw off the Austrian yoke. The first Parliament of all Italy met at Turin a few months before Cavour's death.

Caxton, William (1422-1491), the founder of English printing, was born in the Weald of Kent. During a residence in Flanders he acquired the new typographic art and, on his return, set up a press in the almonry, Westminster, where, in 1477, he brought out the earliest known book printed in England, *Dictes and Sayings of the Philosophers.* He printed about a hundred works, many of which were translations made by himself. His notable pioneer work in the new art helped to fix the English speech and to prepare the way for the Elizabethan era.

Cazin (*kȧ'zăn'*), **Jean Charles (1841-1901),** French landscape painter and ceramic designer, was born at Samer. In 1868, he became director of the art school and curator of the museum at Tours. In 1871, he went to England, where he designed ceramics for the Fulham pottery. After his return to France, he devoted himself to landscape art, in which he attained the foremost rank among French artists of his time. His subjects are chiefly moonlight, twilight, and dusk scenes, which he invests with remarkable feeling and charm. He also became a painter of landscape with religious sentiment in such well-known works as "Judith," "La Terre," "Tobit," and "Hagar and Ishmael," which are now in Luxembourg. Examples of his paintings are found in the National Gallery of Berlin; the Metropolitan Museum, New York; and the Art Institute, Chicago.

Cecil, William. See *Burleigh, William Cecil, Baron.*

Cecil (*sĕs'ĭl; sĭs'ĭl*) **of Chelwood, Edgar Algernon Robert Cecil, Viscount (1864-),** English statesman, was educated at Oxford University; served 1886-88, as a private secretary to his father, the Marquis of Salisbury; and practiced law for 19 years prior to his election to Parliament as a Conservative in 1906. He was chosen chancellor or Birmingham University in 1918. In his public career, he opposed any abridgment of the powers of the Church; fought all socialist measures; favored woman suffrage; during World War I, served as minister of blockade; and later became one of the strongest supporters of the League of Nations, receiving in 1924, the first award of the Woodrow Wilson peace prize. He was awarded the Nobel peace prize for 1937. His writings include *A Great Experiment: an Autobiography.*

Cellini (*chĕl-lē'nē*), **Benvenuto (1500-1571),** Italian goldsmith and sculptor, was born at Florence. He first became known as a chaser and goldworker. At an early period, having been banished from Florence in consequence of a duel, he went to Rome, where he was employed by many distinguished patrons of art. He was afterward allowed to return to Florence. Another affray compelled him to go to Rome, where he secured the favor of Clement VII. Later he accompanied Cardinal Ferrara to France and entered the service of Francis I. He executed many fine works in metal and marble, among them the celebrated bronze group of "Perseus with the Head of Medusa," now in the market place in Florence. His *Autobiography* furnishes one of the most valuable pictures of life in the period of the Renaissance.

Celsius (*sĕl'sĭ-ŭs*), **Anders (1701-1744),** Swedish astronomer, was born at Upsala. He studied in prominent observatories in Germany, Italy, and France; published papers on the aurora borealis; and advocated the adoption of the Gregorian calendar. In 1730, he became professor of astronomy at Upsala, where, in 1740, a splendid observatory was erected for him. In 1742, he constructed the scale of the centigrade thermometer, now in general use for scientific purposes.

Cervantes (*sĕr-văn'tēz*) **Saavedra, Miguel de (1547-1616),** Spanish novelist, was baptized October 9, 1547, at Alcala de Henares, a town of New Castile. The exact date of his birth is not known. He sprang from noble, but not wealthy, parents and was sent to the University of Salamanca and afterward to Madrid. His attention was often diverted from his studies by a strong propensity for writing verse. Cervantes perused anything that attracted his attention and thus gained, besides much other information, an intimate knowledge of the Old Spanish literature.

Cervantes left Spain in 1569 to seek his fortune in Rome. Here he entered the service of Cardinal Giulio Acquaviva; the next year, he enlisted as a private for the relief of Cyprus. In 1571, in the battle of Lepanto, Cervantes received a wound that deprived him of the use of his left hand. Returning to Spain in 1575, he was captured by the Moors and was kept prisoner for five years in Algiers.

Literary Career. After these vain pursuits of fortune, Cervantes dedicated himself to literature. In 1584, he published *Galatea,* a pastoral novel. This same year, he married Dona Catalina de Palacios Salazar and settled in Madrid. He wrote several dramas, none of which was received favorably on the stage.

His *Moral Tales* were supposedly written in Seville, where he was employed for several years following 1588. Subsequently, he resided at intervals in La Mancha, the province which he rendered famous in his great work, *Don Quixote.*

In 1604-05, Cervantes lived with his family at Valladolid, where Philip III held court. In 1605, the first part of *Don Quixote* appeared at Madrid and ran through four editions in one year. For seven years after its appearance Cervantes published nothing. He maintained a studious retirement, yet gained two powerful friends, the Count de Lemos and the Archibishop of Toledo, whose patronage and money kept him from actual want though not from poverty.

In 1613, Cervantes published his *Moral Tales,* much esteemed for their purity of language and depicition of life and character. His *Journey to Parnassus* appeared in 1614. A spurious sequel to *Don Quixote* having been printed, Cervantes angrily repudiated it and published the second part of his masterpiece in 1615, which met with universal applause. His last work was *Persiles y Sigismunda.*

Don Quixote. Cervantes' most celebrated work, *Don Quixote de La Mancha,* is undoubtedly the best-known work in Spanish literature. Cervantes wrote it to extirpate by ridicule the mass of imitations of the older tales of chivalry. An unfailing source of amusement lies in the contrast between the lofty, single-minded knight, Don Quixote, and his simple, yet shrewd and earth-seeking squire, Sancho. Cervantes waged literary warfare against the false and improbable, and his genius championed the sublimity of nature and truth. Died, April 23, 1616, the day of Shakespeare's death. See *Don Quixote.*

Cesnola (*chĕs'nō-lȧ*), **Count Luigi Palma di (1832-1904),** archeologist, was born near Turin. He served with the Sardinians in the Crimean War; went to New York in 1860; and fought in the Civil War. Appointed American consul at Cyprus in 1865, he carried out a series of fruitful excavations there; in 1873, his splendid collection of statues, lamps, vases, and inscriptions was purchased by the Metropolitan Museum, New York, of which he became director in 1879. He wrote *Cyprus: Its Ancient Cities, Tombs, and Temples.*

Cèzanne (*sȧ'zȧn'*), **Paul (1839-1906),** French painter, was born at Aix. His early style followed the Italian masters but with a disturbing intensity of feeling to which his technique was not quite adequate. Examples from this period are "The Autopsy" and "The Judgment of Paris." His acquaintance in 1872-73 with the impressionist Pissaro led to a greater attention to color effects, but Cèzanne strove for a reality which he believed the impressionists missed. In 1879, he retired to Aix, where he worked until his death, largely forgotten by the world. Fame came to him posthumously and established him as one of the greatest modern French painters. His later canvasses returned to his earlier turbulent style but with a surer technique. They include landscapes with nude figures; portraits, some of which have seldom been surpassed; and still life pictures of rare feeling and expressiveness.

Chadwick, George Whitefield (1854-1931), American composer was born in Lowell, Mass. He began musical study under Eugene Thayer and later, in Europe, was a pupil of Jadassohn, Reinecke, and Rheinberger. In 1897, he became director of the New England Conservatory of Music at Boston. He was elected to the American Academy of Arts and Letters in 1909.

Among American composers, Chadwick ranks second only to MacDowell, whom he surpasses in the treatment of the higher instrumental forms of music, although he is inferior in fertility of invention. His lyric drama, *Judith,* and the comic operas, *Tabasco* and *The Quiet Lodging,* are his most ambitious works for the stage. His musical compositions include also three symphonies; the overtures, *Rip Van Winkle, Thalia, The Miller's Daughter, Euterpe;*

and the choral works, *The Viking's Last Voyage*, *Lovely Rosabelle*, *Phœnix Expirans*, *The Lily-Nymph*.

Chagall, Marc (1887-), Russian painter, was born near Vitebsk, Russia. At the age of 20 he began to study painting at Leningrad, but, not caring for the style of art taught in the schools there, he soon became attached to Leon Bakst, the painter, who was engaged in designing settings and costumes for Diaghelev's ballet company. When Bakst went to Paris in 1910 with the ballet, he took Chagall with him. Chagall returned to Russia and started an art school at Vitebsk, but was forced to give it up. Returning to Paris in 1923, he became a French citizen, and remained there until compelled by the defeat of France in World War II to seek asylum in the United States, where he lived from 1941 to 1948. Although Chagall has been connected with art movements such as cubism and surrealism, he has throughout his career been largely independent of all schools, and has pursued his own individual way. In subject matter hs work reflects his nostalgic interest in the Russian-Jewish life and folklore he knew in his youth. Well-known pictures by him in American museums include "The Village and I" (Museum of Modern Art, New York) and "The Rabbi of Vitebsk" (Art Institute, Chicago). Notable among his book illustrations are those for LaFontaine's *Fables* and Gogol's *Dead Souls*.

Chaliapin (*shă-lē-ä'pĭn*), **Theodore (1873-1938)**, Russian operatic singer, was born at Kazan, Russia. Without previous training in music, he joined a comic opera company in 1890, and the natural quality of his voice immediately attracted attention. In 1894, he appeared in grand opera at Leningrad. His intense portrayal of national types in Russian operas made him a prime favorite among his countrymen and abroad. His repertoire included roles in *A Life for the Czar*, *Ivan the Terrible*, and *Faust*.

Chamberlain, (Arthur) Neville (1869-1940), English statesman, son of Joseph Chamberlain, was born at Birmingham. Educated at Rugby and Mason college, Birmingham, he entered public life in the city government of Birmingham, serving as mayor in 1915-16. He was director-general of national service in the following year, one of the most critical in World War I. After the war, he served in various Conservative governments, supervising a housing scheme, under which over 900,000 dwellings were erected. In the national government of 1931, he was made chancellor of the exchequer, in which capacity he exerted a major influence in English policies.

Becoming prime minister in 1937, Chamberlain went to great lengths to avoid war with Germany, his policy of "appeasement" reaching its climax with the abandonment of Czechoslovakia in the Munich agreement with Hitler in 1938. This policy failing, he led Great Britain into war against Germany in 1939. He failed, however, to appreciate the seriousness of the German threat, and, after Germany's conquest of Norway in 1940, he was replaced as prime minister by Winston Churchill.

Chamberlain, Joseph (1836-1914), British statesman was born in London; was educated in a private school and at University College, London; and joined the firm of Nettlefold, screw makers of Birmingham. He became a member of the town council and was three times mayor, 1873-76, in which capacity he made Birmingham conspicuous among British cities for its municipal improvements. In 1876, he entered Parliament and took his seat with the radicals. He was a member of the cabinet from 1880 until 1886, when his disapproval of Gladstone's Irish policy led to his resignation. He went to Washington to negotiate regarding the dispute between the United States and Canada on the fisheries question. In 1895, he took office as colonial secretary; was largely responsible for the British attitude preceding the Boer War; and advocated a system of preferential tariffs for British dominions. This policy, however, met defeat at the polls.

Chamberlain, (Joseph) Austen (1863-1937), English statesman, the son of Joseph Chamberlain, was born at Birmingham. Educated at Cambridge, Paris, and Berlin, he was elected to Parliament in 1892 as a Liberal Unionist and entered Lord Salisbury's cabinet in 1895. In 1900, he became financial secretary to the treasury, in which capacity he supported his father's unsuccessful efforts for the imposition of import tariffs with preferential rates for British dependencies. He became leader of the Unionist party in 1921 and, in 1924, entered Stanley Baldwin's cabinet as secretary of state for foreign affairs. The leading part which he took in negotiating the Locarno treaties in 1925 won for him the award of one-half the Nobel peace prize for that year.

Chamberlain, Thomas Crowder (1843-1928), American geologist and astronomer, was born at Mattoon, Ill. He was graduated at Beloit College in 1866 and later at the universities of Michigan and Wisconsin. He became professor of natural science at the State Normal School in Whitewater, Wis., 1869; professor of geology at Beloit College, 1873; president of the University of Wisconsin, 1887; and head of the department of geology at the University of Chicago from 1892 to 1919. He also conducted much special research in geology, being connected with the Carnegie Institution. With F. R. Moulton, he formulated the planetesimal theory which has succeeded the theory of Laplace as a working hypothesis in astronomy. See *Cosmogony*.

Chambers, William (1800-1883), Scottish publisher, was born at Peebles. In 1814, he was apprenticed to a bookseller in Edinburgh, and, in 1819, he started a business of bookselling for himself, afterward adding printing. Between 1825 and 1830, he wrote the *Book of Scotland* and, in conjunction with his brother Robert, a *Gazetteer of Scotland*. In 1832, he started *Chambers's Edinburgh Journal;* soon thereafter he united with Robert in founding the business of W. and R. Chambers, the best known of whose many publications are, besides the *Journal* and a large series of educational works, a *Miscellany*, *Papers for the People*, the *Cyclopædia of English Literature*, and *Chambers's Encyclopædia*.

Chaminade (*shă'mē'nàd'*), **Cécile Louise Stéphanie (1861-1944)**, French composer, was born in Paris. She made her debut as a pianist at the age of 18, later studying under Le Couppey, Savard, and Godard. She composed a large number of songs and instrumental pieces which attained great popularity by reason of their melodiousness and charm. Her works became well known in the principal concert centers of France and England, and, in 1908, she made a successful tour in the United States. The list of her best-known instrumental pieces includes *La lisonjera*, *Pas des amphores*, *Pas des echarpes*, *Au matin*, *Callirhoe*, and *Les amazones*.

Chamisso (*shä'mĭ-sō*), **Adelbert von (1781-1838)**, lyric poet and naturalist, was born in Champagne, France. He fled during the French Revolution to Germany, where he became a page to the Queen of Prussia in 1796. During 1804-06, he collaborated in the publication of the *Musen Almanach*. In 1806, he returned to France and led an unsettled life until 1812, when he began to study medicine in Berlin. In 1813, he wrote the novel *Peter Schlemihl*. During 1815-18, he accompanied, as naturalist, Kotzebue's Russian polar expedition, his *Journal* of which is ranked among the classics of travel. Subsequently he obtained a situation in the botanical garden of Berlin, and was made a member of the Academy of Sciences. His poems include some of the finest lyrics and ballads in German literature. See *Peter Schlemihl*.

Champlain (*shăm'plān'*), **Samuel de (1567-1635)**, French naval officer and explorer, was born at Brouage. During the reign of Henry IV of France, he founded the first French settlements in America, at Quebec (1608) and Montreal (1611). He penetrated also to Lake Huron and Lake Champlain, supporting the Huron Indians against the Iroquois and their English allies. He was made governor of Quebec, which territory the English captured in 1629, taking him as a prisoner to England. Peace restored Quebec to France in 1632, and Champlain was again made governor. He wrote *Voyages and Travels in New France, Called Canada*.

Champollion (*shăN'pôl'yôN'*), **Jean François (1790-1832)**, French Egyptologist, was born at Figeac, France. He was professor of history in the Lyceum of Grenoble and afterward professor of Egyptian antiquities in the College of France, Paris. We are indebted chiefly to Champollion for the discovery of the method of interpreting Egyptian hieroglyphics. Among his principal works are *Egypt under the Pharaohs*, *Monuments of Egypt*, and *Nubia*, and an *Egyptian Grammar*, edited by his elder brother, Jean Jacques Champollion, who was also a distinguished archeologist.

Channing, William Ellery (1780-1842), founder of American Unitarianism, was born in Newport, R. I.; was graduated from Harvard in 1798; and was ordained minister of the Federal Street church in Boston in 1803. During the earlier years of his ministry, he stood upon friendly terms with all orthodox churches. In 1819, however, he preached a sermon in which he advocated the Unitarian doctrine with so much zeal and ability that he was termed the "apostle of Unitarianism." This involved him in controversy despite his antipathy to everything one-sided and dogmatic, whether Unitarian or Trinitarian.

In 1821, he received the title of D. D. from Harvard University. He visited Europe in 1822 and made the acquaintance of several great authors, notably Wordsworth and Coleridge, both of whom were strongly impressed by his personality. His publications include *Evidences of Christianity*, *Address on War*, *Essays on National Literature*, and *Self Culture*. Both his writings and his public discourses were characterized by a vigorous eloquence and a lofty moral earnestness. He was elected to the American Hall of Fame in 1900.

Chaplin, Charles Spencer (1889-), motion picture actor, was born in London, Eng. Both his parents were actors. He entered a stage career at seven years of age, displaying a remarkable talent for humorous acrobatic acts. Coming to New York in 1911 with the Fred Karno Company, he was there engaged to play in motion picture productions. Through this medium, Chaplin shortly became a world-wide celebrity. In 1918, he formed his own company and produced *A Dog's Life*, *The Kid*, and other successful comedies. He joined later with Douglas Fairbanks, Mary Pickford, and D. W. Griffith to form the United Artists' Corporation. Under his direction and with him as chief actor were produced *The Gold Rush*, *Modern Times*, and *The Great Dictator*, which were widely acclaimed as masterpieces of motion-picture acting. In 1953, Chaplin, a British subject, while in Europe surrendered his permit to reenter the United States.

Chapman, Frank Michler (1864-1945), American ornithologist, was born in Englewood, N. J. From 1887, he was connected with the American Museum of Natural History, of which he became curator in 1908. He was the originator there of habitat bird groups. He conducted many expeditions in temperate and tropical countries. Among his many publications are *Handbook of Birds of Eastern North America*, *Bird Studies with a Camera*, *The Economic Value of Birds to the State*, and *Life in an Air Castle*.

Chapman, George (c. 1559-1634), English poet. He published a translation of the *Iliad* in English ballad measure: afterward translated the *Odyssey* and portions of Ovid, Terence, and Petrarch; and also wrote many plays. He was associated with Jonson, Marston, and others in writing the comedy of *Eastward Hoe!* for which they were imprisoned by King James I because of reflections on the Scotch.

Chapman, John (c. 1775-1847), usually known as "Johnny Appleseed," American frontiersman. He developed an apple tree nursery near Pittsburgh Landing, Pa., from which he gave or sold saplings or seed to families migrating westward. Beginning in 1806, he made canoe trips through Ohio, Indiana, and Illinois, for the purpose of planting in the wilderness apple orchards which he returned to care for, and assisted settlers in establishing orchards of their own. Of a religious and eccentric character, he was widely known to the pioneers, and legends soon gathered about his name. He saved Mansfield, Ohio, from an attack by the Indians in the War of 1812.

Charlemagne (*shär'lê-mān*) **(742-814)** is the French name of Charles the Great, king of the Franks and Roman emperor. He was the son of Pepin the Short and grandson of Charles Martel. His birthplace, according to different traditions, was either Aix la Chapelle or Ingelheim. In 768, he became joint ruler of the Franks with his brother Carolman, whose death three years later left him as sole king of Francia. Opening war against the Saxons in 772, Charles began a series of conflicts which was to last more than thirty years.

Conquests. Crossing the Alps, Charles completely subdued northern Italy as far as the Neapolitan duchy and was acknowledged as king of Lombardy in 774. At Easter of this same year, he visited Rome, where the pope conferred upon him the title, "Patrician of Rome." Charles endowed the Church with immense territorial possessions, which were later known as the States of the Church.

His next expedition took him into Spain. He was invited there by an offer of alliance with a Saracen emir, who had revolted from the caliph of Cordoba in 778. On the return of his army through the valley of Roncesvalles near Pamplona, the Gascons fell upon his rear guard and killed one of the Frankish leaders, named Roland, and many other nobles. This defeat was the historical basis of the poetic legend known in the middle ages as the *Ballad of Roland*. From 778 to 812, the Franks made six other expeditions into Spain, the main result of which was finally to deliver France from any further danger of Saracen invasion.

Other conquests awaited the king beyond his eastern frontiers. Charles defeated the Saxons under Wittekind in 780 and, in 788, carried his arms into Bohemia, Bavaria, and Hungary. The Frankish dominion now comprised the whole of France; all Germany and Austria except East Prussia, eastern Hungary, and Croatia; the northwest corner of Spain; and the entire peninsula of Italy save the kingdom of Naples. Such success called for formal consecration. On Christmas Day, 800, the king in great state attended Mass in Saint Peter's at Rome, where Pope Leo III, placing an imperial crown on his head, thrice hailed him as "Augustus, crowned by God, great and pacific emperor of the Romans." The Church became the spiritual guide of the revived Roman Empire of the West, and the Frankish king was the right hand of the Church.

Constructive Achievements. Great as a warrior, Charles was even greater as an administrator and civil ruler. He divided the whole empire systematically, placing each division under military, judicial, and civil authority. A real, but short, renascence of learning also took place in the Frankish kingdom. From this reign, the Church became a vast, independent power, co-ordinate in authority with the civil government.

Charles entertained a plan for the union of the newly revived Western Empire with the Eastern Empire through his marriage with the Byzantine empress, Irene. The plan failed, however, by reason of Irene's overthrow. Charles left his dominion to his only remaining son, Louis. Placing the imperial crown upon the altar, he ordered Louis to take it with his own hands, thereby giving him to understand that he wore it in his own right and under no authority but that of God.

Charles I (1600-1649), king of England, was proclaimed king on the death of his father, James I, in March 1625. A firm believer in the "divine right of kings," he attempted to rule independently of his subjects, taxing them without the consent of their representatives and thereby precipitated civil war in 1642 between Parliament and the king's supporters. Charles was eventually captured; brought to trial before a court constituted for the purpose; sentenced to death on a charge of treason; and, January 30, 1649, was beheaded. The boldness of this assault on the institution of monarchy created a profound sensation throughout Europe.

Charles II (1630-1685), king of England, son of Charles I, was at The Hague, Netherlands, when his father was beheaded. He assumed the royal title and was proclaimed king by the Scots. Marching into England, he was defeated by Cromwell at Worcester, 1651, and fled to France. By the policy of General Monk, after Cromwell's death, he was restored to his crown and kingdom in 1660, an event known as the Restoration. In 1662, he married Catherine of Braganza. Charles II was an easygoing man, and is known in history as the "merry monarch." His reign was an inglorious one for England, though it is distinguished by the passing of the Habeas Corpus act, one of the great bulwarks of English liberty next to the Magna Charta.

Charles V (1500-1558), emperor of Germany and king of Spain, was born at Ghent. From his father, Philip of Burgundy, he inherited the Netherlands and Franche Comte. In 1516, on the death of his grandfather Ferdinand, he succeeded, under the title of Charles I of Spain, to the crowns of Aragon and Castile with all their possessions in the New World and in Sicily and Naples. In 1519, on the death of his grandfather Maximilian, Charles was elected German emperor, and, the following year, he was crowned as Charles V of Germany.

Germany was in a state of unprecedented agitation concerning the doctrines proclaimed by Luther. Charles made it his aim to restore tranquility, and, with this end in view, he summoned, in 1521, the famous Diet of Worms, over which he presided in person. The conference, however, failed of its main purpose. In 1522, he reduced to subjection the towns of Castile, which had risen against him. He was likewise successful in his war against the Turks under Soliman the Magnificent and in a long struggle with France. In 1525, the French king, Francis I, became his prisoner at Pavia. The emperor's forces took Rome itself in 1527 and made prisoner Pope Clement VII, who had allied himself with France and with the principal Italian towns. In 1529 at Cambrai, peace was concluded with the pope and France, and, in 1530, Charles was crowned King of Lombardy and Emperor of the Romans.

A diet summoned at Augsburg in 1530 for the purpose of settling the religious controversy ended in failure. In 1535, Charles undertook a successful expedition from Spain against the pirate Barbarossa, then established at Tunis. Peace with France was patched up in 1538. Charles then hastened to supress a revolt in Ghent. In 1542, war about Milan was renewed with France, and, two years later, Francis I was forced to make the unfavorable peace of Crepy.

Though the Council of Trent, in 1545, seemingly made Catholic and Protestant union impossible, Charles still aimed at it. In the second diet of Augsburg, 1548, he proposed a common platform, which was rejected by both parties. The Lutherans rose in arms, and Charles narrowly escaped capture at Innsbruck in 1552. This same year, he made an unsuccessful venture to recover from Henry II of France the bishopric of Metz.

The emperor's principal aim in life had been hopelessly crossed. In 1554, he gave up the kingdom of Naples to his son Philip, and, the next year, he resigned to him the Netherlands. In 1556, Spain and the West Indies passed into the same hands; the imperial dignity was renounced; and the crown was sent to Charles's brother Ferdinand. Broken in health and with no worldly ambitions, Charles sought repose in the sequestered monastery of Saint

Yuste, near Plasencia in Estremadura, Portugal, where he died.

Charles VII (1403-1461), king of France. He was a son of Charles VI, on whose death in 1422 Henry VI of England was proclaimed king of France. Henry proceeded to assert his authority by force of arms and had almost succeeded when, in 1428, Joan of Arc came forward and inspired new ardor in the French armies, which she led in person against the English. A series of victories enabled her to have Charles crowned king of France at Reims in 1429. The English were gradually driven from France until, in 1453, Calais alone remained in their hands. Peace and order were restored, a regular army was organized, and commerce was encouraged. Charles VII was timid and irresolute in character and has been much censured for failing to save Joan of Arc from the hands of the English.

Charles IX (1550-1574), king of France, son of Henry II and Catherine de' Medici, succeeded his brother Francis II in 1560, under the regency of his mother. His reign was marked by almost uninterrupted civil war between the Huguenots led by the Condé and the Catholics headed by Guise. Barbarities and outrages were practiced by both sides, but all other atrocities were eclipsed by the massacre of Saint Bartholomew in 1572. This massacre of the Huguenots received the assent of Charles under the influence of his mother, who planned it for political reasons. Charles continued to be subject to her influence until his death.

Charles X Gustavus (1622-1660), king of Sweden, son of the Count Palatine, was born at Nykoping. He took part in the Thirty Years' War, and, on the abdication of his cousin Queen Christina, 1654, succeeded to the throne of a kingdom impoverished by her extravagance. He overran Poland in 1655; forced the Elector of Brandenburg to enter into an alliance with him; and crushed the forces of the Polish king in a terrible three days' battle at Warsaw, late in July 1656. His next war was with the Danes, when he crossed two arms of the sea on the ice and extorted the Treaty of Roeskilde, 1658, which gave to Sweden the southern parts of the Scandinavian peninsula, previously Danish. In 1659, he was driven from a new attack on Copenhagen by help of the Brandenburgers and the Dutch.

Charles XII (1682-1718), king of Sweden, son of Charles XI, ascended the throne at the age of 15. He had to cope with the combined power of Denmark, Russia, and Poland. He foiled the Danes at Copenhagen, the Russians at Narva, and Augustus II of Poland at Riga; but, being trapped in Russia and compelled to spend a winter there, he was, in July 1709, attacked and defeated by Peter the Great at Poltava, so that he had to take refuge with the Turks at Bender. Here he was again attacked, captured, and conveyed to Demotica, but, escaping, he succeeded in effecting a precarious return to Sweden. Making peace with the czar, he commenced an attack on Norway, but was killed by a musket-shot at the siege of Frederikshald.

Charles XIV John (1763-1844), king of Sweden and Norway, and known before his election to the throne as Jean Baptiste Jules Bernadotte, was born at Pau, France, the son of a French lawyer. In 1780, he joined the French army; fought in the Revolutionary wars with distinction; became general in 1794 and minister of war in 1798. In 1800, he suppressed an uprising of the Chouans, commanding the army in La Vendée. In 1804, Napoleon made him one of the 18 marshals of France. For brilliant services at Austerlitz in 1805, he was made Prince of Pontecorvo, and, in 1809, he won new fame at Wagram.

Being chosen Crown Prince of Sweden by the Swedish diet in 1810, he accepted, going immediately to Stockholm and changing his name to Charles John. He became powerful and popular and soon joined the allies against Napoleon, contributing materially to his defeat at Leipzig in 1813. He compelled Denmark to give up Norway, which he annexed to Sweden. Upon the death of Charles XIII in 1818, he became king of Sweden and Norway. His reign was able, uniformly peaceful, and resulted in great progress and prosperity. He was the only one of Napoleon's generals to found a dynasty.

Charles Martel (c. 689-741), duke of Austrasia, was the natural son of Pepin d'Heristal and succeeded his father in the dukedom in 714. As mayor of the palace, he possessed a regal power, which he employed with little interference from the titular Frankish kings. His chief title to fame is a decisive victory which he won over the Saracens under their general, Abd-er-Rahman, whom he defeated with great slaughter between Tours and Poitiers in 732. It was in consequence of this victory, which saved northern Europe from the invading Moors, that he was called *Martel*, or "The Hammer." At his death, he divided his dominions between his sons, Carloman and Pepin. The latter became the first king of France of the Carlovingian race.

Charles the Bold (1433-1477), the last duke of Burgundy, succeeded his father Philip the Good in 1467. He conceived the ambition of restoring the kingdom of Burgundy. This involved the defeat of the king of France, his feudal superior, and the conquest of territories including Lorraine and part of Switzerland. Louis XI was compelled to sign a treaty by which he gave up part of his territory. Alsace and Lorraine were won, partly by the help of Charles's father-in-law, Edward IV of England. In Switzerland, however, Charles suffered three severe defeats, in the last of which he was slain. With his death terminated the long resistance of the great French vassal chiefs to the centralized power of the monarchy.

Charpentier (*shär'päN'tyā'*), **Gustave (1860-),** French composer, was born at Dieuze, Lorraine. He received his musical education at the Paris Conservatory, studying under Masenet and winning the *grand prix de Rome*, 1887. He composed songs, orchestral pieces, and a symphonic drama, *The Poet's Life*, which was produced in 1892. In 1898, he captivated musical Paris by the production of his opera *Louise*, of which he wrote both words and music. This distinctly modern work, characterized by a dramatic libretto and music of notable beauty and originality, won him high rank among the French "impressionists."

Chase, Salmon Portland (1808-1873), American jurist and statesman, was born in Cornish, N. H. After being graduated from Dartmouth in 1826, he taught in a boys' school at Washington, D. C. He was admitted to the bar in 1829; began practice in Ohio; and, in 1834, was appointed solicitor in Cincinnati for the bank of the United States. His defense of J. G. Birney in 1837 for harboring a fugitive slave brought him into prominence as an antislavery advocate.

In 1849, the Democrats and Free-Soilers elected him to the United States Senate, where he was a vigorous opponent of slavery extension. He joined Sumner and Seward in opposing the Kansas-Nebraska bill. In 1855, he was elected governor of Ohio by the Republicans. Chosen secretary of the treasury by President Lincoln at the outbreak of the Civil War, he conducted the finances of the government during this trying period with rare skill and success. In 1864, he was appointed chief justice of the United States Supreme Court and as such presided in 1868 over the impeachment trial of President Andrew Johnson.

Chase, Stuart (1888-), American social and economic writer, was born at Somersworth, N. H. Educated at the Massachusetts Institute of Technology and Harvard University, he entered an accounting firm and, from 1917 to 1922, was an investigator for the Federal Trade Commission. He won a name as an independent critic of the current economic system through his *Tragedy of Waste*, *The Nemesis of American Business*, and *A New Deal. Your Money's Worth*, written in co-operation with F. J. Schlink, challenges the prevailing advertising practices. In *Mexico —A Study of Two Americas*, he set forth a searching criticism of the conventional values of civilized life. He wrote also *Rich Land, Poor Land; The Tyranny of Words;* and *The New Western Front. The Proper Study of Mankind* appeared in 1948, *Roads to Agreement* (with M. Tyler) in 1951, and *Power of Words* in 1954.

Chase, William Merritt (1849-1916), American painter, was born at Franklin, Ind. He began art study in Indianapolis, continuing at New York and, under Wagner and Piloty, in Munich. He established a studio in New York, 1878, and rose to the foremost rank among American artists, painting figures, portraits, and still life with remarkable skill. Many examples of his work are found in the leading American art galleries. Among the best known are "A Broken Jug"; "Ready for a Ride"; "Alice," Art Institute, Chicago; and "Lady in Black," Metropolitan Museum, New York. He was elected to the American Academy of Arts and Letters in 1908.

Chateaubriand (*shà'tō'brē'äN'*), **François Auguste, Vicomte de (1768-1848),** French author and statesman, was born at Saint Malo in Brittany. He traveled in America, 1791-92, and, while still there, learned of the flight and arrest of Louis XVI. He immediately returned to France, but retired to England before the revolutionary tide. In 1800, he returned to Paris and wrote for the *Mercure de France*. In this journal, he first printed his tale of *Atala* with a preface lauding the first consul, Bonaparte. Its success was remarkable, but his *Génie de Christianisme* was even more successful. Bonaparte appointed Chateaubriand secretary to the embassy in Rome.

Chateaubriand was created a peer of France, 1815, was ambassador at London in 1822, and became minister of foreign affairs in 1823. His *René* and *Atala* marked the inception of the romantic movement in France and a new era in literary art. Died at Paris.

AMERICAN SINGERS

Geraldine Farrar

Ernestine Schumann-Heink

Louise Homer

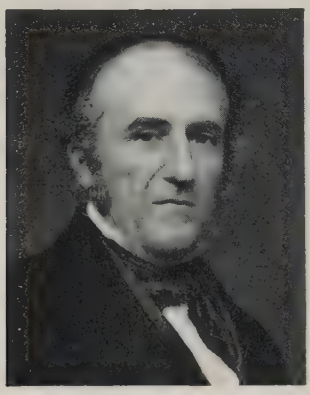
Mary Garden

Marion Anderson

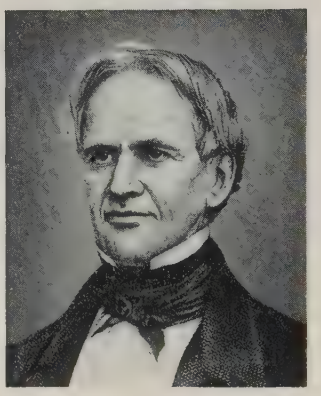
Lily Pons

Rosa Ponselle

AMERICAN EDUCATORS



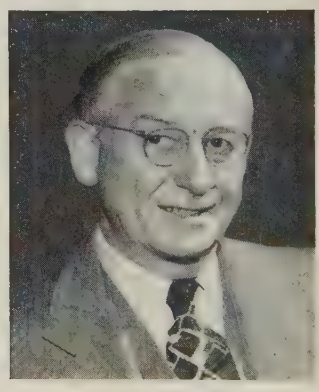
Mark Hopkins



Horace Mann

Dr. Herold Hunt

Rev. George C. Johnson



Robert Gordon Sproul

David Starr Jordan

John Dewey

Chatham, William Pitt, first earl of. See *Pitt, William.*

Chaucer (*chô'sẽr*), **Geoffrey (1328-1400),** early English poet, was born most probably about 1340, though the traditional date is 1328. He is believed to have studied at Cambridge and later at Oxford. While a student, he wrote *The Court of Love* and *The Book of Troilus and Cressida.* In 1359, he served under Edward III in his French campaign and was made prisoner. After his release and subsequent marriage, he entered public life. He was sent on an embassy to Genoa in 1372. On his return, he was appointed comptroller of the customs for wools, and, in the same year, the king granted him a pitcher of wine daily for life. In 1377, he proceeded to Flanders in the retinue of Sir Thomas Percy, afterward Earl of Worcester, and, for several years thereafter, he was employed in the public service.

Chaucer is the "father of English poetry" in the sense that he gave prestige to the language's use in narrative poems such as had previously been confined to Latin and French. The earlier ones are translations, but he improved on the originals and gradually emerged as an independent poet, the greatest in the English language before Shakespeare. His poems include *The Flower and the Leaf, The Romaunt of the Rose, The Canterbury Tales, The Book of the Duchess, The House of Fame,* and *The Legend of Good Women.* He died at London and was buried in Westminster Abbey. See *Canterbury Tales, The.*

Chávez (*chä'vās*), **Carlos (1899-),** Mexican composer and conductor, was born at Mexico City. He began his musical studies in Mexico, and went to Berlin in 1921, but Germany disappointed him because it seemed to have nothing new to offer. The United States, on the other hand, proved musically stimulating and won his approbation. He returned to Mexico resolved to build up the musical life of his native land on the American model, but on a nationalistic foundation. He organized the Mexican Symphony Orchestra in 1928, and that same year became head of the Mexican National Conservatory of Music. He has been guest conductor of both the Boston Symphony Orchestra and the New York Philharmonic. Among his compositions are *Sinfonia India, Sinfonia Antigone,* and *H. P.* (Horse Power).

Chékov (*chĕ'kôf*), **Anton (1860-1904),** Russian novelist and dramatist, was born at Taganrog, southern Russia. He first worked as an assistant to his father, a former serf, who was a provision merchant. At 17, he wrote a tragedy in verse, and shortly after entered the University of Moscow to study medicine. At the same time, he began writing short stories, which soon became successful. His collections of *Humorous Stories* and *In Twilight,* published in 1887, and *Morose Folks* in 1890 attracted wide attention; his reputation increased so that he soon occupied, with "Gorky" and Andréiev, the foremost place among Russian writers of his day. Plotless, his stories emphasize what the author feels as the tragic inescapable isolation of the individual from understanding by others.

In 1887, Chékov was compelled by ill health to go south. He spent his remaining years in the Crimea, where he wrote five plays which have established him as a dramatist of the first rank. The list of his stories includes *Memoirs of a Stranger, Fires, Ward No. 6, A Tedious Story,* and *The Steppe.* Among his most important plays are *The Swan Song, A Proposal, Ivanoff, The Boor,* and *The Cherry Orchard.* See *Cherry Orchard, The.*

Cheops (*kē'ŏps*), or **Khufu,** was a king of Egypt of the fourth dynasty. He built the greatest of the pyramids, employing 100,000 men working in relays of three months. He reigned about 23 years, probably between 2900 and 2800 B. C.

Chesterfield, Philip Dormer Stanhope, Earl of (1694-1773), English politician, writer, and man of fashion, was educated at Cambridge. He represented Saint Germans, Cornwall, in the House of Commons, and in 1726 succeeded to the earldom. He was distinguished at the court of George II, and, in 1728, was sent as ambassador extraordinary to the Netherlands. In 1745, he was appointed lord lieutenant of Ireland, and afterward became secretary of state. He is now far more widely known by his letters of *Advice to His Son,* by virtue of which his name has become a synonym for worldly wisdom and courtliness.

Chesterton, Gilbert Keith (1874-1936), English journalist and author, was born at Campden Hill, Kensington. He was educated at Saint Paul's School and for a time studied art. He began his literary career by reviewing art books for the *Bookman.* Subsequently, he contributed to magazines and reviews in both England and America. By his attractive, piquant prose style and by the notable range and brilliancy of his fiction, essays, biography, and criticism, he soon firmly established himself in the front rank of English writers.

Among Chesterton's numerous works are *Twelve Types, Browning, Heretics, Dickens, The Man who was Thursday, Orthodoxy, Defendant, Magic, The Wisdom of Father Brown, Irish Impressions, The Superstition of Divorce, Evils of Eugenics,* and *What I Saw in America.*

Chevalier (*shē-vä-lyā'*), **Maurice (1888-),** French singer and actor, was born in Paris of working class parents. The death of his father compelled Maurice to earn his living while still a boy. He began singing in a suburban variety theater, and even performed on street corners in the city. After World War I, during which he was wounded and made a prisoner of war, he became the partner of Mistinguette, the revue star at the Folies Bergère. He soon became the most popular artist in the revues at the Casino de Paris. It was not until the introduction of sound films that he came to Hollywood. His broken English and his gay and suggestive songs have made him extremely popular with American and British stage and screen audiences. His autobiography, *The Man in the Straw Hat,* was published in 1950.

Chevreul (*shē-vrûl'*), **Michel Eugène (1786-1889),** French chemist, was born at Angers. He studied chemistry at the College de France in Paris. Later, he lectured at the Lycée Charlemagne, and held a technical post at the Gobelins. In 1826, he became a member of the Academy of Sciences, and, in 1830, was made professor at the museum of natural history. Among his discoveries were those of margarin, olein, and stearin. The results of his researches, especially his theory of saponification, led to the establishment of vast industries.

Chiang Kai-shek (*chē-äng'kī'shĕk'*), **(1886-),** Chinese political leader, was born in a village near Ningpo. He was orphaned in infancy. Through scholarships he was enabled to study at the national military academy in Paoting and the Tokyo Military Academy. The revolution of 1911 recalled him to China. Later he became a follower of Sun Yat Sen.

Chiang went to Russia in 1923 to study Soviet methods. Returning in 1924, he aided Sun Yat Sen in establishing, with Soviet help, a government at Hangkow based on a party dictatorship. Sun died in 1925. Chiang broke with his Soviet supporters in 1927 and set up a new government in Nanking, backed by Shanghai industrial interests. He opposed the Communist movement, and played a waiting, passive role against the aggressive tactics of Japan. Kidnapped in 1936 by a general restive under his policy, he returned to Nanking with his captor a captive. When Japan invaded China in 1937 he rallied his countrymen to resistance. He was obliged to remove the seat of government to Chungking. On the death of President Lin Sen, 1943, Chiang was chosen president. When Japan surrendered, Chiang returned the seat of government to Nanking. In May 1948 he became the first president under the new constitution but in 1949 he relinquished the office, which he resumed in 1950 on the island of Formosa (Taiwan), after the communists had gained control of China.

Madame Chiang Kai-shek, née Soong, was educated at Wellesley College and married General Chiang in 1927. She became conspicuous in educational and war relief work in China and in 1942 visited the United States to represent China's pressing need of assistance.

Childs, George William (1829-1894), American publisher and philanthropist, was born in Baltimore. He began mercantile life as a clerk in a bookstore in Philadelphia. In 1847, he established an independent business and in 1849, became partner in the publishing firm of Childs and Peterson. In 1864, he purchased the Philadelphia *Public Ledger,* which he developed into a journal of great influence. He devoted his wealth to beneficence, erecting a memorial window in Westminster Abbey to Cowper and George Herbert, a monument to Leigh Hunt at Kensal Green, and a fountain to Shakespeare at Stratford-on-Avon. He is said to have educated 800 boys and girls.

Chippendale, Thomas (c. 1718-1779), English cabinet maker, born at Otley in Yorkshire, England. In 1727 he began work in London, and in 1754 brought out his famous book of designs, *The Gentleman and Cabinet Maker's Director.* Working almost exclusively in dark mahogany, Chippendale produced furniture of outstanding design and craftsmanship in the style that bears his name. Although his style was frankly derivative, he made his adaptions so skillfully that the result was something new and original. His chief sources were the earlier eighteenth century Queen Anne and Georgian furniture, with borrowings from the French, Dutch, and Chinese. His influence in England and America has been great. (See *List of Illustrations—Furniture*).

Chirico (*kē'rē-kō*), **Giorgio di (1888-),** Greek-born Italian painter, studied in Germany, Italy, and France, and first exhibited at the Paris Salon in 1911. He has followed various styles of painting from surrealism to representational art, but is chiefly known for his earlier works of a nostalgic character, in which faceless figures appear against mysterious and enigmatical backgrounds. Horses have been a favorite subject with him. Chirico has also designed ballet settings and done some writing. His

pictures are to be found in the leading galleries of America and Europe.

Choate (*chōt*), **Joseph Hodges (1832-1917),** American lawyer and diplomat, was born in Salem, Mass. He was graduated from Harvard College, 1852, and from Harvard Law School, 1854. In 1855, he was admitted to the bar, and, in 1856, he began law practice in New York City. He was identified with many famous legal cases, and was one of the committee of seventy which, in 1871, broke up the Tweed Ring. From 1899 to 1905, he was the ambassador of the United States to England, and, in 1907, he sat as the first United States delegate to The Hague Peace Conference. He was noted as a public and after-dinner speaker. His writings include *Addresses on Abraham Lincoln, Admiral Farragut,* and *Rufus Choate.*

Choate, Rufus (1799-1859), American lawyer, statesman and orator, was born at Essex, Mass. After being graduated from Dartmouth College, he entered upon the study of law at Cambridge and in Washington. He practiced at Danvers, Salem, and Boston, successively, and, in 1841, was elected to the Senate, which he quitted in 1845. After the death of Daniel Webster, Choate became the recognized leader of the Massachusetts bar, and acquired a national reputation. His foresight led him to anticipate the Civil War, and to do more to conciliate the South than was by some considered wise. As an advocate and orator, he may be classed with the most distinguished masters of modern eloquence. He was elected to the American Hall of Fame in 1915.

Chopin (*shō'păn'*), **Frédéric François (1810-1849),** Polish pianist and composer, was born near Warsaw, of French-Polish parentage. He appeared in public with great success when only nine years old and was hailed as "the new Mozart." In 1830, he started upon a proposed world tour, proceeding through Germany to Paris where he was warmly encouraged by Cherubini and Liszt. Remaining in Paris, he met in 1836 the noted author, George Sand, with whom he lived for ten years.

Chopin composed almost exclusively for the piano. In the field of emotional music he has been justly styled "the poet of the piano." His walzes, mazurkas, nocturnes, preludes, and other compositions are peculiar in melody, rhythm, and harmony, and possess great and enduring charm. He was a pianist of the first rank, and his playing, like his music, had a peculiarly captivating grace. After a trip to England in 1847, he fell ill and died of consumption in Paris. See *Music: The Romanticists.*

Chou En-lai (*jō'ĕn'lī'*) **(1898-),** Chinese Communist leader, was born at Huaian, Kiangsu Province, China, of a Mandarin family. He was educated in Japan, China, and France. As a student at Nankai University in 1919, he led a student revolt against the treatment accorded China by the Versailles Treaty and was imprisoned. The following year he went to France, where he was active in organizing the Communist Youth party. Returning to China in 1924, he became associated in a political capacity with Whampoa Military Academy, then under the presidency of Chiang Kai-shek, and in 1927 took part as a nationalist in the uprising at Shanghai. He became a Red army leader, fighting the forces of Chiang Kai-shek and later those of the Japanese invaders. On the establishment of the People's Republic of China in 1949, he was elected premier and foreign minister, positions which he has since held.

Christian IV (1577-1648), king of Denmark and Norway, and Duke of Schleswig-Holstein, was born in Zealand, and was elected successor to the throne in 1588. He became king in 1593. Beginning in 1611, he carried on against Charles IX of Sweden and his successor, Gustavus Adolphus, a successful war, known as the Kalmarian War, which, in 1613, ended in an advantageous peace. As leader of the Protestants in the Thirty Years' War, Christian was not successful. His legislative and financial reforms, together with his love and patronage of the arts and sciences, gained the esteem of his people. He founded the present capital of Norway, long called Christiania after him.

Christian X, Carl Frederik Albert Alexander Wilhelm (1870-1947), king of Denmark, the son of Frederick VIII, was born at Charlottenlund. In 1898, he married Alexandrine, Duchess of Mecklenburg. Upon the death of his father in 1912, Christian X succeeded to the throne of Denmark. His country was occupied by Germany in 1940, but the king was permitted to retain his throne. He regained his authority with the German defeat.

Christie, Agatha (?-), English writer of detective stories, was born at Torquay, England. Since the publication of her first book *The Mysterious Affair at Styles,* in 1920, she has written more than fifty mystery stories, sometimes at the rate of two or three a year. The character of Hercule Poirot, a Belgian detective, who is featured in many of her novels, has proved highly popular. One of her best books, *The Murder of Roger Ackroyd* (1926), has been hailed as one of the outstanding detective stories of the present century. Other books by her include *Murder in the Calais Coach* (1934), *Death on the Nile* (1937), *And Then There Were None* (1940), *Sparkling Cyanide* (1945), and *Witness for the Prosecution* (1953). Some of her stories have been successfully dramatized for stage and screen. *Witness for the Prosecution* was a 1956 Broadway hit.

Christina (*krĭs-tē'-nă*) **(1626-1689),** queen of Sweden, was born at Stockholm. She succeeded her father, Gustavus Adolphus, in 1632. After her coronation in 1650, she fell under the influence of favorites, and ceased to interest herself in state affairs. She resigned the crown to her cousin, Charles Gustavus, in 1654, embraced Catholicism, and lived for some time at Paris. On the death of Charles Gustavus, in 1660, she vainly endeavored to regain the throne. Christina was one of the most accomplished women of her time, a remarkable linguist, and the friend and correspondent of many famous *literati* and scientists.

Christophe (*krēs'tôf'*), **Henri (1767-1820),** Haitian ruler, was born a slave. A man of great strength and commanding stature, he assisted in a revolt against the French governor of the island, on whose death in 1806 Christophe was elected first president of the republic of Haiti. In 1811, Christophe declared himself king, as Henri I, and proceeded to build up an army, created a currency, and developed a substantial foreign trade. Blending an uncanny grasp of statecraft with methods of fantastic cruelty, he created a political state by main force. A palace at San Souci and a great mountain citadel at La Ferrière are monuments to his power. Overtaken by partial paralysis and threatened by revolts, he took his life, shooting himself with a silver bullet.

Christy, Howard Chandler (1873-1952), illustrator and writer, was born in Morgan County, Ohio. He studied art in New York and at the National Academy and also at the Art Students' League under W. M. Chase. He became an illustrator on New York periodicals. During the Spanish-American War, he went to Cuba with the "Rough Riders," and won wide notice by his letters and illustrations. He is known by his illustrations of authors, executed with marked facility and spirit, and by his picturesque types of society women.

Chrysler, Walter Percy (1875-1940), American motor car manufacturer, was born at Wamego, Kans. He was apprenticed to a mechanic in a Union Pacific machine shop at 17. Rising rapidly, he was superintendent of motive power for the Chicago and Great Western system at 33. By 1912, he had become manager of the Pittsburgh works of the American Locomotive Company.

As early as 1905, Chrysler purchased an automobile to study its mechanical construction. In 1916 he became president of the Buick Motor Car Company, later a division of General Motors. Following a difference with W. C. Durant, president of General Motors, he reorganized the Willys-Overland Company. A similar service for the Maxwell Motor Corporation led to the formation of the Chrysler Corporation in 1923. This organization forged rapidly ahead to the front rank. In 1928, it acquired the Dodge Bros. properties and became the third largest unit of the American motor car industry.

Chrysostom (*krĭs'ŏs-tŭm; krĭs-ŏs'tŭm*), **Saint John (c. 347-407),** one of the Greek fathers of the Church. From an early age, he devoted himself to a life of prayer and asceticism, and, in 398, was made bishop of Istanbul by the emperor Arcadius. As an orator and theologian, Chrysostom ranks among the most important doctors of the early Church. His zeal as a reformer made him many enemies, among them the Empress Eudoxia. He was summoned before a synod at Chalcedon, deposed and banished, but an insurrection of the people led to his immediate recall. He was soon afterward deposed again, and conveyed to the Taurus Mountains, whence he was ordered to proceed to Pityus, on the Euxine, but died on the journey.

Church, Frederick Edwin (1826-1900), American landscape painter of the Hudson River School, was born at Hartford, Conn. He was a pupil of Thomas Cole and first attracted notice by his scenes from the Catskill Mountains. Later, he traveled in South America, and painted "Heart of the Andes," "Morning on the Cordilleras," and "Cayambe." His "View of Niagara Falls from the Canadian Shore" is one of his best works.

Churchill, John. See *Marlborough, Duke of.*

Churchill, Winston (1871-1947), American novelist, was born at Saint Louis, Mo. He was graduated from the United States Naval Academy, 1894. After serving as an editor of the *Army and Navy Journal* of New York, 1894, and as managing editor of the *Cosmopolitan Magazine,* 1895, he devoted himself to the production of historical fiction. By careful, substantial work, he won high rank as a historical novelist and as a portrayer of contemporary life. His works include *Richard Carvel, The Crisis, The Crossing, The Inside of the Cup, A Far Country, The Dwelling Place of Light,* and *The Uncharted Way.*

Churchill, Sir Winston Leonard Spencer (1874-), English statesman and writer, was born at Blenheim Palace, Oxfordshire. He was educated at Harrow and at Sandhurst, entered the army in 1895, and fought with distinction in India, 1897, and in the Sudan, 1898. During 1899-1900, he acted as South African correspondent of the London *Morning Post*.

Elected to Parliament in 1900, he rapidly rose to prominence. He was first lord of the admiralty when World War I broke out, serving later as minister of munitions and secretary of state for war. In 1921, he was made secretary of state for the colonies and, in 1924, became chancellor of the exchequer and was largely responsible for the restoration of British currency to a gold basis in 1925.

His opposition to Chamberlain's policy of "appeasement" in 1938 led to his severance from the cabinet, but when war with Germany broke out in 1939 he was made first lord of the admiralty. In the next year, popular dissatisfaction with Chamberlain's half-hearted conduct of the war led to Churchill's elevation to the prime ministry. The choice was dictated partly by the fact that for years he had warned the government of the impending danger and partly by the fact that, in various crises in the past, he had shown striking decisiveness in action. With great energy he extricated his countrymen from threatened disaster and inspired them with a spirit of ultimate resistance in the face of their direst peril. When Russia and later the United States became allies against the common enemy, he led in welding Allied efforts into effective unity. With the defeat of his party in the elections of July 1945, he left office to lead the opposition. In April 1946, in a speech at Fulton, Missouri, he urged a spiritual union of Britain and the United States against the danger developing behind the "Iron Curtain" from Stettin to Trieste. In May 1948, at an unofficial assembly at the Hague, he advocated the federation of western Europe. His party winning the general election of 1951, Churchill again became prime minister. He was knighted in 1953 by Queen Elizabeth, and in 1954 was installed as a Knight Companion of the Order of the Garter. In 1955 he resigned as prime minister and was succeeded by Sir Anthony Eden. In 1953 he was awarded the Nobel prize in literature. His numerous writings include *The River War*, *My African Journey*, *Liberalism and the Social Problem*, *The World Crises*, *Marlborough, his Life and Times*, *The Second World War*, and *A History of the English Speaking Peoples*.

Ciano (*chä'nō*), **Galeazzo, Count (1903-1944),** Italian statesman, was born at Leghorn. He joined with Mussolini in the "march on Rome" in 1922. Under the Fascist regime, he entered the diplomatic service. In 1930, he married Mussolini's daughter, Edda. From 1933, he was head of the press bureau. He served as minister of foreign affairs from 1936 to 1943. Having participated in the overthrow of Mussolini in 1943, he was executed by Mussolini's later German-supported government.

Cibber (*sĭb'ẽr*), **Colley (1671-1757),** actor, manager, dramatist, and poet, was born in London. He was educated at Grantham. In 1690, he joined the Theatre Royal, where he remained, except for short intervals, during his whole theatrical career of 43 years. In 1696, his first comedy, *Love's Last Shift*, was produced; it established his fame as both dramatist and actor. Cibber also prepared the acting version of Shakespeare's *Richard III* now commonly used. He was made poet laureate in 1730.

Cicero, Marcus Tullius (106 B. C.-43 B. C.), Roman orator and politician, was born in Arpinum, Italy. He inherited a large estate from his father and, as a boy, went to Rome, where he studied law, oratory, Greek philosophy, and Greek literature. At the age of 17, he served a few years in the Social war under Sulla. After his return, he devoted several years to the further study of law and of oratory. At 26, he attained his first brilliant success in the law courts; but poor health sent him to travel for the next few years in Greece and Asia Minor.

Political Career. At the age of 30, Cicero entered public life in Rome and soon became quæstor of Sicily, where he obtained the information that enabled him, in 70 B. C., to impeach Verres, the corrupt governor of Sicily. This success gave him a high reputation, and, in 66 B. C., he became prætor.

In 63 B. C., at the age of 44, Cicero was elected consul, in which capacity he checkmated the dangerous conspiracy of Catiline, delivering in the senate his famous *Orations against Catiline* and having some of the conspirators executed. The vigor and courage with which he conducted himself at this crisis won for him, by popular acclamation, the title of "father of his country."

Cicero's fortune had now reached the culminating point. His archenemy, the demagogue Clodius, assailed him with the charge of acting contrary to the constitution by putting citizens to death without appeal to the people. Thus in 58 B. C. he was obliged to go into exile in Thessalonica, and his country seats were torn down. Pompey and Cæsar had suffered Cicero to undergo this humiliation for their own purposes; but the following year, wearied by the arrogance of Clodius, they let it be understood that the persecution should cease, and Cicero was recalled from exile.

Cicero returned to Rome; but he felt powerless in the presence of the leaders of factions, and henceforth he vacillated in his allegiance between Pompey and Cæsar. In 53 B. C., he attained a seat in the College of Augurs, and two years later, he was sent as proconsul to Cilicia, a post in which he conducted himself so meritoriously that he was received in triumph on his return to Rome.

When civil war was imminent between Cæsar and Pompey, Cicero first endeavored to reconcile the two rivals. This hope proving vain, he gave his allegiance to Pompey after a period of vacillation. Following the defeat of Pompey, however, at the battle of Pharsalus, he recommended himself to Cæsar.

The next few years Cicero devoted to literature and philosophy. He was divorced from Terentia, his first wife, and married the heiress Publia. His beloved daughter Tullia died. Upon the assassination of Cæsar in 44 B. C., Cicero hoped to regain political influence, and he opposed Antony in orations called *Philippics* from their analogy to the orations of Demosthenes against Philip of Macedon. His eloquence won him Antony's implacable animosity.

Writings. Cicero's works may be classed as political, philosophical, and personal. The political works comprise 56 speeches delivered in the forum and courts, among which are *For the Manilian Law*, *Against Catiline*, *Against Verres*, *For Milo*, and the *Philippics*. Cicero also produced several treatises on the subject of oratory, of which *On the Orator* is the most important. From his philosophical treatises we derive most of our knowledge of the Greek systems of thought and culture as they were diffused in the Roman world. His *Familiar Letters*, half of which are addressed to his lifelong friend Atticus, possess consummate literary style.

Character. Cicero was not a great nor a wise politician, but, throughout his whole career, he was a true patriot. His chief fault was his vanity. He presents to us the Latin language at the highest stage of its development, and he will ever stand pre-eminent as an example of the best moral and intellectual culture of the ancient world. He was slain by order of Antony. The hired assassin was a man whom Cicero, as a lawyer, had successfully defended.

Cimon (*sī'mŏn*) **(?-449 B. C.),** Athenian general, was the son of Miltiades, the conqueror at Marathon. With his patron Aristides, he was placed over the Athenian contingent to the allied fleet, which, under Pausanias, continued the war against Persia, 447 B. C. His greatest exploit was his encounter with a Persian fleet at the river Eurymedon, 466, when he destroyed or captured some 200 out of 350 ships, and defeated the land forces on the same day. He advocated a close alliance with Sparta; and, when the Helots revolted, he twice led an army to support the Spartans. But the second time, having lost the confidence of his allies, he was ignominiously dismissed. At Athens he was opposed by the democracy, headed by Pericles, who procured his ostracism. He was recalled about 454, and was instrumental in obtaining a five years' armistice with Sparta.

Cincinnatus (*sĭn'sĭ-nā'tŭs*), **Lucius Quinctius (c. 519 B. C.-c. 430 B. C.),** Roman consul. About 460, he was chosen consul, and two years later was made dictator. When the messengers from Rome arrived to tell him of his new dignity, they found him plowing on his small farm. After a dictatorship of 16 days he returned to his simple country life. When 80 years old, he was again made dictator and put down a threatened insurrection. By the later Romans, Cincinnatus came to be regarded as the model of old-fashioned virtue.

Clairaut (*klĕ'rō'*) **Alexis Claude (1713-1765),** French mathematician, was born in Paris. He displayed remarkable precocity, read works on infinitesimal analysis and conic sections at the age of 10, presented a memoir on curves to the French Academy in his 13th year, published a work on curves of double curvature at 16, and was elected to the Academy at 18. In astronomy he solved the celebrated problem of three bodies in the case of the sun, the earth, and the moon. He demonstrated the figure of the earth, proving the flattening toward the poles; explained the motion of the moon; and computed the return of Halley's comet. In mathematics he contributed valuable studies in curves and differential equations.

Clark, Alvan Graham (1832-1897), American optician and astronomer, was born at Fall River, Mass. He was the son of Alvan Clark (1808-87), maker of astronomical instruments, and was associated with his father in the manufacture of telescopes. The chief refracting telescopes of the early 20th century were products of their establishment. The great lenses for refracting telescopes made by Alvan Graham Clark include those of the Naval Observatory at Washington (26 inches in diameter), of the Nicholas Central Observatory at Pulkovo, Russia (30

inches in diameter), of the Lick Observatory, Mount Hamilton, California (36 inches in diameter), and of the Yerkes Observatory of the University of Chicago (40 inches in diameter). He was an active astronomical observer and made numerous discoveries of double stars.

Clark, Champ (1850-1921), American politician, was born in Anderson County, Kentucky. He was educated in Kentucky University, Bethany College, and at the Cincinnati Law School. During 1873-74, he was president of Marshall College. He worked as a hired hand on a farm, was clerk in a country store, was editor of a country newspaper, and became prosecuting attorney of Pike County, Missouri. In 1893, he was elected to Congress and, except for the term 1895-97, was re-elected continuously until 1921. He was chairman of the Democratic National Convention at Saint Louis in 1904. At the Democratic National Convention in 1912, he was a prominent candidate for the presidential nomination but was defeated on the 46th ballot by Woodrow Wilson. From 1911 to 1919, he was speaker of the House of Representatives.

Clark, Francis Edward (1851-1927), American clergyman, was born of New England parentage at Aylmer, Quebec. A graduate of Dartmouth College and Andover Theological Seminary, from 1876 to 1883 he was pastor of Williston Congregational church, Portland, Me. In 1881, he organized the Williston Young People's Society of Christian Endeavor. Most of his time thereafter was devoted to Christian Endeavor work, as president of the United Society and of the World's Christian Endeavor Union and as editor of the *Golden Rule*. His writings include *Our Vacations* and *The Holy Land of Asia Minor*. See *Christian Endeavor*.

Clark, George Rogers (1752-1818), American military leader, was born near Charlottesville, Va. Engaged as a surveyor, he bought land in Kentucky and settled there. In 1778, when the pressure of British and Indians threatened to drive the Americans from Kentucky, he secured authority from the state of Virginia to lead a counter attack. With 175 men and little equipment, he captured Kaskaskia, Cahokia, and Vincennes, accomplishing his ends by speed of movement and brilliant strategy and securing for the colonists Kentucky and the Northwest.

Clark, Mark Wayne (1896-), American general, was born at Madison Barracks, N. Y. A graduate of West Point in 1917, he served in World War I and was promoted through grades to brigadier-general in 1940, In October 1942, he was sent into North Africa to gain information and make contacts for the Allied invasion. For his success in this mission he was promoted to lieutenant-general. In 1943, he commanded the fifth United States army in the invasion of the Italian peninsula. After commanding the Allied forces in Italy, he was placed in command of the American Occupational forces in Austria. In 1952 he was appointed U. N. commander in Korea. Since 1953 he has been president of The Citadel Military Academy of South Carolina, at Charleston.

Clark or **Clarke, William (1770-1838),** American explorer, was born in Virginia. In 1804-06, in company with Meriwether Lewis, he conducted the famous exploring expedition sent out by Jefferson from Saint Louis to the mouth of the Columbia River and kept the log of the journey. He was governor of Missouri territory, 1813-21, and superintendent of Indian affairs at Saint Louis from 1822 to 1838.

Clarke, Charles Cowden (1787-1877), English writer and critic, was born at Enfield, Middlesex. He early developed a passion for the theater, and made frequent visits to London, where he formed the friendship of Leigh Hunt, Shelley, Hazlitt, and Charles and Mary Lamb. In 1820, he became a bookseller in London, and shortly after partner as music publisher with Alfred Novello, whose sister Mary Victoria he married in 1828. A year later, Mrs. Cowden Clarke began her famous *Concordance to Shakespeare's Plays*. In 1834, Clarke entered on a twenty years' course of public lectures on Shakespeare and other dramatists and poets which brought him much celebrity and profit.

Some of Clarke's lectures were published, including his *Shakespeare Characters* and *Molière Characters*. The joint productions by Clarke and his wife were the *Shakespeare Key, Cassell's Illustrated Shakespeare, Recollections of Writers*, full of reminiscences of Keats, Lamb, Dickens, and other literary friends. In 1856, Clarke and his wife removed to Nice and, in 1861, to Genoa, where Charles died in 1877 and his widow in 1898.

Clarke, James Freeman (1810-1888), American theologian and writer, was born at Hanover, N. H. He was graduated at Harvard in 1829 and at Cambridge Divinity School in 1833. He was pastor of a Unitarian Church, Louisville, Ky.; professor of natural theology at Harvard, 1867-71; and lecturer on ethnic religions, 1876-77. In 1841, he aided in founding the Church of the Disciples, Boston, of which he was pastor from 1841 to 1850 and from 1854 to 1888. Among his writings are *The Ten Great Religions, Events and Epochs in Religious History, Self-Culture, Manual of Unitarian Belief, Essentials and Nonessentials in Religion*, and *Anti-Slavery Days*.

Clarke, John Hessin (1857-1945), American jurist, was born at Lisbon, Ohio. He was educated at Western Reserve University where he was graduated in 1877 and received his master's degree in 1880. He was admitted to the bar in 1878 and practiced law in his native town, 1878-80. He practiced law in Youngstown, Ohio, from 1880 to 1897 and in Cleveland from 1897 to 1914, when he was made United States district judge. From 1916 to 1922, he was Associate Justice of the United States Supreme Court, his opinions being of a pronounced liberal trend. He resigned to devote his time to the furtherance of world peace.

Claude (*klōd*) **Georges (1870-),** French inventor and engineer, was born at Paris. He devised an improved method for producing liquid air and for obtaining its constituent gases in a pure form; also a modification of the Haber process for making synthetic ammonia, in which the requisite hydrogen is obtained from the distillation of coal. Best known of his inventions is the neon electric lamp, in which the illumination proceeds from the gas within a neon-filled tube instead of from a filament.

Claude (*klōd*) **Lorraine,** or **Claude Gelée (1600-1682),** early French landscape painter, was born at Chamagne in Lorraine. Left an orphan at the age of 12, he found a home with an elder brother, who was a carver in wood at Freiburg, and there showed some signs of pictorial genius. He afterward studied at Rome and at Naples. In return for his teaching, in the house of Agostino Tassi at Rome, he ground his master's colors and performed household duties. He made a tour of Italy, France, and Germany, suffering much through poverty; but, in 1627, he returned finally to Rome where he speedily made himself famous by paintings remarkable for their warm, rich coloring and brilliant light effects. He painted Italian landscapes with unsurpassed perfection and notable poetic feeling. He was the foremost painter of classic landscape in his century and one of the world's greatest landscape artists. Most of his paintings are in England. He died at Rome.

Claudius (*klâ'dĭ-ŭs*), or **Tiberius Claudius Drusus Nero Germanicus (10 B. C.-54 A. D.),** Roman emperor, was born at Lugdunum. When Caligula was killed, 41 A. D., Claudius was made emperor by the soldiers. This was the first time that an emperor was chosen by the army.

The conquest of Britain was begun by Claudius. From his conquests in Germany he took the title of Germanicus. He built the harbor of Ostia and the Claudian aqueduct. He was poisoned by his wife Agrippina, who wanted the empire for her son Nero.

Clausius (*klou'zē-ŭs*), **Rudolf Julius Emanuel (1822-1888),** German physicist, was born at Koslin, Pomerania. He was educated at Berlin, and held professorships in physics at Zurich, Würzburg, and Bonn. In 1850, he stated the second law of thermodynamics, namely that "heat cannot of itself pass from a colder to a hotter body," and is regarded as one of the founders of thermodynamics. In his theory of electrolysis, now accepted, he assumed that the ions are not in complete union, but are in part free, and that the uncombined ions are brought by the action of the electric current to the anode and cathode. He was one of the most eminent mathematical physicists of his century and made many notable researches in electricity, heat, and molecular physics.

Clay, Henry (1777-1852), American statesman, was born in Hanover County, Va. He studied law and was admitted to the bar, 1797, thereafter taking up his residence in Lexington, Ky. In 1806, he was appointed senator and, in 1809, was again chosen to fill a vacancy. In 1811, he was sent to the House of Representatives, where he was immediately elected speaker. A strong advocate of nationalism, he denounced the claims put forth by England as to right of search. He was a strenuous supporter of the war with that country and in consequence was sent, in 1814, as one of the commissioners to sign the treaty of peace at Ghent. On his return he exerted all his talents in favor of the independence of South America, and labored hard to eradicate all European influence from America.

Clay, however, is best known as the author of the famous Missouri Compromise, and of the Compromise of 1850, known as Clay's "omnibus" measure. In 1824, he was an unsuccessful candidate for president, but was made secretary of state by J. Q. Adams, the successful candidate. In 1832, he ran against Jackson and was defeated. He was then returned to the United States Senate, in which he played a leading part for many years ensuing, especially in the tariff compromise of 1833 whereby a conflict with South Carolina was averted.

Clay was a candidate for president before the first Whig national convention in 1839, but Harrison was nominated and elected. Harrison's death and Tyler's course brought Clay forward as the choice of his party in 1844, when an

unsuccessful effort was made to elect him. Clay's name was once more presented to the Whig national convention of 1848, but Taylor was nominated over him and elected. In 1842, he resigned his seat in the Senate, but was persuaded to return to it after 1844, and bore a leading part in effecting the slavery compromise of 1850.

Though not successful as an aspirant to the presidency, he was a gallant party chief, an eloquent orator, a skillful legislator, wielding unsurpassed influence not only over his friends but even over his political antagonists. He was elected to the American Hall of Fame, 1900.

Clay, Lucius D. (1897-), United States army officer, was born in Marietta, Ga., and was graduated from the U. S. Military Academy in 1918. In the earlier stages of World War II, as a recognized authority on logistics, he served in various capacities to expedite the production and forwarding of materials to the overseas forces. Working under General Brehon Somervell, he mapped out many details of the army supply program. After the capture of Cherbourg, he was given charge of funneling supplies through that port. His assignment as commander of the U. S. forces in occupied Germany (1947-49) involved keeping order, feeding the population, and carrying out a program of de-Nazification, while maintaining correct relations with the Russians. General Clay's varied experiences and his conception of the problem are summarized in his book *Decision in Germany*. He retired in 1949.

Clayton, John Middleton (1796-1856), American statesman and diplomat, was born at Dagsboro, Del. He was graduated from Yale, 1815, and became a noted lawyer. He was United States senator, 1829-37, 1845-49, and 1851-56. During 1849-50, he was secretary of state under President Taylor and negotiated with the British government the historic Clayton-Bulwer Treaty.

Clemenceau (*klā'mān' sō'*), **Georges (1841-1929)**, French statesman, was born in Vendée. In 1865 he visited the United States as a journalist, returning to France in 1869 to practice medicine. He entered politics, supporting Gambetta, was a member of the Chamber of Deputies, 1876-93, as leader of the extreme left, and was elected senator in 1902. In 1880 he established a daily newspaper, *La Justice*, and became a political power, feared as the destroyer of ministries. He defended Dreyfus and published Zola's famous letter, *J'Accuse* (I Accuse). In 1906 he was chosen premier, resigning in 1909. During his ministry he firmly carried out the law separating Church and State.

Pledged from the days of the French defeat in 1870 to the ultimate restoration of Alsace-Lorraine, Clemenceau, during World War I, became one of the most vigorous patriotic leaders of France. At the critical period following the downfall of the Painlevé ministry, Clemenceau was again chosen premier (November 16, 1917) and, by unflagging energy, united the French nation for the supreme effort which, within a year, led to complete victory for the Allies. In 1919, Clemenceau was made leader of the French delegation to the Peace Conference at Versailles and was chosen to preside over its sessions. He undertook a tour of the United States in 1923. An autobiographical vindication of his life entitled *Grandeur and Misery of Victory* was completed just before his death.

Clemens, Samuel Langhorne (1835-1910), ("Mark Twain") American humorist and novelist, was born at Florida, Mo. He was educated in the common schools, Hannibal, Mo.; was apprenticed to a printer when about 12 years of age; and served for a time as a Mississippi pilot. He engaged in 1861 as private secretary to his brother when the latter was appointed territorial secretary of Nevada. In 1862, he became editor of the Virginia City (Nev.) *Enterprise*. Here he first displayed his powers as a writer of humor and sarcasm. He then alternated between mining and newspaper work until he began lecturing and writing books. In 1884, Clemens engaged in the publishing enterprise of C. L. Webster and Co., the failure of which some ten years later involved him in heavy losses. He paid much of the firm's indebtedness and restored his own fortune by proceeds of lectures and books. Few other novelists have so clearly pictured the irresponsible American boy as has Clemens in the escapades of Tom Sawyer and Huckleberry Finn. His rich humor lends a compelling charm to his books as it did to his lectures. His writings document a period of American history that has passed and introduce a healthy scepticism into the narrative of ages earlier than his. He lived abroad for many years and was greatly admired in England. He was one of the seven original members of the American Academy of Arts and Letters.

His works include *The Jumping Frog*, *The Innocents Abroad*, *The Gilded Age* (with C. D. Warner), *Roughing It*, *Adventures of Tom Sawyer*, *A Tramp Abroad*, *The Prince and the Pauper*, *Life on the Mississippi*, *Adventures of Huckleberry Finn*, *A Yankee at the Court of King Arthur*, *Pudd'nhead Wilson*, *Tom Sawyer Abroad*, *A Dog's Tale*, *Eve's Diary*, *A Horse's Tale*, *Christian Science*, and *Autobiography of Mark Twain*. He was elected to the American Hall of Fame in 1920. See *Literary Plots, Characters, and Allusions: Innocents Abroad; Prince and the Pauper, The; Pudd'nhead Wilson; Sellers, Colonel Mulberry; Tom Sawyer*.

Clement, Frank Good (1920-), American lawyer and politician, was born at Dickson, Tenn., and was educated at Cumberland and Vanderbilt universities. Admitted to the Tennessee bar in 1941, he practiced law at Nashville and Dickson. He saw service with the Federal Bureau of Investigation from 1941 to 1943, and also served at 1st lieutenant in the U.S. army during World War II. He was elected governor of Tennessee in 1953, and in 1956 was the keynote speaker at the Democratic National Convention at Chicago. Clement is a Methodist lay preacher.

Clement of Alexandria (c. 150 A. D.-c. 215), or Titus Flavius Clemens, Greek theologian of the early Church, was educated under many teachers, and finally studied in a Christian school at Alexandria, where he entered the Church. About 190, he succeeded Pantænus as the head of the catechetical school, which became renowned on account of his own and Origen's teachings.

Clement was thoroughly versed in Greek philosophy, literature, and history and ranked high as a theologian, although overshadowed by Origen, his celebrated pupil. In his view Greek philosophy was a divinely inspired preparation for Christianity. His chief works are *Exhortation to the Greeks*, *The Instructor*, and *The Stromata*. He wrote also a tract entitled *Who is the Rich Man that Shall be Saved*? During the persecution, about 203, he left Alexandria, visiting Palestine and Asia Minor, but the place and the date of his death are unknown.

Cleon (?-422 B. C.), Athenian politician and advocate of democracy, son of Cleænetus, was by occupation a leather dealer. He first became known by his opposition to Pericles, causing the latter's conviction for misuse of public funds. In 427 B. C., he urged severe penalties against the revolting populace of Mytilene. In 425, he induced the Athenians to impose harsh terms upon Sparta, and, in co-operation with Demosthenes, he ended the siege of Sphacteria in 20 days. Although denounced as a demagogue by Aristophanes and Thucydides, he was for some years the leading man in Athens, able in public administration, and a zealous advocate of war with Sparta. While in charge of a campaign to recover for the Athenians the city of Amphipolis, he was defeated and slain.

Cleopatra (*klē'ō-pā'trā*) **(c. 69 B. C.-30 B. C.)**, queen of Egypt, celebrated for her beauty, was the daughter of Ptolemy Auletes, by whose will she was left joint sovereign with her brother Ptolemy, 51 B. C. Expelled by the latter, she sought the assistance of Julius Cæsar, who restored her to the throne in conjunction with a younger brother. She afterward followed Cæsar to Rome, and, in 41 B. C., captivated Mark Antony, who rejected Octavia for her sake. A quarrel with Octavius ensued. The fleet of Antony and Cleopatra was defeated at the battle of Actium, and Cleopatra, followed by Antony, fled to Egypt, where they committed suicide.

Cleveland, (Stephen) Grover (1837-1908), 22d and 24th president of the United States, 1885-89 and 1893-97, was born in Caldwell, N. J. He received an academic education, and, in 1855, went to Buffalo, N. Y., where he became clerk in a law office. He was admitted to the bar in 1859, was assistant district attorney from 1863 to 1866, sheriff of Erie County from 1870 to 1873, and, in 1881, was elected mayor of Buffalo. His veto of extravagant appropriations directed outside attention to him and led to his nomination and election as governor of New York in 1883.

In 1884, Cleveland was elected president of the United States, Democrat, over James G. Blaine, Republican. In 1888, he was again the Democratic nominee, but was defeated by Benjamin Harrison. He then returned to law practice, locating in New York City. In 1892, he was again elected president as a Democrat, defeating President Harrison. In 1896, the Democratic party having declared for the free coinage of silver, Cleveland withheld his support from the ticket and the platform. After his second retirement from the White House, he took up his residence at Princeton, N. J., where he died. He was elected to the American Hall of Fame in 1935.

Clews, Henry (1836-1923), banker, was born in Staffordshire, Eng. He was intended for the ministry, but he left school at 15 to enter mercantile life in New York, where his father had taken him for a visit. At the outbreak of the Civil War, he was invited by the secretary of the treasury to become agent to sell government bonds. He rose to prominence in finance and, in 1877, organized the firm of Henry Clews and Company, its members pledging themselves to take no speculative risk. He wrote *Twenty-eight Years in Wall Street* and *The Wall Street Point of View*.

Clinton, De Witt (1769-1828), American statesman, was born at Little Britain, N. Y. He graduated at Columbia College, and, after studying law, entered the lower house of the New York legislature in 1797, where he soon became

the leader of his party in the state. He was chosen United States senator in 1802, but left the Senate to become mayor of New York City. On the question of war with England, he competed for the presidency with Madison in 1812, receiving 89 electoral votes. He was elected governor of New York four times. His greatest service to the state was in urging the construction of the Erie Canal and pushing the measure assiduously until he saw that great enterprise completed and the canal open for traffic. He died at Albany, N. Y.

Clinton, George (1739-1812), American general and statesman, was born in Little Britain, N. Y. In the French and Indian war he served as lieutenant at the capture of Fort Frontenac, 1758. After the war he practiced law. During the struggle for independence, he sat in the Colonial Congress, and was made a brigadier general. He was the first governor of New York, serving, 1777-95, and again, 1801-04. Objecting to some of the provisions of the Federal Constitution, he did all in his power to prevent New York from adopting it. In 1805, he was chosen vice president of the United States and served continuously until his death.

Clinton, Sir Henry (c. 1738-1795), English general. He served as a general in the American Revolutionary War, fought at Bunker Hill and so distinguished himself at the battle of Long Island that shortly afterward he succeeded Sir William Howe as commander in chief of the English forces. He assisted in the capture of Charleston. After his return to England he was appointed governor of Limerick and later of Gibralter, where he died.

Clive (*klīv*), **Kitty (1711-1785),** British actress, the daughter of William Raftor, a Jacobite lawyer from Kilkenny, was born in London. She appeared at Drury Lane about 1728, and continued to play chiefly at that theater until 1769, when she quitted the stage. In 1732, she married George Clive, a barrister, but they soon parted. She was a friend of Garrick, Handel, Horace Walpole, and Dr. Johnson, the last remarking to Boswell that "in the sprightliness of humor he never had seen her equal." She died at Strawberry Hill.

Clive of Plassey, Robert Clive, Baron (1725-1774), English statesman and soldier, founder of the British Indian Empire, was born at Styche, in Shropshire. He went to India in 1744 as a writer under the East India Company, but three years later relinquished the civil for the military service, in which he greatly distinguished himself. In 1753, he visited England and, in 1755, returned to India with rank of lieutenant colonel. Scarcely had he arrived when the nabob of Bengal captured Calcutta, and threw some English prisoners into the memorable "black hole of Calcutta." At Plassey, in 1757, Clive avenged this deed by defeating the nabob's large army with a small force of expertly led troops. He was then made governor of Bengal, but two years afterward returned once more to England, when he was created Baron. In 1765, he went again to Bengal, as president, but finally returned to England in 1767. His last years were embittered by the attacks of his enemies. In a fit of gloom he committed suicide in London. See *Black Hole of Calcutta.*

Clovis I (*klō'vĭs*) **(c. 466-511),** king of the Salian Franks. He is regarded as the founder of the French monarchy. He succeeded his father, Childeric I, in 481. By defeating Syagrius at Soissons in 486, he made himself master of all the Roman possessions in the center of Gaul. After a victory over the Germans at Tolbiac near Cologne in 496, he made a vow to embrace christianity at the instance of his wife Clotilda. With 3000 Franks, he was baptized by Saint Remigius, Archibishop of Reims. He conquered Alaric II, king of the Visigoths, in 507 and gained most of the south provinces.

Clyde, Colin Campbell, Baron (1792-1863), British general, was born in Glasgow. His father was a cabinetmaker named Colin Macliver. In 1808, he entered the army as an ensign, taking, to please an uncle, the name of Campbell. He greatly distinguished himself in wars in the Spanish peninsula, the United States, China, India, and the Crimea. He reached the summit of his fame in 1857, when, as commander of the forces in India, he brilliantly relieved Lucknow, thoroughly subdued the Sepoy mutiny, and saved the English empire in India. In 1858, he was created Baron. He was buried in Westminster Abbey. See *Sepoy Mutiny.*

Cobb, Henry Ives (1859-1931), American architect, was born at Brookline, Mass. He was educated at the Massachusetts Institute of Technology and Harvard University, being graduated from the latter in 1880. In 1881, he removed to Chicago. He was architect for the Newberry Library, the University of Chicago, the Church of the Atonement, and many other prominent buildings in Chicago and other cities. He was one of the board of architects for the World's Columbian Exposition, 1893, and, from 1893 to 1903, was special architect for the United States government. Throughout the country he acquired a large general practice, his commissions including the Pennsylvania State Capital, the United States government buildings at Chicago; League Island, and Annapolis; the City Hall and Courthouse Building, Chicago; and the American University at Washington.

Cobb, Irvin Shrewsbury (1876-1944), American writer and correspondent, was born at Paducah, Ky. He was educated in public and private schools, and at an early age became a reporter and a contributor to comic weeklies. At 19 he edited the Paducah *Daily News.* After seven years of experience on New York papers, he was engaged in 1911 as staff contributor to the *Saturday Evening Post.*

Cobb was the author and collaborator of several plays and musical comedy skits, among them *Funabashi, Mr. Busybody,* and *Guilty as Charged.* His published books include *Back Home, Cobb's Anatomy, The Escape of Mr. Trimm,* and *Exit Laughing,* an autobiography.

Cobden, Richard (1804-1865), English statesman and economist, was born at Heyshott, Sussex. He was the son of a poor farmer, went to an inferior school in Yorkshire, and began life as a clerk. At 21 he became a commercial traveler, and at 24 set himself up at Manchester in the calico-print business, in which he was notably successful. By systematic self-education and travel he prepared himself for a larger field. His pamphlet, *England, Ireland and America,* published in 1835, revealed a new force in the political world. He was active in forming the Anti-Corn-Law league in 1839, and was elected to Parliament in 1841.

Cobden devoted his energies and sacrificed his fortune to secure the repeal of the Corn laws, which was effected in 1846. His supporters came to his financial aid with a national testimonial of £75,000. He continued in Parliament until 1857, always advocating a peace policy, the reduction of armament, and international arbitration. To him more than to any other one person was due the establishment of the policy of free trade by England, which continued for nearly a century.

Cochran, Charles Blake (1872-1951), British producer and impresario, was born in Sussex. His indifferent success as an entertainer, or comedian, was followed by more rewarding activity as a theatrical business agent, beginning with an assignment as secretary to Richard Mansfield. His various enterprises, not all of which had to do with the drama, included the promotion of boxing and wrestling matches and the management of Eleanora Duse, Chaliapin, Houdini, and Elizabeth Bergner. Among the stage or film plays for which he is best remembered are *The Better 'Ole, As You Were,* and, with Noel Coward, *Cavalcade.* His book, *Secrets of a Showman,* recalls many of his experiences, including some of the ups and downs that lend constant excitement to a theatrical manager's occupation.

Cocteau (*kŏk'tō'*), **Jean (1881-),** French poet, novelist, dramatist, librettist, and motion picture director, was born at Maisons-Lafitte, France. He has long been known as an exponent of modernism in the arts and as a leader of advanced groups. His output includes ballets such as *Le Bœuf sur le toit* (1920) and *Les Maries de la tour Eiffel* (1921), and plays like *La Machine infernale* (*The Infernal Machine;* 1934). One of his best-known novels is *Les Enfants terribles* (*Enfants Terrible;* 1931). Throughout his career Cocteau's reception from the critics has been mixed, some of them considering him favorably, others quite the reverse. In 1955, he was made a member of the French Academy.

Cody, William Frederick (1846-1917), American frontiersman, scout, and showman, known as "Buffalo Bill," was born in Scott County, Iowa. In 1851, his parents removed to Kansas, where his father was killed five years later in the border warfare. He found himself the head of the family at the age of ten. In 1860, he became a rider of the pony express. At the outbreak of the Civil War he served as government scout and guide and, in 1863, enlisted in the cavalry. At the end of the war he contracted with the Kansas Pacific railroad to supply buffalo meat to its laborers, whence he was named "Buffalo Bill."

He served in the army as a scout from 1868 to 1872, when he became a member of the Nebraska legislature. In 1876, he served in the Sioux War and, at the battle of Indian Creek, killed Chief Yellow Hand in personal combat. In 1883, he organized a noted "Wild West" show, which he took to Europe in 1887. In 1901, he established a school of rough riders on his lands in Wyoming. He wrote several books on frontier life including *The Adventures of Buffalo Bill* and *True Tales of the Plains.* He was the last notable frontier scout in American history.

Coffin, Henry Sloane (1877-1954), American clergyman, was born in New York City. After being graduated from Yale University, he studied in Edinburgh, Scotland, and Marburg, Germany. He was ordained a Presbyterian minister in 1900 and preached in New York until 1926, first at Bedford Park Church and, after 1905, at Madison Avenue Church. In 1926 he was made president of Union

Theological Seminary, in which position his influence was exerted for the liberal wing of religious thought with emphasis on the social aspects of Christianity. He retired in 1945. His publications include *Christian Convictions, A More Christian Industrial Order,* and *God's Turn.*

Cohan (*kō-hăn'*), **George Michael (1878-1942),** American comedian and playwright, was born at Providence, R. I. He first appeared on the stage at 9 years of age in *Daniel Boone,* and, when 12 years old, appeared in *Peck's Bad Boy.* Later, with his family in an act called *The Four Cohans,* he became popular on the vaudeville stage. From 1899 to 1940 he wrote, produced, and acted in a large number of plays and musical comedies, all of which were very popular. His plays include *Forty-Five Minutes from Broadway* (1906) and *The Seven Keys to Baldpate* (1913). Among the many popular songs he has written are "Give My Regards to Broadway" (Remember me to Herald Square), "I'm a Yankee Doodle Dandy," "You're a Grand Old Flag," "Mary's a Grand Old Name," and "Over There." In 1941, he was awarded the Congressional Medal for his patriotic World War I song "Over There" and for "You're a Grand Old Flag."

Coke (*kōōk; kōk*), **Sir Edward (1552-1634),** English jurist and law writer, was born at Mileham, in Norfolk. He was educated at Norwich Grammar School and at Cambridge University. Admitted to the bar in 1578, he early acquired a high reputation. He became solicitor-general in 1592 and attorney general in 1594. In his prosecution of Essex, Raleigh, and others, he showed much harshness, but his loyalty gained him, in 1606, the chief justiceship of the common pleas. In this position and in that of chief justice of the king's bench, 1613, he opposed the claim of King James I to exercise prerogatives and was temporarily deposed in 1616. Entering Parliament in 1620, he there resisted the king's encroachments; was imprisoned in the Tower in 1622; and, in 1628, took the chief part in drawing up the petition of rights. The remainder of his life was spent in compiling his famous legal commentary, *Coke upon Littleton.*

Colbert (*kôl'bûr'*), **Jean Baptiste (1619-1683),** French statesman, was born at Reims, France. As minister of finance under Louis XIV, he devoted his efforts to financial and fiscal reforms, and to the encouragement of commerce and manufactures. To him the kingdom was indebted for the enlargement of its navy, for the acquisition of many of its foreign possessions, and for a large number of internal improvements. He reorganized the Royal Academy of Painting and Sculpture, and founded the Academy of Sciences and the Academy of Architecture. The gardens of the Tuileries, the Hôtel des Invalides, the façade of the Louvre, and several of the quays along the Seine were all the work of Colbert.

Cole, Rossetter Gleason (1866-), American musician and composer, was born at Clyde, Mich. He was graduated at the University of Michigan in 1888, and, after teaching languages in high schools, 1888-90, he studied composition and organ, 1890-92, in Berlin. He became musical director at Ripon College in 1892; was professor of music at Grinnell College, 1894-1901; acted as musical editor in Chicago, 1902-07; and was director of the School of Music, University of Wisconsin, 1907-09. From 1915 he taught at the Chicago Cosmopolitan School of Music. His published compositions include *The Passing of Summer* (a lyrical cantata), *Hiawatha's Wooing, King Robert of Sicily, a Fantaisie Symphonique* and a *Rhapsody* for the organ, and some 85 other compositions for chorus, piano, organ, and orchestra, including *Heroic Piece,* first performed in 1924 by the Chicago Symphony Orchestra.

Cole, Thomas (1801-1848), American landscape painter, was born at Bolton, England, and came to America in 1819. He studied in Philadelphia and New York; associated with Durand and Trumbull; traveled three years in Europe, but strongly preferred American scenery to that of the Old World. He was the founder of the Hudson River School of Painting, from which American landscape art has developed. Among his best-known allegorical works are "The Voyage of Life," "Course of Empire," and "Expulsion from Eden." His landscapes are mostly in private collections. Five of his paintings, however, are in the Metropolitan Museum, New York. Died at Catskill.

Cole, Timothy (1852-1931), American wood engraver, was born at London, England, and came to the United States, 1857. He studied in New York under Bond and Chandler, and, in 1875, entered the employment of the *Century Magazine,* then called *Scribner's.* In 1883, he went to Europe to engrave the old masters. He finished the Italian series in 1892, the Dutch and Flemish series in 1896, the English series in 1900, the Spanish series in 1907, and the French series in 1910. Later, he began to engrave a series of old masters in American public and private galleries.

Regarded as the foremost modern wood engraver, Cole was notably effective in his use of the white line, in his appreciation of light and shade, and in reproducing the personality and atmosphere of his subject. His writings include *Notes to Old Italian Masters, Monograph on the Lives of Dutch Masters,* and *Notes to English Masters.* In 1913, he was elected member of the American Academy of Arts and Letters.

Coleridge, Samuel Taylor (1772-1834), British poet, critic, and philosopher, was born in Devonshire. He was sent to Christ's Hospital School and subsequently studied at Cambridge, where he obtained the prize for the best Greek ode. He was the founder of modern Shakespearean study; introduced German literature and Kant's philosophy into England; and won enduring fame as a poet by a small volume of verse. His *Christabel, The Rime of the Ancient Mariner,* and *Kubla Khan* rank among the finest poems in English. Like De Quincey, he fell short of the highest attainments of his genius through long enslavement to opium. Among his other works are *Sibylline Leaves, Biographia Literaria, Remorse,* and *Aids to Reflection.* He died in London. See *Ancient Mariner, The.*

Coleridge-Taylor, Samuel (1875-1912), English composer, was born in London. He was of African descent through his father, a native of Sierra Leone. His mother was an English woman, and he received his education under English influence. He entered the Royal Academy at 15 and made a distinguished record, winning the composition scholarship in 1893. After studying three years with Villiers-Stanford, he turned his attention entirely to musical composition. His principal works are symphonies, ballads, and waltzes for the orchestra; the operetta, *Dream-Lovers;* choral pieces with orchestra, including *Hiawatha's Wedding, The Atonement, Endymion's Dream,* and *A Tale of Old Japan;* chamber music, piano pieces, and many songs. He died at London.

Colet (*kŏl'ĕt*), **John (c. 1467-1519),** English theologian and educator, was born probably in London. He was educated at Oxford, and traveled in Paris and Italy, where he made the acquaintance of Budæus and Erasmus. Upon his return to England, he lectured on the various books of the New Testament until 1505, when he was made dean of Saint Paul's in London. In 1509, he devoted a part of a large inheritance to the establishment of Saint Paul's School in London where William Lily was first head master. By his liberal opinion and his frankness in denouncing corruption in the Church, he was influential in paving the way for the Reformation.

Coligny (*kō'lēn'yē'*), **Gaspard de (1517-1572),** French admiral and general, was born at Châtillon sur Loing. Introduced at court, he served under Francis I in Italy. Under Henry II he was made an infantry colonel and, in 1552, admiral of France. On the death of Henry II, Coligny became a Protestant and a friend of the Prince of Condé. Coligny went to court and was apparently well received by Charles IX, but the enmity of the Guises was stirred up against him, and an attempt was made to assassinate him. This attempt at individual murder was but a preliminary step to the general massacre of the Huguenots, which took place soon afterward, and in which Coligny perished.

Collier (*kŏl'yĕr*), **Jeremy (1650-7126),** English clergyman and controversialist, was born in Cambridgeshire. He was educated at Caius College, Cambridge, afterward becoming rector of Ampton, near Bury Saint Edmunds, and lecturer at Gray's Inn. His reply to Burnet's defense of King William, 1688, cost him some months in Newgate prison. He next waged warfare on the crown with incisive pamphlets and, in 1692, was arrested on suspicion of being a partisan of the Stuarts. In 1698, he published his *Short View of the Immorality and Profaneness of the English Stage,* which led to 10 years of controversy with leading dramatists. Collier continued to preach and, 1713, was consecrated bishop. He died in London.

Collier, John (1884-), American administrator, was born at Atlanta, Ga., in 1884. Educated at Columbia University and College de France, he entered social service work in New York, interesting himself particularly in the welfare of immigrants. He went to California in 1919 and taught social science for a time at the State Teachers College, San Francisco. In 1923 he founded and became secretary of the American Indian Defense Association, the purpose of which was to promote legislation protecting Indians from being taken advantage of. Collier was commissioner of Indian affairs from 1933 to 1945. He sponsored legislation which authorized Indian tribes, if the members so voted, to return to a communal or corporate form of land ownership analogous to their ancestral system. One result of the system is to prevent alienation of Indian lands. In 1945 he became director of the National Indian Institute.

Collins, Michael (1890-1922), Irish patriot and military officer, was born at Woodfield, Clonakilty, Ireland. He was educated in the local schools, and, at 15, entered the civil service as a clerk. In the Easter rebellion of 1916, he was a member of the party that seized the general post office in Dublin. He was made prisoner and, after his

release some months later, became one of the most active workers for Irish freedom. In 1918, he was imprisoned for a time in Sligo jail for sedition. While still a refugee, he was elected to the Dail Eireann, and later became finance minister. He was an active advocate of the Sinn Fein cause and took a prominent part in the party councils. After the ratification of the treaty with Great Britain, Collins was made commander in chief of the forces of the Irish Free State. While repelling an attack by a party of irregulars, he was killed near Bandon.

Collins, William Wilkie (1824-1889), English novelist, was born in London. He was educated at a private school. Early in life he adopted the profession of the law, became a student at Lincoln's Inn, and was called to the bar. He soon inclined to literature and a meeting with Dickens, in 1851, decided his career. In the creation of baffling mystery, Collins had no superior in his time. His first novel was called *Antonina, or the Fall of Rome.* This was followed by *Basil, Hide and Seek, After Dark, The Dead Secret, The Fallen Leaves, Heart and Science, The Legacy of Cain, Blind Love,* and *The Moonstone.*

Colonna (*kô-lŏn'nä*), **Vittoria (1490-1547),** Italian poetess, daughter of Fabrizio Colonna, grand constable of Naples, was born at Marino. When four years old she was betrothed to a boy of the same age, Ferrante d'Avalos son of the Marchioness Pescara. At 17 they were married. After her husband's death in the battle of Pavia, 1525, she found her chief consolation in the cultivation of her poetical genius. She formed a Platonic friendship with Michelangelo, who addressed many of his sonnets to her. Cardinal Bembo, Lugi Alamanni, and Baldassare Castiglione were among her literary friends. Tender melancholy and spiritual exaltation characterize her poems. Died in Rome.

Colt, Samuel (1814-1862), American inventor, was born in Hartford, Conn., He early conceived the idea of revolving firearms, and, in 1835, took out a patent for the weapon since known as "Colt's revolver ." He established a company for the working out of his patent and built at Hartford one of the most extensive armories in the world.

Colum (*kŏl'ŭm*), **Padraic (1881-),** Irish-American poet and dramatist, was born at Longford, Ireland. As editor of the *Dublin Review,* he was a leader in the revival of Irish literature. He assisted in founding the Irish National Theater. In 1914, he removed to New York where he continued to write and lecture. His works comprise, besides plays and poems, books for children, collections of folk stories, and essays. They include *The Children of Odin, The Golden Fleece, The Fountain of Youth, Poems,* and *The Story of Lowry Maen.*

Columbus, Christopher (1451-1506), navigator and discoverer, was born in Italy, the son of a weaver. His birthplace is usually given as Genoa, but an important recently discovered document states that he was born at Milan. In 1474, he made a voyage to Chios, and, in 1476, to England. On the latter voyage, his ship was attacked by pirates and he was compelled to take refuge for a while in Lisbon. He settled there the following year, and, in 1479, he married the daughter of Perestrello, a distinguished Italian navigator in the Portuguese service. The charts and memoranda of his father-in-law were placed in the hands of Columbus, who was inspired by them to devote his life to geographical discovery.

Preparations for Great Voyage. Letters exist purporting to be a correspondence between Columbus and Toscanelli in 1481 on the feasibility of a western passage to Asia. In 1482, Columbus is believed to have made several voyages to the coast of Guinea, and he claimed to have measured the length of a degree at the equator. This claim implies that Columbus was familiar with the view of the Greek geographer Ptolemy that the earth was a sphere.

Columbus saw important authority and illimitable wealth as the reward of his proposed western passage to Asia; but all earthly gains were subordinated to the anticipated triumphs of the Cross among new and vast populations. He first vainly applied for financial aid to Genoa and then to John II of Portugal he proposed unsuccessfully his daring scheme of reaching India by the western ocean. In 1485, in the south of Spain, Columbus carried his project to the dukes of Medina Sidonia and Medina Celi. But his only direct gain was a recommendation to Queen Isabella of Castile, who, with her husband, Ferdinand of Aragon, was then occupied in campaigns against the Moors. They half-heartedly entertained the schemes of Columbus, 1487-90. At length, in the summer of 1490, he pressed with such earnestness for a distinct reply to his application that a conference was held, which reported unfavorably on his scheme of discovery.

Through Juan Perez de Marchena, a former confessor of the queen, Columbus ultimately succeeded in convincing Martin Alonzo Pinzon, the head of a family of navigators at Palos. More interviews with Isabella followed, and, at last, on April 17, 1492, she and Ferdinand signed the so-called capitulations, by which Columbus was authorized to search for and take possession of certain islands. Three vessels were made ready: the *Pinta* and *Niña,* commanded by the brothers Pinzon, and the *Santa Maria* under Columbus himself. They sailed August 3, 1492.

Discovery of America. After the ships had passed beyond the Canary Islands, lamentations and great fear broke out amid the crew. The admiral, however, courageously suppressed all mutiny. At last, they picked up riverweeds and a branch of thorn with red berries. Joy and hope ran high, for they knew land must be near. On Friday, October 12, 1492, they landed on an island of the Bahamas, where Columbus solemnly planted the Cross; called it San Salvador; and took possession of it in the name of Spain. To his dying day, Columbus believed that he had reached the confines of India, and, for this reason, the aborigines of the New World have ever since been called Indians.

Later Voyages. Henceforth the biography of Columbus is unimportant, when compared with the grand and primal fact of the discovery itself. Intrigue and mortifications saddened his triumph, and he was continually harassed by disputes and greed among the colonists who accompanied his later expeditions.

Having returned to Palos from his first voyage on March 15, 1493, he sailed again in September from Cadiz with 17 ships. He discovered Jamaica and the Caribbee Islands, but calumnies at home forced him to return in 1496. A third voyage, undertaken in 1498, led to his discovering Trinidad and touching for the first time the American continent near the mouth of Orinoco River. Intrigues of his enemies in Spain, however, especially of Fonseca, Bishop of Palencia, resulted in the arrest of Columbus in 1500, when he was brought back to Spain in chains. He was released, but found it impossible to secure the honors originally promised him by his royal patrons. Betrayed, impoverished, and broken in health, Columbus still planned a fourth expedition. Setting out in 1502, he discovered Cape Honduras and Puerto Bello. On November 7, 1504, he again reached Spain.

Weary arbitrations and disheartening months followed. Columbus died at Valladolid, May 20, 1506, and, to make amends somewhat for his injustice, Ferdinand gave him a pompous funeral. He was first buried at Valladolid; then, for a time, his body rested in a monastery near Seville. After some years the body was removed to Santa Domingo, Haiti; thence later to Havana, Cuba.

Columella, Lucius Junius Moderatus, Roman writer on agriculture, was born at Cadiz in Spain and flourished about the middle of the 1st century A. D. For some time he resided in Syria, but lived chiefly at Rome, and died, most probably, at Tarentum. His work, *De Re Rustica,* in twelve books, treats of arable and pasture land, culture of vines and olives, and the respective duties of masters and servants.

Comenius (*kô-mā'nê-ŏŏs; kô-mē'nĭ-ŭs*), or **Komensky, John Amos (1592-1670),** educational reformer, was born in Moravia. His parents belonged to the Moravian brethren. He studied at Herborn and later at Heidelberg. He became a minister of the Moravian sect at Fulnek, but lost all his property in 1621, when that town was taken by the invading Spaniards. Settling at Lissa in Poland, he worked out a new theory of education based on the view that words and objects must go together.

In 1641, Comenius was invited to England by Parliament to assist in reforming the system of public instruction; but, owing to the outbreak of the civil war, he went instead to Sweden, 1642. He returned to Lissa in 1648 and, in 1650, went to Sarospatak, Hungary. Here he composed his *Orbis Sensualium Pictus,* the first picture book successfully adapted to the teaching of children. By his early formulation and practical adaptation of educational principles, though but little known for two centurics, Comenius ranks as a leading figure in the history of education. He died at Amsterdam. See *History of Educational Reformers.*

Commager, Henry Steele (1902-), American historian and educator, was born at Pittsburgh, Pa., and was educated at the University of Chicago and at foreign universities. From 1931 to 1938 he was professor of history at New York University, and since 1939 has been professor of American history at Columbia University. In 1947-48 he was Pitt professor of American history at Cambridge University, England. He has written and edited numerous historical works, including *The American Mind* (1950), *America's Robert E. Lee* (1951), and *Europe and America Since 1492* (1954).

Comnena, Anna. See *Anna Comnena.*

Compton, Arthur Holly (1892-), American physicist, was born at Wooster, Ohio. After being graduated from Wooster College in 1913, he continued his studies at Princeton and Cambridge universities. He was professor of

physics at Washington University, 1920-23, and, from 1923 to 1945, at the University of Chicago. In 1945 he became chancellor of Washington University. His principal work is in the X-ray field. Among other things he showed that, when X-rays are scattered by a material object, the scattered rays have a longer wave length than the incident rays. This is the so-called Compton effect, for which he received one-half the Nobel prize for physics in 1927. He supervised the development of the first atomic chain reaction and the first quantity production of plutonium. He wrote *The Human Meaning of Science* (1940) and contributed to *Man's Destiny in Eternity* (1949).

Compton, Karl Taylor (1887-1954), American physicist, educator, and administrator, was born at Wooster, Ohio. Educated at Wooster College and Princeton University, he taught physics at Princeton University until 1930, becoming chairman of the physics department in 1929. From 1930 he served as president of the Massachusetts Institute of Technology. In 1940 he became chairman of the National Defense Research Committee, in which capacity he directed development of inventions for prosecution of the war against the Axis nations. His scientific work includes studies on the effect of crystals on X-ray photography.

Comstock (*kŭm'stŏk*), **Anna Botsford (1854-1930),** naturalist and wood engraver, was born at Otto, N. Y. She was graduated at Cornell University in 1878 and studied art at Cooper Union, New York. In 1878, she married John Henry Comstock, the entomologist. She exhibited wood engravings at the World's Columbian Exposition at Chicago in 1893, at the Paris Exposition of 1900, and at the Pan-American Exposition in Buffalo in 1901. She taught nature study at Cornell University from 1913 to 1922. Her writings include *Ways of the Six-Footed, The Pet Book,* and *Bird, Animal, Tree, and Plant Notebooks.*

Comte, (*kôNt*), **Auguste (1798-1857),** French philosopher, founder of the "positive philosophy," was born at Montpellier, France. He studied at Paris, and attracted the attention of his associates by the boldness and the novelty of his speculations, maintaining that political and social phenomena may be grouped under scientific laws. He was thus the founder of sociology. He published several philosophical works of which the most important was his *Cours de philosophie positive,* in which he aimed to found not only a new philosophy but also a new religion, the good of humanity taking the place of a supreme being.

Conant, James Bryant (1893-), American educator, was born in Dorchester, Mass. He was graduated from Harvard, 1913, and received his Ph.D. degree in 1916. In 1916-17, he was instructor in chemistry at Harvard. During World War I he served with the Bureau of Chemistry and Bureau of Mines at Washington, contributing valuable information on the production of war gas. He served successively as associate professor, assistant professor, professor, and Sheldon Emery professor of organic chemistry at Harvard, 1919–33. In 1933, he was elected president of Harvard. For his work regarding chlorophyll, the green coloring substance in plants, he was awarded medals by Columbia university and the American Chemical Society. In 1953 he was appointed U. S. high commissioner for Germany, and from 1955 to 1957 was ambassador to Germany.

Condé (*kôN'dā'*), **Louis I de Bourbon, Prince de (1530-1569),** younger brother of Antoine of Bourbon, king of Navarre. During the wars between Henry II and Spain, he distinguished himself at the siege of Metz, the battle of Saint-Quentin, and the capture of Calais from the English. On the accession of Francis II in 1559, Condé, like his brother, joined the Huguenots, took part in an unsuccessful conspiracy of Amboise against the Guises, and escaped execution only by the death of the king.

As a result of concessions made to the Huguenots by the regent, Catherine de' Medici, Condé became governor of Picardy. After the massacre of Huguenots at Vassy, 1562, Condé and Coligny took up arms against the Guise faction, but they were defeated at Dreux the same year and Condé was taken prisoner. In the second Huguenot war, 1567-69, Conde had coins struck with the inscription "Louis XIII, first Christian king of France," but at Jarnac he was defeated, taken prisoner, and shot.

Condillac (*kôN'dē'yak'*), **Etienne Bonnot de (1715-1780),** French philosopher, the founder of sensationalism, was born of a noble family at Grenoble. In youth he numbered among his friends Rousseau, Diderot, and Duclos. Many of his works were composed for his pupil the Duke of Parma, grandson of Louis XV. He was chosen a member of the French Academy of Sciences in 1768. He based all knowledge on the senses and denied the existence of innate ideas. Among his works were *Essai sur l'origine des connaissances humaines, Traité des systèmes, Traité des sensations, La logique,* and *Longue des calculs.*

Confucius (*kŏn-fū'shĭ-ŭs*) **(551 B. C.-478 B. C.)** is the Latinized name of the religionist and sage, Kung-fu-tse, whose influence has held uninterrupted sway over the Chinese people for almost 2500 years. He was born, according to tradition, in the village of Tsou, state of Lu, now in the province of Shantung, China. At the age of 19, Confucius had married and held an office as district inspector of agriculture. His honesty in tax collections was credited with contributing greatly toward the prosperity of his district.

Early Life. When he was 22, his mother died. Confucius then resigned his office and lived in retirement for three years, mourning his loss. This act of filial piety made a strong impression upon his fellow citizens, and it was later used as the historical prop in restoration of ancient funeral rites in honor of the dead. This conduct by Confucius affords a key to his influence, which rested upon idealization of the past in terms of social virtues calculated to preserve society. To spread his doctrines, he began, in his 30th year, to establish schools as he had opportunity and to educate disciples.

Labors. About 501 B. C., Confucius was appointed governor of the State of Lu. The next year, he became minister of works: the next, minister of crime. He applied in public office reforms based on his conceptions of civic virtues. As a result of antagonisms created by his reforms however, he was finally compelled to retire from office and to seek refuge in the province of Wei. He proffered his services as a reformer there and elsewhere, but met with refusal in each case. Finally, when he was in extreme poverty, he was recalled to Lu. He was well received, but did not re-enter political life.

In his last years, Confucius is said to have completed a collection of the ancient writings. His work consisted in gathering together the documents that make up the *Shu King, "Canon of History,"* and writing an introductory commentary on it. The direct teachings of Confucius are to be found principally in the *Analects,* compiled after his death by his immediate disciples.

Doctrines. It is often said that Confucianism is a system of morality without religion, because it is a system of political and social life built upon a very slight foundation of philosophy. Its distinctive feature, however, is its emphasis on ceremonies, most of which were of a distinctly religious character. In all that Confucius did or thought, the useful and practical, in a broad sense, formed the sole object of his labor and consideration. His precepts included the following typical admonition: First, let every man govern himself according to the sacred maxims; then his family according to the same; and, finally, let him render to the emperor, who is the father of his people, such filial obedience as he demands of his own children, and worship him with the same veneration that he pays to his own ancestors.

Schools arose throughout the empire where the maxims of his philosophy were taught, and his influence was perpetuated from generation to generation.

Congreve (*kŏng'grēv*), **William (1670-1729),** English dramatist, was born at Bardsey. He entered as a student at the Middle Temple, but abandoned the law for literature. His first piece was a romance entitled *Incognita, or Love and Duty Reconciled.* In 1693, he wrote his first comedy, *The Old Bachelor.* This established his reputation as a playwright. His comedies, which brought him much money and fame, are intricate in plot, but the characters play their parts brilliantly and the dialogue abounds in sparkling wit. His writings include *Love for Love, The Double Dealer, The Mourning Bride, The Way of the World,* and poems.

Conkling (*kŏngk'lĭng*), **Roscoe (1829-1888),** American politician, was born at Albany, N. Y. In 1846, he removed to Utica, N. Y., where he became district attorney, and was mayor in 1858. In the latter year he was elected to Congress and, in 1867, became a member of the United States Senate. He took a prominent part in the practical business of both houses, served on important committees, and was instrumental in the passing of many useful legislative measures. After the war he took an active part in the reconstruction of the Southern states, and advocated the resumption of specie payments. He opposed President Johnson's policy, and was a zealous champion of Grant's administration. In 1881, he resigned his seat in the Senate, owing to Garfield's assumption of the control over patronage in his native state. He sought re-election to vindicate his action but was defeated and retired to private life. See *Stalwarts.*

Connaught, Arthur William Patrick Albert, Duke of (1850-1942), third son of Queen Victoria. He was educated at Woolwich; entered the army, 1868; became captain, 1871, major, 1875, colonel and major general, 1880; accompanied the expedition to Egypt, 1882; became lieutenant general, 1889, and general, 1893. He commanded the Bombay army in India, 1886-90; the southern district of England, 1890-93; and that of Aldershot, 1893-98. In 1900, he succeeded Lord Roberts in command of the forces in Ireland, became inspector general in 1904,

and was commander in chief of Mediterranean, 1907-09. He was created Duke of Connaught and Strathearn and Earl of Sussex in 1874; married Princess Louise of Prussia, 1879. From 1911 to 1916, he was governor general of Canada.

Connelly, Marc (1890-), American playwright, whose full name is Marcus Cook Connelly, was born at McKeesport, Pa. He began as a newspaperman and a contributor to magazines, but soon turned to writing for the theater, collaborating with George S. Kaufman in such plays as *The Deep Tangled Wildwood* (1913), *Dulcy* (1921), *Merton of the Movies* (1922), *To the Ladies* (1923), and *Beggar on Horseback* (1924). He was co-author with Frank Ball Elser of *The Farmer Takes a Wife* (1934). Among the plays he has written single-handed are *The Wisdom Tooth* (1926) and *The Mole on Lincoln's Cheek* (1941). He is probably best known for his *Green Pastures* (1930), founded on Roark Bradford's *Old Man Adam an' His Chillun.*

"Connor, Ralph." See *Gordon, Charles William.*

Conrad, Joseph (1857-1924), English novelist, was born in Poland. He is known by his first two names—his family name was Korzeniowski. His father was a Polish revolutionist, and, upon his death, Conrad, then 13 years of age, made his way to Marseilles, entered the French merchant marine and advanced to the rank of captain. Somewhat later, he became mate on an English ship. Although he did not learn English until comparatively advanced in life, he acquired a stirring descriptive style which has won him increasing reputation as a master of English.

Conrad's novels vividly depict seafaring life in the Orient and faithfully reflect the effects of Eastern influences on Western character. Among his writings are *The Children of the Sea, An Outcast of the Islands, Tales of Unrest, Typhoon, The Mirror of the Sea, Nostromo, Chance, The Secret Agent, Under Western Eyes, The Shadow Line, Rescue, The Arrow of Gold,* and *The Rover.* See *English Literature.*

Constable (*kŭn'stă-b'l*), **John (1776-1837)**, landscape painter, was born in East Bergholt, Suffolk, England. He studied at the Royal Academy, began with portraits and historical subjects, but finally specialized in landscape. By reason of his truthful portrayal of nature, he became the father of modern landscape art, profoundly influencing all subsequent painting in England. The National Gallery, London, has his best pictures— "The Cornfield," "The Valley Farm," and "The Hay Wain." Other good examples of his art include "Hamstead Heath," in the Louvre; and "The Bridge on the Stour" and "The White Horse," in the Metropolitan Museum, New York.

Constantine I (*kŏn'stăn-tīn*) **(c. 274 A. D.-337 A. D.)**, called the Great, was born in Naissus, now Nish, Yugoslavia, the son of Constantius Chlorus by Helena. On the death of his father at York, in Britain, 306, where he had accompanied him, Constantine was proclaimed emperor by the troops. This title being challenged by Maximian, his father-in-law, and by Maxentius, his brother-in-law, he took up arms against first the one and then the other and defeated them. During these campaigns Constantine is said to have seen a cross in the sky with the words, in Greek, "By this sign, conquer."

Under this sign, known as the labarum, which he adopted as his standard, Constantine marched to Rome, where he was acknowledged emperor by the senate in 312, and, in 313, the edict of Milan was issued granting toleration to the Christians. He then proceeded to extend his dominion over the East and transferred the seat of his empire to Byzantium, which was thereafter called Constantinople, i. e., Constantine's city. Constantine was baptized in 337 as a Christian, having three years before proclaimed Christianity the state religion.

Constantine I (1868-1923), king of Greece, was born in Athens. He was the eldest son of King George I and Olga, niece of Czar Nicholas I. He was educated at the universities of Berlin and Leipzig, and, in 1889, married Princess Sophia, sister of Emperor William II of Germany. He was commander in chief of the Greek forces in the unsuccessful war with Turkey, 1897, and was compelled by the criticism of the military league to leave Greece in 1909. In the Balkan war, 1912-13, he led the Greek armies in Macedonia against the Turks with such success that he was acclaimed a national hero. Upon the assassination of his father in 1913, he became king.

In 1917, in response to the demands of France, Great Britain, and Russia, Constantine abdicated in favor of his second son, Alexander. On the death of Alexander and the defeat of the Venizelos party at the polls in 1920, Constantine returned to Athens as king in defiance of the Allied powers. In 1921, he took command of the Greek army in a disastrous war against the Turks in Asia Minor. In 1922, he abdicated in favor of his son George.

Constantine XIII, Palæologus (1394-1453), the last Byzantine emperor. His father and his brother had been emperors before him, and he did not come to the throne until he was 54 years old, 1448. At that time the Turks had conquered almost all of the Byzantine Empire, and but little was left besides Istanbul and a few other cities The Turkish sultan, Mohammed II, determined to take Istanbul also and laid siege to it with a great army. Constantine, who had fewer than 10,000 soldiers, resisted bravely for a time, but finally, May 29, 1453, the Turks battered down part of the walls and rushed in. The emperor and his little band of defenders were all slain.

Conwell, Russell Herman (1843-1925), American educator and clergyman, was born at Worthington, Mass. He was educated at Wilbraham Academy and Albany Law School; served in the Union army, 1862-65; and practiced law in Minneapolis, 1865-67. In 1867, he went abroad and served as foreign correspondent for several American newspapers. On his return, he practiced law in Boston for some years, and, in 1879, was ordained to the Baptist ministry. In 1888, he founded Temple University, Philadelphia, and became its first president. He was widely known as a lyceum lecturer, his earnings amounting to about $11,000,000, nearly all of which he devoted to the education of deserving young people. His publications include *Woman and the Law, Acres of Diamonds, Lives of the Presidents,* and *The Romantic Rise of the Temple University.*

Cook, Frederick Albert (1865-1940), American physician and explorer, was born at Hortonville, near Callicoon, N. Y. He received his medical degree from the University of the City of New York in 1890. Fascinated by books of exploration at a time when the arctic was the chosen field of many men of science and adventure, Cook served as surgeon and anthropologist of Robert E. Peary's first North Greenland expedition in 1891-92. In 1893 and 1894 he was the leader of two expeditions to Greenland in quest of scientific data. From 1897 to 1899 he was with the Belgian antarctic expedition. In 1901 he served on the Peary relief ship *Erik.* Between explorations, Dr. Cook practiced medicine in Brooklyn, N. Y.

He was leader of two exploring expeditions to Mount McKinley, Alaska, in 1903 and 1906, and in September 1906 announced his conquest of the peak. In the summer of the following year he sailed for the arctic with the North Pole as his geographical objective. For the sled journey he chose a game route that enabled him to make the dash across the Arctic Sea with the minimum of men, equipment, food, and dogs. On his return in 1909, he announced that he had reached the pole with two Eskimos on April 21, 1908. Five days later, Peary announced his attainment of the pole on April 6, 1909. A bitter controversy followed between the two explorers and their supporters as to which man had been first, and, though Peary is generally recognized as the discoverer, many persons believe that Dr. Cook was the first to reach the North Pole.

Cook, Captain James (1728-1779), English navigator, was born in Marton, Yorkshire. He made three principal voyages, in the course of which he made many important discoveries, particularly in Australia, New Zealand, and the antarctic region. These were described in his *Three Voyages Round the World.* In 1778, he discovered the Sandwich (Hawaiian) Islands, and explored the west coast of North America to Bering Strait. He returned to Hawaii, where he met his death at the hands of hostile natives early in 1779. Many honors were paid to his memory, including the erection of an obelisk on Kealakekua Bay at the place where he was slain.

Cooke, Sir William Fothergill (1806-1879), British electrician, was born at Ealing, England; was educated at Durham and Edinburgh; served in the Indian army from 1826 to 1831; and, after studying medicine at Paris and Heidelberg, took up telegraphy. In 1837, he entered into a partnership with Professor Wheatstone, which resulted in notable advances in electrical engineering and telegraphy. In 1838, he built the first English telegraph line. In 1845, Wheatstone and Cooke patented the single needle apparatus. In 1846, Cooke formed a company, which paid £120,000 for the partners' earlier patents. In 1867, Cooke and Wheatstone received the Albert gold medal. Cooke was knighted in 1869.

Coolidge, Calvin (1872-1933), 30th president of the United States, was born at Plymouth, Vt., of early New England ancestry. He was graduated from Amherst College, 1895, and was admitted to the bar, 1897. He was elected to the Massachusetts House of Representatives, 1907-08, was mayor of Northampton, 1910-11, member of the state senate, 1912-15, and lieutenant governor, 1916-18. Elected governor of Massachusetts in 1919, he attracted nation-wide notice by his firm stand for law and order during the Boston police strike and was overwhelmingly re-elected for 1920. He was elected vice president on the Republican ticket in 1920 along with Warren G. Harding as president. On the death of President Harding, August 2, 1923, Coolidge became president. He was re-elected in 1924.

His administration was one of marked governmental economy, which, together with general prosperity, permitted a drastic reduction of income taxes. A soldier bonus act was passed over his veto; immigration was severely restricted; Allied debts to the United States were funded; and the Senate, at presidential request, voted, with reservations, for adherence to the World Court. The Paris Pact, or multilateral treaty renouncing war as an instrument of national policy, was negotiated and ratified during his administration. He had a reputation for taciturnity and sparing use of words. On the expiration of his term in 1929, he retired to private life.

Coolidge, Charles Allerton (1858-1936), American architect, was born in Boston. After being graduated from Harvard University in 1881, he studied architecture at the Massachusetts Institute of Technology. Among the many noted structures and groups of buildings designed by him are Leland Stanford University; the South Station and the new Harvard Medical School, Boston; the Public Library and Art Museum, Chicago; the Law School and Commons, University of Chicago; and the new buildings for the Rockefeller Institute, New York.

Coolidge, William David (1873-), American physical chemist, was born at Hudson, Mass. After being graduated from the Massachusetts Institute of Technology and the University of Leipzig, he taught in the former institution from 1901 to 1905. He then joined the research staff of the General Electric Company at Schenectady, N. Y., and became director in 1932.

Among the valuable products of his research were the invention and application of ductile tungsten for electric lamps and the development of powerful X-ray tubes which emit rays, known as Coolidge rays, having physiological effects unexampled in the case of any rays previously known.

Cooper, Anthony Ashley. See *Shaftesbury, Earl of.*

Cooper, Sir Astley Paston (1768-1841), English surgeon, was born in Norfolk; studied under Henry Cline, surgeon to Saint Thomas's Hospital, London, and was appointed demonstrator of anatomy there, 1789. In 1793, he was appointed professor of anatomy at Sturgeon's Hall and, in 1800, surgeon to Guy's Hospital. In 1813, he received the professorship of comparative anatomy in the College of Surgeons. He was the earliest to attempt the tying of the carotid artery, a bold experiment at the time. A colossal statue to his memory stands in Saint Paul's Cathedral, London.

Cooper, Hugh Lincoln (1865-1937), American hydraulic engineer, was born at Sheldon, Houston County, Minn. On leaving high school in 1883, he went to work for a bridge construction company and rose to be chief engineer. In 1891, he devoted his efforts to problems of dam construction for the development of electric power. Among the most famous of the dams constructed by him are the Keokuk Dam in Iowa, the Wilson Dam at Muscle Shoals, and the Dnieprostroy Dam in Russia.

Cooper, James Fenimore (1789-1851), American novelist, was born in Burlington, N. J. When very young, he was taken to Cooperstown, Otsego County, N. Y., where he lived in the frontier wilds until he went to sea. In 1811, after six years' experience in naval life, he settled in Westchester County, N. Y., his wife's home, where he began to write.

In 1820 appeared his first work, *Precaution,* which was followed in 1821 by *The Spy,* a tale which at once secured for him a place in the first rank of novelists; then appeared his almost unequaled sea stories,—*The Red Rover, Pilot,* and *Waterwitch,*—and his famous "Leatherstocking series" of Indian life and adventure, including the *Pioneers, Last of the Mohicans, Pathfinder, Deerslayer,* and *Prairie.*

Cooper was regarded in America as an aristocrat and a snob, but in Europe, where he spent seven years, he was criticized for his blatant republicanism. His works exhibit a rare power of narrative and entitle him to rank as one of the greatest literary geniuses of America. He was practically the first writer to extend the domain of fiction over the sea, the primeval forest, and the prairie. He was elected to the American Hall of Fame in 1900. See *Leatherstocking Tales.*

Cooper, Peter (1791-1883), American inventor, manufacturer, and philanthropist, was born in New York City. His early life was laborious. His first invention was an improvement in a machine for shearing cloth. In 1828, he erected ironworks in Baltimore, and here constructed after his own designs the first locomotive engine ever made in this country. He took a great interest in the first telegraph, in state canals, and many mercantile enterprises, from which he amassed considerable wealth.

One of the most noteworthy of his achievements was the founding of an institution for the instruction of working people—the Cooper Union, New York, whose cornerstone he laid in 1854. It was made a center for free instruction in art, science, mathematics, and engineering, offering also popular lectures on general topics and a widely used library service. In 1876, the Independent party nominated him for president of the United States, and he received nearly 100,000 votes. He was elected to the American Hall of Fame, 1910. See *Greenback Party.*

Cope, Edward Drinker (1840-1897), American zoologist and paleontologist, was born at Philadelphia. He was educated privately, studied at the University of Pennsylvania and at the Smithsonian Institution, and devoted a year to research in the great museums of Europe. From 1864 to 1867, he was professor of natural sciences at Harvard College. He made immense collections of fossils, especially of extinct vertebrates, and did important work in herpetology and ichthyology, establishing the basis of the modern classification of North American reptiles, amphibians, and fishes. In 1891, he became professor of geology and paleontology at the University of Pennsylvania. In the field of theoretical science, he was the leader of the American Neo-Lamarckian evolutionists. His more important publications include *Origin of Genera, Origin of the Fittest,* and *Primary Factors of Organic Evolution.* He was editor of the *American Naturalist* from 1878 until his death.

Copernicus (*kō-pûr'nĭ-kŭs*), or **Koppernigk, Nicolas (1473-1543),** mathematician and the founder of modern astronomy, was born at Thorn, Poland. He was instructed in the Latin and Greek languages at home. In 1491, he entered the University of Krakow, where later he received the diploma of doctor in arts and medicine. His early taste for mathematical studies, especially astronomy, was furthered by an acquaintance with the works of the astronomer John Müller, known as Regiomontanus.

The years 1496 to 1500 Copernicus spent in Bologna as pupil, assistant, and companion of the professor of astronomy, Domenico Maria Novarra.

Career. In 1500, Copernicus was appointed to a professorship of mathematics in Rome. The following year, he continued his studies at Padua, and, in 1503, he was made doctor of canon law by the university at Ferrara. Returning to Poland in 1505, Copernicus entered into holy orders and was enrolled by his uncle, the bishop of Ermeland, as a canon of his chapter. This chapter became the center of violent political struggles, and, in the ensuing years, Copernicus frequently interrupted his speculative inquiries to serve actively the interests of the bishopric.

At least as early as 1507, Copernicus began to meditate on the ideas which led him to the theory of the solar system propounded in his book, *De Revolutionibus Orbium Coelestium,* "*The Revolutions of the Celestial Spheres.*" This work seems to have been practically completed about 1530, but various political and religious considerations delayed its publication until 1543. Upon it rests the fame of Copernicus, though he wrote also a noteworthy treatise on trigonometry and several other minor works.

Copernican System of Astronomy. Before Copernicus, it was generally believed, in accordance with the Ptolemaic theory, that the earth occupies the center of the universe; that the changes of day and night are produced by a rapid revolution of the heavens; that the sequence of seasons and the apparent motions of the planetary bodies are caused by the revolution of the sun and planets in orbits of various complexity, subject to the common daily motion of all from east to west. The Copernican system represents the sun to be at rest in the center of the solar system, and the earth and planets to move around it in elliptical orbits.

The most brilliant and valuable part of *The Revolutions of the Celestial Spheres* is that in which are explained the variations of the seasons, the precession of the equinoxes, and the stations and retrogradations of the planets. As a whole, the explanations given by Copernicus are right as to the general nature of the causes of the phenomena. But Copernicus had neither mathematical nor mechanical knowledge sufficient to enable him to explain more than the mean motions of the solar system. To account for irregularities, he introduced a system of epicycles, not yet having discarded the false notion, current in his time, that all motions must be compounded of circular ones. Yet, despite such inadequacies, Copernicus laid the foundation upon which Kepler, Galileo, Newton, and other men of genius could build the structure of modern astronomical science.

Copley (*kŏp'lĭ*), **John Singleton (1737-1815),** American portrait and historical painter, was born at Boston, Mass. In painting, he was practically self-taught. At the age of 17, he ranked as a prominent artist and soon became the recognized portrait painter of Boston. At Benjamin West's invitation, he went in 1774 to London, where he painted the king and the queen and other notable personages. After studying in Italy, he became celebrated in England for his popular historical paintings "The Death of Lord Chatham," "The Death of Major Pierson," and the "Siege of

Gibraltar." His portraits typically represent the New England society of his time, and he ranks as one of the chief painters of the period. Among his noted portraits are those of Paul Revere, John Hancock, Samuel Adams, and John Quincy Adams. He died at London.

Corbett, Harvey Wiley (1873-1954), American architect, was born in San Francisco. After being graduated from the University of California, he studied architecture in Paris at the Ecole des Beaux Arts and began practice in the office of Cass Gilbert in New York. Firms in which he was a partner designed, among many other buildings, the Bush Terminal building in New York, Bush House in London, the Masonic National Memorial at Alexandria, Va., and, with two other firms, Rockefeller Center, New York. Corbett was one of the first to work out an aesthetically satisfactory treatment of the skyscraper. A grasp of the relation of architecture to social purposes characterizes his work, the forward-looking nature of which led to his selection, in 1933, as chairman of the architectural commission of the Century of Progress Exposition in Chicago.

Corbin, Margaret (1751-1800), American heroine, was born in Franklin Co., Pa. She married John Corbin in 1772 and accompanied him when he enlisted to fight in the Revolutionary War. In an attack on Fort Washington, N. Y., her husband was killed while firing a cannon. She took his place and fired the cannon until wounded. She was the first woman to receive a pension from the government. Her remains were removed in 1916 from Highland Falls, N. Y., to West Point, where a monument was erected to her memory.

Corday d'Armont (*kôr'dĕ' dàr'môN'*), **Marie Anne Charlotte (1768-1793),** generally known as Charlotte Corday, French heroine, was born of a noble family at Saint Saturnin, Normandy. She sympathized with the ideas of the French Revolution, but was horrified at its excesses. She visited Paris in July 1793 with the purpose, it is said, of assassinating Marat or Robespierre. Obtaining an interview with the former while in his bath, she stabbed him with a knife. She was immediately apprehended and was executed four days afterward. Her beauty added to the interest which her sanguinary heroism inspired.

Corelli (*kô-rĕl'i*), **Marie (1864-1924),** English novelist, was born of Italian and Scotch parentage. She was adopted in infancy by Charles Mackay, the song writer and *littérateur*, and spent her childhood in England. She was afterward sent to France and educated in a convent, where she received, with other instruction, excellent musical training. Her first book, *A Romance of Two Worlds*, was an instant success, and from that time she devoted herself entirely to literature. She never, however, abandoned her love of music. Her fiction, which is romantic, melodramatic, and sensational, nevertheless displays a genuine gift of story-telling and is widely popular. Her books include *Thelma, Soul of Lilith, The Sorrows of Satan, The Murder of Delicia, A Study in Supremacy, God's Good Man, The Devil's Motor,* and *The Secret Power.*

Corliss, George Henry (1817-1888), American inventor and manufacturer, was born at Easton, N. Y. He received an academic education and, in 1844, removed to Providence, R. I. There, after patenting several devices which he had invented for the improvement of steam engines, he organized a company in 1856 and established engine works. His inventions for securing uniformity of motion revolutionized the construction of stationary steam engines. A single colossal engine built by him furnished the power which moved all of the machinery in the Centennial Exposition at Philadelphia in 1876. This famous "Corliss engine" was later transferred to Pullman, Ill., where it furnished motive power for the Pullman Car Company's works. Corliss died at Providence.

Corneille (*kôr'nā'y'*), **Pierre (1606-1684),** French dramatist and creator of French tragedy, was born at Rouen. He studied for the legal profession. A love affair, in which he became the rival of a friend, first prompted him to write verses, and *Mélite*, the comedy founded on this incident, was performed with success in 1629. It was quickly followed by other dramatic pieces. In 1635 appeared his *Médée*, a declamatory drama written in imitation of Seneca.

Cardinal Richelieu for a time numbered Corneille among poets whom he hired to write plays from dictated plots, but Corneille soon lost his favor by altering a plot. He then returned to his native place, where M. Chalon, once secretary to Marie de' Medici, suggested that he should turn his attention to tragedy. The result was *The Cid*, 1636, which was received with enthusiastic applause. In 1639, he composed *Horace* and *Cinna*, which were followed by *Polyeucte*, a tragedy of Christian martyrdom. Soon afterward appeared *La Mort de Pompée* and *Le Menteur*, the latter a comedy, the only one he wrote worthy of his great genius. Corneille closely followed the three unities—time, place, and action—declared by Aristotle to be requisites of effective tragedies. See *Cid, The.*

Cornelia, Roman matron of the 2d century B. C., was celebrated as the most admired type of early Roman womanhood. She was the daughter of Scipio Africanus and the wife of Tiberius Sempronius Gracchus, who left her, at his death, a widow with 12 children. She was still in the prime of life, but she refused many offers of marriage, including one from King Ptolemy of Egypt, and devoted herself to the training and education of her children. These included the democratic leaders Tiberius and Gaius. A lady, after displaying her jewels, asked to see those of Cornelia, who, producing her sons Tiberius and Gaius, said, "These are mine." She devoted her last years to the study of Greek literature and to the society of men of letters in Misenum.

Cornelius (*kôr-nā'lê-ŭs*), **Peter von (1783-1867),** German historical painter, founder of the Munich School, was born at Düsseldorf. His first work of importance was his series of illustrations of Goethe's *Faust*. In 1811, he went to Rome, where he gained a wide reputation by two cartoons, "Joseph's Interpretation of the Dream" and "Joseph's Recognition of his Brethren," in which he notably revived fresco painting. He was then called to Berlin and became the head of the Düsseldorf academy. His paintings, which are colossal and executed in the cartoon style, emphasize design rather than color.

Cornell, Ezra (1807-1871), American capitalist and philanthropist, was born at Westchester Landing, N. Y. He began life as a mechanic and miller at Ithaca, but spent most of his active years in the extension of the telegraph service throughout the northern and western states. He was a delegate to the first Republican national convention in 1856; president of the New York State Agricultural Society, 1862; member of the assembly, 1862-63; and state senator, 1864-67. In 1865, he founded Cornell University at Ithaca, intending it to be "an institution where any person can find instruction in any study." He endowed it with $500,000 and subsequently devoted an additional $500,000 to the purpose.

Cornell, Katharine (1898-), American actress, was born of American parents in Berlin, Germany. She made her debut in New York in 1917 with the Washington Square players and appeared in *Little Women* in London, 1920. Her ability in intense characterizations was revealed in Shaw's *Candida*, Arlen's *Green Hat*, and the highly successful *Barretts of Wimpole Street*, in which her portrayal of the invalid, Mrs. Browning, created a sensation. Other plays in which she starred include *Casanova, Saint Joan,* and *No Time for Comedy*. She married Guthrie McClintic in 1921.

Cornwallis, Charles, Marquis (1738-1805), English statesman and general, was born at London. He entered the British army in 1756, the House of Commons in 1760, and the House of Lords in 1763. He was promoted major general, and, in 1776, he joined Sir William Howe in command of the British forces during the American Revolution. He defeated General Gates at Camden in 1780; won the battle of Guilford Courthouse, 1781; and surrendered to Washington at Yorktown, October 19, 1781. He was afterward governor general and commander in chief in India, where he greatly distinguished himself by his victories over Tippoo Sahib; still later, in 1798, he was lord lieutenant of Ireland. In 1805, he was appointed governor general of India a second time.

Corot (*kô'rô'*), **Jean Baptiste Camille (1796-1875),** French painter, was born in Paris. He began to exhibit in 1827. His early pictures were in the classic manner but in 1843 he abandoned this style and developed a delicate romantic style, not inaccurately called "painted music," which won him fame throughout the world. He has been styled the lyric poet among the eminent painters of the Barbizon-Fontainebleau group, among whom were Rousseau, Millet, Dupré, and Diaz. In the Louvre are about 80 of his pictures, including the well-known "Dance of the Nymphs," "Paysage," and "Souvenir of Castelgandolfo." Excellent examples are found in many American art galleries. See *List of Illustrations: Landscape, by Corot.*

Correggio (*kôr-rĕd'jô*), **Antonio Allegri (1494-1534),** Italian painter, was born at Correggio, a small town near Modena from which the painter received his name. He was the first among the moderns who displayed that grace, general beauty, and softness of effect and that combined excellence of design, color, taste, and expression in which he is still unsurpassed.

Almost before he had seen the great masters, he became a master in a style all his own. He is ranked with Michelangelo, Leonardo da Vinci, Raphael, and Titian among the five most eminent painters of Italy. His "Holy Night" (Dresden Museum) is classed among the world's twelve greatest pictures. Both his sacred and his mythological subjects are treated with joyousness. Their effects depend in considerable degree on the soft interplay of light and shadow. Other noted works are "The Marriage of Saint Catherine," Louvre; "La Danaë,"

Borghese Gallery; "Holy Family"; "Ecce Homo"; and many frescoes at Parma.

Cortés (*kôr-tās'*), or **Cortez** (*kôr'tĕz*), **Hernando (1485-1547)**, Spanish adventurer, was born in Medellin, Estremadura. He was first intended for the law, but, a passion for arms carrying him to the military profession, he went early in the 16th century with Velásquez to Cuba and subsequently obtained the command of an expedition sent against Mexico.

With 700 men under his command, he landed at San Juan de Ulloa and founded the town of Vera Cruz in 1519. He then burned his ships so that his followers might have no hope but in victory. He advanced to Mexico, where he was at first received with friendly demonstrations but, on his seizure of Montezuma, the Mexican king, a struggle ensued, in which many thousands of lives were lost. He eventually succeeded in putting down all opposition and in overrunning Mexico. In 1536, he discovered Lower California. For his conquests in Mexico, he was rewarded with the title of Marquis and with a grant of land. See *Noche Triste*.

Cortissoz (*kôr-tē'sōs*), **Royal (1869-1948)**, American art critic, was born in New York City. He had a common school education and entered the office of the architects McKim, Mead, and White. While there, he began to write for the press criticisms of art, music, drama, and books. These led to his appointment as art critic on the New York *Commercial Advertiser* and, in 1891, on the New York *Tribune*. He also lectured widely before universities and museums. His thorough knowledge of art and keen discrimination gave him a foremost place among art critics of the day. His published works include *Augustus St. Gaudens, Art and Common Sense*, and *An Introduction to the Mellon Collection*. He was elected to the American Academy of Arts and Letters in 1924.

Cosgrave, William Thomas (1880-), Irish statesman, was born in Dublin. He was educated at a Christian Brothers School and, in 1918, was elected a member of the Irish Parliament or the Dail Eireann. He became a member of the provisional government in 1922 and, the same year, was elected president of the executive council of the Irish Free State, guiding its fortunes until defeated at the polls in 1932. Thereafter he led the opposition party.

Costain, Thomas Bertram (1885-), American editor and author, was born at Brantford, Ontario, Canada. From 1908 to 1910 he was editor of the Guelph (Ontario) *Daily Mercury*, and from 1910 to 1920 editor of *MacLean's Magazine* (Toronto). Coming to the United States in 1920, he became associate editor of *The Saturday Evening Post* continuing in that position until 1934. In 1939 he joined the editorial staff of the book publishing house of Doubleday, and soon after began writing historical novels, among them *For My Great Folly* (1942), *Joshua* (with Rogers MacVeagh, 1943), *Ride With Me* (1943), *The Black Rose* (1945), *The Moneyman* (1947), *The Silver Chalice* (1952), *The White and Gold* (1954), and *The Tontine* (1955). A naturalized citizen, Costain has devoted all his time to writing since 1945.

Costello, John Aloysius (1891-), Irish statesman, was born at Dublin, Ireland, where he was educated at University College. Called to the bar in 1914, he first gained public notice by his defense of the Irish patriots following the Easter rebellion of 1916. On the establishment of the Irish Free State, he served as assistant to the attorney general from 1922 to 1926, and then as attorney general from 1926 to 1932. He was for years a member of the Dail Eireann as representative of various Dublin constituencies. Costello was prime minister of the coalition government opposed to De Valera's party from 1948 to 1951. In 1949, he became the first prime minister of the Irish Republic which was proclaimed that year. In 1954, on the defeat of De Valera's party in the elections, he again became prime minister. He was President Eisenhower's guest in Washington in 1956, the first head of his country to visit the United States. During his stay he signed an agreement for U.S.-Irish co-operation on peaceful uses of atomic energy.

Coues (*kouz*), **Elliott (1842-1899)**, American ornithologist, was born at Portsmouth, N. H.; was graduated from Columbian (George Washington) University, 1861; and became a surgeon of the United States army in 1863. He studied the flora and fauna at various posts where he was located until 1880, when he resigned to devote himself exclusively to natural science. He became a prominent writer on ornithology and a leading authority on American birds. His chief works include *Field Ornithology* and *Dictionary of North American Birds*.

Coulomb (*kōō'lôn'*), **Charles Augustin (1736-1806)**, French physicist, was born at Angouleme. He experimented on friction and invented the torsion balance for measuring the force of magnetic and electric attraction. He was elected to the French Academy in 1781. The unit of electric quantity was named the coulomb in his honor.

Coulter (*kōl'tĕr*), **John Merle (1851-1928)**, American botanist, was born at Ningpo, China; was graduated from Hanover College, Indiana, 1870; and subsequently studied at Harvard. He was botanist of the United States Geological Survey in the Rocky Mountains in 1872-73 and later taught at Hanover College and Wabash College, and was president successively of the University of Indiana and Lake Forest University. From 1896 to 1925, he was head of the department of botany in the University of Chicago and then became adviser to the Boyce Thompson Institute of Plant Research, Yonkers, N. Y., which he helped to found. Among his works are *Manual of Rocky Mountain Botany, Plant Relations*, and *Plant Genetics*.

Courbet (*kōōr'bĕ'*), **Gustave (1819-1877)**, French painter and founder of the modern realistic school of painting, was born at Ornans. In 1839, he was sent by his father to study law in Paris, but the bent of his nature was toward art. In 1841, he took up landscape work, painting in the forest of Fontainebleau. In 1844, he began to exhibit at the salon, and his works created a great sensation in 1850. His hunting scenes and animal subjects are especially vigorous and spirited. In 1871, he joined the commune. He was implicated in the destruction of the Vendôme column, for which act he was sentenced to six months' imprisonment and a fine for its restoration, his pictures being sold in 1877 to raise funds for that purpose. On his release, he retired to Switzerland, where he died.

Courtois (*kōōr'twä'*), **Bernard (1777-1838)**, French chemist, was born at Dijon. He became Fourcroy's assistant in the Polytechnic School in Paris. With Séguin, he discovered the alkaloids of opium. In 1811, while investigating the products of mother liquors prepared by leaching the ashes of burnt seaweed, he discovered the element iodine. He did not communicate his discovery to other scientists until late in 1813. Within a month after Courtois had made his communication to the institute, Gay-Lussac published an account of the properties of the new element, which he named iodine on account of its violet color. Notwithstanding his discovery, Courtois was ignored and forgotten until the Academy of Sciences, in 1832, awarded him a prize of 6000 francs in appreciation of his important discovery. He died at Paris.

Cousin (*kōō'zăN'*), **Victor (1792-1867)**, French philosophical writer and educator, was born in Paris. After a literary and educational career extending over many years, he was made, in 1830, a member of the Council of Public Instruction in France. In 1832, he was chosen a peer of France and, in 1840, became minister of public instruction. In this capacity he entirely reorganized the system of primary education. In higher education he exercised an important influence in discarding the dogmatic teaching of philosophy for a more historical approach. His position in the history of thought is that of an eclectic rather than an analyst. He published a translation of *Plato*, and a *Course of the History of Philosophy*, which was his largest original work.

Coverdale (*kŭv'ĕr-dāl*), **Miles (1488-1568)**, translator of the Bible into English, was born in Yorkshire. He was a monk of Norwich, but early devoted himself to the promotion of the Reformation. In 1551, he was appointed Bishop of Exeter, but was ejected and imprisoned on the accession of Mary in 1553. In the subsequent reign of Elizabeth until within two years of his death, he was rector of the Church of Saint Magnus in the city of London. In 1535, he published his first translation of the Bible, which was the earliest complete Bible printed in the English language.

Coward, Noel (1899-), English dramatist and actor, was born at Teddington. He made his first appearance on the stage in 1910. His first successful plays were sparkling comedies. They include *The Vortex, Easy Virtue, Hay Fever*, and *Private Lives*, which depended for their effect largely on short, comic speeches and amusing passages of mutual abuse. In 1930, he produced a tragic play, *Cavalcade*, which won him an enviable reputation in both England and America as a dramatist and actor of rare ability. Among his numerous works are *Present Laughter* and *This Happy Breed*, both published in 1947, *Peace in Our Time* (1948), *Relative Values* (1952), *and the* autobiographical *Future Indefinite* (1954).

Cowen, Sir Frederic Hymen (1852-1935), English musician and composer, was born at Kingston, Jamaica. At the age of four, he was taken to London, where he began his musical education. He was made director of the Edinburgh Academy of Music in 1882 and later was a conductor successively in London and Glasgow. While he is most widely known for his songs, of which he composed over 300, he won fame also with his *Sleeping Beauty, Saint John's Eve, The Water Lily*, and his Scandinavian, Welsh, and Idyllic symphonies. He also wrote four oratorios, *The Deluge, St. Ursula, Ruth*, and *The Veil*, and the operas, *Pauline, Thorgrim, Signa*, and *Harold*.

Cowley, Abraham (1618-1667), English poet and essayist, was born in London. He wrote excellent verses at 10

years of age. From Westminster School he proceeded in 1637 to Trinity College, Cambridge, and there wrote, among many other pieces, a large portion of his epic, the *Davideis*, the hero of which was King David. From 1644 to 1656 he was an exile to France with the queen of Charles I. His poetry abounds in metaphysical subleties and niceties of expression, which were very popular in his time. Among his longer poems his elegies are the most worthy, and some of his most natural verses are found scattered through his essays, which are graceful and beautiful. He died at Chertsey, and was buried in Westminster Abbey.

Cowley, Malcolm (1898-), American writer, critic, translator, and editor, was born at Belsano, Pa. After he was graduated from Yale in 1920, he lived for a number of years in Paris, where he was a free lance writer and translator. Returning to the United States, he served as associate editor of *The New Republic* from 1929 to 1944. In 1934, his autobiographical *Exiles Return* was published (revised edition 1952). Among the books he has edited are *The Portable Hemingway*, *The Portable Faulkner*, *The Portable Hawthorne*, *The Complete Whitman*, and *The Stories of F. Scott Fitzgerald*. His translations include works by Paul Valéry, Maurice Barrès, and André Gide.

Cowper (*kōō'pĕr; kou'pĕr*), **William (1731-1800)**, English poet, was born in Hertfordshire. He was admitted to the bar in 1754, but did not practice. He passed many years at Olney, Buckinghamshire, in the society of Mrs. Unwin, Lady Austen, and the Rev. John Newton, engaged in religious exercises and charities. Lady Austen turned his attention to poetry, and, after contributing extensively to the *Olney Hymns*, he published in 1782 his first volume, which was tolerably well received. The ballad of *John Gilpin* gave him wide renown. His longest original poem, *The Task*, 1785, also gained general popularity. He next translated *Homer* into English blank verse and undertook a new edition of Milton with translations of the Latin and Italian poems. In 1799, he wrote his last poem, *The Castaway*. Besides possessing great gifts as a poet, Cowper was one of the most charming of letter writers, his epistles ranking among the finest in the English language. See *Gilpin, John*.

Cox, James Middleton (1870-), congressman and governor, was born at Jacksonburg, Ohio; grew up on a farm; and received a public school and high school education. In early life he taught country school and worked in a printing office. Later be became a newspaper reporter and rose to the position of editor on the staff of the *Cincinnati Enquirer*. In 1898, he bought the *Dayton Daily News* and, in 1903, he purchased the *Springfield Press-Republic*, forming the News League of Ohio and making a record as a successful newspaper man. He was a member of Congress, 1909-13, and governor of Ohio for three terms, 1913-21. He ran as Democratic candidate for the presidency in 1920. In 1933, President Franklin D. Roosevelt named him as delgate to the London Economic Conference, where he was made chairman of the Monetary Commission.

Cox, Kenyon (1856-1919), American mural and figure painter, was born in Warren, Ohio; studied in Cincinnati and Philadelphia, and later in Paris under Carolus-Duran and Gérôme, 1877-82. His works consist principally of portraits, figure pieces, and mural decorations. Among his mural paintings, which rank with the greatest in America, are "Art and Science" in the Library of Congress, Washington; "The Progress of Civilization" in the Capitol, Des Moines, Ia.; and "Venice" at Bowdoin College, Me. His finest pictures include "Hope and Memory," "The Hunting Nymph," "October Afternoon," "A Vision of Moonrise," and "A Book of Pictures." His "Harp Player" and portrait of Saint-Gaudens are in the Metropolitan Museum, New York. He wrote, among other books, *Mixed Beasts, Old Masters and New*, *Painters and Sculptors*, *Artist and Public*, and *Concerning Painting*. He was elected to the American Academy of Arts and Letters in 1908.

Cox, Louise Howland King (1865-1945), American painter, was born in San Francisco. She was a pupil at the New York Academy and studied at the Art Students' League under Kenyon Cox, whom she married in 1892. Her graceful decorative work is similar in style to that of her husband. Her mural painting of "The Fates" and the decorative canvases, "The Annunciation," "Psyche," and "Pomona," are noteworthy examples of her art in this field. She excels in her paintings of children. her charming naturalism in portraying them is well shown in "Lucile," "The Wonder Book," "Goldilocks," "My Children" and "Mrs. Homer Saint-Gaudens and Child."

Cox, Palmer (1840-1924), author and artist, was born in Granby, Quebec, Canada; was graduated from Granby Academy; lived in San Francisco, 1863-75, contributing to *Golden Era* and *Alta California;* and, in 1875, removed to New York. His specialty was the execution of original pictures illustrating his own juvenile books of humorous fancy, of which the most characteristic are his widely known *Brownies*. Among his other books are *Squibs of California*, *Hans von Pelter's Trip to Gotham*, *How Columbus Found America*, *That Stanley*, and *Queer People with Paws and Claws*.

Cozzens, James Gould (1903-), American novelist, was born in Chicago, Ill. His literary talent developed early; he appeared in *The Atlantic Monthly* magazine when he was sixteen, and had his first novel *Confusion*, published when he was nineteen and a sophomore at Harvard. Over the years, Cozzens has maintained a steady production of rewarding, expertly-written novels. His first success was *S. S. San Pedro*, in 1931. *The Just and the Unjust*, published in 1942, was remarkable for its insight into the legal profession. Cozzens won the Pulitzer prize in 1948 with *Guard of Honor*, a big, richly colorful story of practically every level of life on a Florida air force base during World War II. He lives in New Jersey and writes often for magazines.

Crabbe (*krăb*), **George (1754-1832)**, English poet, was born at Aldeburgh. He was a surgeon, but abandoned his profession for literary pursuits and went to London in 1780. Edmund Burke secured a publisher for his poem *The Library* in 1781 and advised him to take Holy Orders. He was ordained in 1782 and became chaplain to the Duke of Rutland at Belvoir Castle. He published *The Village* in 1783 and, in 1807, *The Parish Register*. These, his best works, were followed by *The Borough*, *Tales in Verse*, and *Tales of the Hall*. His poetry portrays realistically the lives of the destitute. His last days were spent as rector of Trowbridge, Wiltshire.

Craig, Edward Gordon (1872-), English stage designer, son of the actress Ellen Terry. He began his career as an actor in 1889 under the direction of Sir Henry Irving, but soon specialized in stage design into which he introduced ideas that deeply influenced stage settings throughout the world. Simplicity and massive effects were the keynotes. He founded a school of theatrical art in Florence in 1913 and was given opportunity to carry out his views in productions at the Reinhardt Theater in Berlin and the Moscow Art Theater. His influence was spread, however, chiefly through his writings, which include *On the Art of the Theatre*, *Books and Theatres*, and *Ellen Terry and Her Secret Self*.

Craigie (*krāg'ĭ*), **Mrs. Pearl Mary Teresa.** See *Hobbes, John Oliver*.

Cranach (*krä'näĸ*), **Lucas, the Elder (1472-1553)**, German painter, was born near Bamberg, Germany. Besides following other lucrative trades, he acted as court painter to Frederick the Wise, elector of Saxony, and to his two successors. In 1520, he bought an apothecary's business at Wittenberg, where he was also a bookseller and paper maker, became councilor and chamberlain, and was twice chosen burgomaster of the town. He was an intimate friend of Luther and Melanchthon, whose portraits he several times painted. He has been styled the painter of the Reformation. His best works are his portraits and madonnas, some of which rank among the noblest in German art. Other well-known works are "Christ Blessing the Children," "Repose in Egypt," "Samson and Delilah," "Marriage of Saint Catharine," and "Fountain of Youth."

Cranch (*kränch*), **Christopher Pearse (1813-1892)**, American painter and poet, was born at Alexandria, Va. He studied in France and Italy, 1846-63; returned to New York; and became a member of the National Academy in 1864. He was also a graceful writer in prose and verse, and published a book of *Poems*, *The Bird and the Bell*, *Ariel and Caliban*, and prose tales for children, which he illustrated. His best pictures are "October Afternoon," "Venice," and "Venetian Fishing Boats." Died at Cambridge, Mass.

Crane, Walter (1845-1915), English illustrator, was born at Liverpool. He was educated privately and, although influenced by Rossetti, Holman Hunt, and Millais, was in the main self-taught. In his painting, his style reveals his study of the Florentine masters, particularly Botticelli. He was pre-eminently an illustrator and is considered the leader of the romantic movement in decorative art in England. His drawings, chiefly in outline, are distinguished by imagination, humor, and notable mastery of method. Among the finest are: "The Baby's Opera," "Pan Pipes," "Echoes from Hellas," "Queen Summer," and illustrations for Shakespeare's works. Among his paintings, which are classed with those of the Pre-Raphaelites, the best-known are "The Birth of Venus," "The Chariot of the Hours," "Mask of the Four Seasons," and "Prometheus Unbound." He made designs for tapestry and glass windows, and wrote many articles on art subjects, including *India Impressions* and *William Morris and Whistler*.

Cranmer, Thomas (1489-1556), archbishop of Canterbury, was born in Nottinghamshire, and was educated at Cambridge University. He obtained the favor of Henry VIII by furthering his divorce from Catherine of Aragon and was appointed Archbishop of Canterbury in 1533. He

favored the reformed doctrines during the reign of Henry VIII and in that of Edward VI. Under his guidance, Protestantism was thoroughly established and the *Book of Common Prayer* was compiled and issued, 1549. He was committed to the Tower on the accession of Mary; condemned at Oxford for heresy in 1554; and, after two years' imprisonment, was burned there in 1556, openly rejecting the recantations of Protestantism which he had been induced to sign.

Crassus, Marcus Licinius (c. 115 B. C.-53 B. C.), Roman general and statesman. He was the wealthiest citizen of Rome in his day, having made much of his wealth by purchasing houses when burning and then extinguishing the flames with the help of a body of slaves trained for the purpose. The buildings were then repaired and sold at a huge profit.

During his consulate, he gave to the people a feast which was spread on 10,000 tables, and he distributed a three months' supply of grain. In 60 B. C., Cæsar, Pompey, and Crassus formed the First Triumvirate. In 55 B. C., as consul with Pompey, Crassus received Syria to govern and made preparations for war against the Parthians; after being defeated, he was beguiled into a conference with the Parthian general Surenas and was slain at the appointed place of meeting.

Crawford, Francis Marion (1854-1909), American novelist, son of Thomas Crawford, the sculptor, was born at Bagni di Lucca, Italy, and was educated in the United States, Italy, England, and Germany. In 1879, he edited *The Indian Herald* at Allahabad, India. From 1881 to 1883, he was in America, and subsequently he resided at Sorrento, Italy.

Crawford published over forty novels, including *An American Politician, Zoroaster, Saracinesca, With the Immortals, Love in Idleness,* and *The Heart of Rome.* He wrote also a play, *Francesca da Rimini,* and several historical romances, including *Ave Roma Immortalis* and *The Rulers of the South.* His *Saracinesca* series is of the romantic type, ingenious in plot, with characters and scenes charmingly portrayed in the style of an experienced and discerning man of the world. He was a member of the American Academy of Arts and Letters.

Crawford, Thomas (1814-1857), American sculptor, was born at New York. He early manifested a taste for art and, in 1835, repaired to Rome, where he entered the studio of Thorvaldsen. His principal works are a bronze bust of Beethoven, executed for the Boston Music Hall; the colossal equestrian statue of Washington at the Capitol, Richmond; the marble and bronze statuary for the Capitol, Washington. Among his works in American art collections are "The Indian," belonging to the New York Historical Society; "Orpheus" and "Adam and Eve after the Expulsion," in the Boston Museum; "Josiah Quincy," a bust in the Boston Atheneum; and "The Dancer," "Dying Indian Maiden," and "Flora," at the Metropolitan Museum. Died in London.

Creasy, Sir (*krē'sĭ*), **Edward Shepherd (1812-1878),** English historian, was born at Bexley, Kent. From Eton he passed to King's College, Cambridge, and, in 1834, was elected a fellow there. Admitted to the bar in 1837, he served as a judge for some years and, in 1840, was appointed professor of history at London University. In 1860, he was knighted and appointed chief justice of Ceylon, a post which he held for ten years. He is the author of *The Fifteen Decisive Battles of the World, Invasions of England, History of the Ottoman Turks, Imperial and Colonial Constitutions,* and a novel entitled *Old Love and the New.* He died at London.

Cremazie, Octave (1827-1879), French Canadian poet, was born at Quebec. Financial involvements, arising from an unsuccessful bookselling enterprise, led him, in 1862, to seek refuge in France under an assumed name. His poems, written in French and inspired by intense religious and patriotic sentiment, were first published in complete form in 1882, three years after his death in Havre, France. He is known as "the father of French Canadian poetry."

Cremer (*krē'mĕr*), **Sir William Randal (1838-1908),** English advocate of international peace, was born at Fareham. From 1860 to 1870, he was a prominent figure in English trade unions. He was elected to the House of Commons as a Liberal in 1885 and was repeatedly re-elected until 1906. For 37 years he was secretary of the International Arbitration League. In 1903 he was awarded the Nobel Peace prize, which he gave to the league as an endowment. He was knighted in 1907.

Crile (*krĭl*), **George Washington (1864-1943),** American surgeon, was born at Chili, Ohio. He was graduated from Western Reserve University and, after European study, taught surgery there until 1924, when he became surgeon and later director of research for the Cleveland Clinic. Crile's contribution to surgery related to the reduction or elimination of surgical shock and the relation of cells and electric currents to the phenomena of life. His publications include: *Surgical Shock, The Phenomena of Life,* and *Intelligence, Power and Personality.*

Cripps, Sir (Richard) Stafford (1889-1952), English politician. Educated at Winchester College and University College, London, he was called to the bar in 1913. Closely associated with the Fabian socialist group, he joined the Labor party. He was elected a member of Parliament for East Bristol in 1931. He was solicitor-general in Macdonald's Labor ministry, 1930-31, but went into opposition with the formation of the national government of Macdonald and Baldwin. In 1940, he was sent as ambassador to Russia, but was recalled in 1941 to serve in the reorganized Churchill cabinet as lord privy seal and leader of the House of Commons. He conducted an unsuccessful mission to India in 1942, and was minister for airplane production, 1942-45. In the Attlee Labor ministry he was made president of the board of trade. In 1947 he became chancellor of the exchequer.

Crispi (*krēs'pē*), **Francesco (1819-1901),** Italian statesman, was born at Ribera, Sicily. After the revolutionary movement of 1848 he was obliged to take refuge in France. He organized the successful movement of 1859-60 and re-entered Sicily with Garibaldi. He became eventually premier, advocating the Triple Alliance of Germany, Austria, and Italy; in 1896 the Abyssinian disaster compelled him to resign; and in 1898 he withdrew from politics. He ranks as a much maligned but constructive statesman. He died in Naples.

Croce (*krō'chā*), **Benedetto (1866-1952),** Italian philosopher, was born at Pescasseroli, Aquila, and was educated at Naples and Rome. He began in 1902 an exposition of what he called the philosophy of the spirit. A basic concept is the identity of concrete philosophy and history. Through his periodical, *La Critica,* he deeply influenced Italian literature. He was made a senator in 1910 and after Mussolini's fall took a prominent part in the reconstruction of the government. Among his many works are: *Esthetics; History, Its Theory and Practice; Goethe; Europe in the XIX Century;* and his *Autobiography.*

Crockett, David (1786-1836), American pioneer and politician, was born in Tennessee. He was noted chiefly for his adventures and eccentric habits. He was a member of Congress from 1827 to 1831 and from 1833 to 1835. He joined the Texans in their revolt against Mexico; was taken prisoner at Fort Alamo in 1836; and, with the five other survivors of the battle, was massacred by order of Santa Anna. *A Narrative of the Life of David Crockett,* an autobiography probably authorized or dictated by him, was published in 1834.

Crœsus (*krē'sŭs*), last king of Lydia, lived in the 6th century B. C. He was celebrated for his wealth, his name becoming a synonym for a man possessing extraordinary riches. It is said that Solon, visiting him, replied to his questions that no man could be considered happy until his death. Crœsus was later defeated by Cyrus, King of Iran, and condemned to be burned. Amid the flames he thrice called the name of Solon. Cyrus, hearing and wondering, ordered the flames to be extinguished, and, on learning the cause of Crœsus' exclamation, spared his life and retained him as one of his counsellors.

Crofts, Ernest (1847-1911), English painter, keeper of the Royal Academy, was born in Yorkshire. He studied art in London and later at Düsseldorf, where he lived many years. His historical paintings range over a wide period and deal mainly with military subjects. The chief ones include "Napoleon at Ligny," "On the Morning of the Battle of Waterloo," "Oliver Cromwell at Marston Moor," "George II at Dettingen," "Wallenstein," "Marlborough after Ramillies," "Napoleon Leaving Moscow," and "Execution of Charles I."

Croker, Richard (1843-1922), politician, was born at Black Rock, Ireland; was brought to the United States when two years old; and was educated in the public schools of New York. He rose to great prominence in the politics of New York City, where he stoutly opposed the Tweed Ring and was long recognized as leader of the Tammany forces. He retired from politics in 1902 and, soon after, removed to Ireland, where he devoted much time to the turf. He was a Derby winner in 1907.

Crome, John (1768-1821), English landscape painter, was born at Norwich. He founded the so-called Norwich school of painting, a cardinal principle of which was fidelity to nature. His art is characterized by realism, and his landscapes contain a true appreciation of light and air. His works include "Willow," "Coast Scene near Yarmouth," and "Fishmarket at Boulogne."

Cromer (*krō'mĕr*), **Evelyn Baring, first Earl (1841-1917),** British statesman and diplomat, was born at Cromer Hall, Norfolk. He was educated at the Ordnance School, Carshalton, and at the Royal Military Academy, Woolwich. After serving with distinction in the royal artillery, he became private secretary to the Earl of Northbrook;

governor general of India, 1872; commissioner of the Egyptian public debt, 1877; controller general of Egypt, 1879; and finance minister of India in 1880. From 1883 to 1907, he was agent and consul general in Egypt. In this capacity he was virtually British viceroy and, by reason of his constructive administration, was called the "maker of modern Egypt." After his return to England in 1907, he became active in Parliament. His writings include *Staff College Essays, Paraphrase and Translations from the Greek, The War Game, Modern Egypt,* and *Ancient and Modern Imperialism.*

Crompton, Samuel (1753-1827), English inventor, was born near Bolton, England. For five years, he devoted all his spare time and money, including his earnings from playing the violin at Bolton Theater, to work upon improving the spinning jenny. The outcome was the spinning mule, which would spin yarns fine enough to make muslin. He sold the invention under an unfortunate arrangement, from which he realized a total of only about £60. The spinning mule was of revolutionary importance but the only substantial recognition to the inventor was a grant of £5000 from the House of Commons in 1812. He died in comparative poverty.

Cromwell, Oliver (1599-1658), lord protector of England, Ireland, and Scotland, was born at Huntingdon, England. Educated at the Huntingdon Grammar School, he entered Sidney Sussex College, Cambridge, in 1616. He later went to London to study law. In 1620, he married Elizabeth Bourchier and embraced Puritanism in its most uncompromising form.

Parliamentary Career. In 1628, Cromwell sat for Huntingdon in the stormy third Parliament of Charles I, and, in 1640, when 41 years of age, he was sent to Parliament for the town of Cambridge. As a member of the so-called Long Parliament, which met in that year, Cromwell warmly supported all measures that tended to disarm royalty and to invest Parliament with the supreme power. When the hopes of reconciliation between the king and Parliament failed through the perfidy or vacillation of the former, Cromwell was among the first to offer of his substance to defend the state. Ranking as captain of a troop of cavalry in 1642, he exhibited astonishing military genius. He was promoted to the rank of lieutenant general.

Military Campaigns. Cromwell served at Winceby, October 11, 1643; at Marston Moor, July 2, 1644; and in the second battle of Newbury, October 27, 1644. When, by a self-denying ordinance, the army had been rid of its grandees, it was remodeled, and the war was pushed forward with new vigor. In the capacity of lieutenant general, Cromwell commanded the right wing of the Parliamentary army at Naseby, June 14, 1645. Everywhere the royal cause was failing, and Charles himself was given up to the Parliamentary commissioners in 1646.

With characteristic sagacity, Cromwell perceived that the advantage would lie with that party which held possession of the king's person, and he had Charles removed from the commissioners into the hands of the army, June 1647. At this time, the country was in a critical situation. The Welsh had risen in insurrection; a Scotch army was bearing down from the north; and Rupert was threatening a descent from the Netherlands. There was extensive royalism also in Ireland. Prompt measures alone could prevent anarchy, and Cromwell was not afraid to employ them.

In 1648, the Scotch were utterly defeated at Preston Moor. Then came the execution of Charles I on January 30, 1649, and Parliament established the Commonwealth. The abolition of the House of Lords followed speedily, and Cromwell became a powerful member in the new council of state. In August 1649, he quelled the rebellion in Ireland and established unexampled prosperity in that country. Affairs in Scotland now claimed his attention. Charles II was declared king in the north of Scotland and, on September 3, 1650, Cromwell routed the Scotch army at Dunbar. A year later to the day, September 3, 1651, he defeated Charles II at Worcester. This battle, which ended the civil war, placed Cromwell at the head of public affairs in England.

Protectorate. In April 1653 came the dissolution of Parliament. Cromwell now convened a parliament, which consisted wholly of Puritans and Dissenters, numbering 154 persons. It assembled July 4, 1653, and immediately invested Cromwell with the supreme power under the title of lord protector. When Parliament met again, its two houses fell into a disagreement which compelled Cromwell to dissolve it. His power thenceforth rested upon the army, though it was his constant desire to revert to constitutional government.

His protectorate was a continual struggle between Royalist plots and Republican resistance, yet Cromwell was able to maintain a strong policy, home and foreign. He united Scotland and Ireland to England, giving to each representation in Parliament. He upheld toleration and curbed the persecuting tendencies of the time. He saved the universities from the fanatics, put capable men at their head, and encouraged letters. Under Cromwell, the Commonwealth became the head and protectress of Protestant Europe. He made peace with the Netherlands and, in the interest of religious liberty and commerce, allied himself with France against Spain. By the hand of Blake, he chastised the pirate states of Barbary. His boast, that he would make the name of Englishman as fully respected as that of Roman, had been fulfilled. He died at Whitehall.

Cromwell, Thomas (c. 1485-1540), earl of Essex, English statesman. He was in the service of Woolsey for several years before the cardinal's downfall in 1529 and remained his steady friend in adversity. His superior talents commended him to Henry VIII, who appointed him his secretary and his spokesman in the House of Commons. He thus became the leader of the English Reformation, although his motive was strengthening the royal power. In 1535, he was made visitor general of all the country's monasteries, religious houses, and universities, and, in 1536, he became lord privy seal, baron, and ecclesiastical vice regent.

The visitorial power was executed with great vigor, monastery properties being extensively confiscated to the enrichment of the king. He received valuable estates from the spoils of the monasteries, and was the king's most powerful subject. But his unscrupulous methods and single-minded devotion to the royal cause created numerous enemies. When he lost the king's favor by his promotion of the marriage with Anne of Cleves, whom Henry accepted only for political reasons which soon lost their potency, Cromwell was beheaded.

Cronstedt (*krōn'stĕt*), **Axel Frederic, Baron (1702-1765),** Swedish scientist, was born at Stropsta Nykoping. He was councilor of mines and member of the Academy of Sciences at Stockholm. In 1751, he discovered nickel, isolating the metal in impure form from niccolite. His results were verified by Bergman in 1775. With Wöhler's invention, 50 years later, of a method for extracting the metal in commercial quantities, the foundation was laid for the present day nickel industry with its innumerable applications in the arts. In 1758, he published an important work on mineralogy, making chemical composition the basis of classification. He was the first to draw a clear distinction between minerals and rocks.

Crookes (*krŏŏks*), **Sir William (1832-1919),** British chemist and physicist, was born in London; was educated at the Royal College of Chemistry; and became professor of chemistry in the training college, Chester, in 1855. He discovered the element thallium; repulsion resulting from radiation; radiant matter; radiant matter spectroscopy; and new elements in gadolinite. In 1865, he worked out the sodium amalgamation process for separating gold and silver from their ores. By inventing improvements in the Sprengel air pump, he was enabled to make the famous high vacuum tubes known as "Crookes tubes," used in the production of the Roentgen or X-rays. This discovery also made the incandescent electric light commercially practicable. Crookes also devised the radiometer, the otheoscope, and the spinthariscope. In 1907, with Eduard Buchner, Crookes received the Nobel prize for chemical researches.

Crosby, (Bing) Harry Lillis (1904-), singer and motion picture actor, was born in Tacoma, Wash. After attending Gonzaga University at Spokane, he became a vaudeville performer, but was soon singing with Paul Whiteman's orchestra and other dance bands. Since 1931 he has been enormously successful on the radio and in motion pictures and his records have been best sellers. He popularized, among other songs, *White Christmas,* and achieved fame in his picture *Going My Way,* which won him the 1944 ("Oscar") award of the Academy of Motion Picture Arts and Sciences.

Crosby (*krŏz'bĭ*), **Fanny** (Mrs. Frances Jane Van Alstyne) **(1820-1915)** blind writer of popular hymns, was born at Southeast, N. Y. When 6 weeks old, she lost her eyesight during an illness. At 15, she entered an institution for the blind, New York, and taught there, 1847-58. Among the best-known hymns written by her are "Safe in the Arms of Jesus," "Jesus Keep Me Near the Cross," "Pass Me Not, O Gentle Savior," "Jesus is Calling," "I am Thine, O Lord," and "Jesus the Water of Life Will Give." Among her songs are "There's Music in the Air" and "Hazel Dell." She wrote, among other works, *The Blind Girl* and *A Wreath of Columbia's Flowers.*

Cross, Wilbur Lucius (1862-1948), American writer and scholar, was born at Mansfield, Conn. A graduate of Yale University, he joined the faculty there in 1894 as instructor in English and, from 1916 to 1930, was dean of the graduate school. He edited many books and wrote various works on the history of the English novel and also *An Outline of Biography.* In 1926, he was elected to the American Academy of Arts and Letters. From 1931 to 1939 he was governor of Connecticut. In 1943 he published his autobiography, *Connecticut Yankee.*

Crothers, Rachael (1878-), American dramatist and theatrical manager, was born at Bloomington, Ill. After being graduated from the Illinois State Normal School, she taught school and began writing plays, directing their production herself. They were typically social comedies with sparkling dialogue written from a woman's point of view. The more successful include *Mother Carey's Chickens, As Husbands Go, When Ladies Meet,* and *Susan and God.*

Crouse, Russel (1893-), American playwright and librettist, was born at Findlay, Ohio. He began writing as a newspaper reporter in the Middle West and in New York City. In the 1930's, he was author or co-author of librettos for several well-known musical comedies, including *The Gang's All Here, Hold Your Horses, Anything Goes,* and *Red, Hot and Blue.* With Howard Lindsay, he prepared a stage version of *Life with Father,* and wrote *State of the Union* and *Call Me Madam.* He is also the author of *Mr. Currier and Mr. Ives, It Seems Like Yesterday, Murder Won't Out,* and *The American Keepsake.*

Cruikshank (*krōōk'shăngk*), **George (1792-1878),** English artist and caricaturist, was born in London. The works illustrated by him include, among hundreds of others, Grimm's *Fairy Tales, Peter Schlemihl,* Dickens's *Oliver Twist* and *Sketches by Boz,* and Ainsworth's *Jack Sheppard.* Like Hogarth, he was a moralist as well as an artist, and he used his art to dramatize the downward career of the drunkard. His last important work, done in oil, is the "Worship of Bacchus," which is a vigorous protestation against intemperate drinking.

Cui (*kü-ē'*), **César Antonovitch (1835-1918),** Russian composer and military engineer, was born at Vilna. He received his early education at Vilna, where his father, a survivor of Napoleon's army of invasion, was an instructor in French. He studied music for a brief period and then took up engineering at Leningrad, later becoming a professor in the Military Academy and attaining the rank of lieutenant general. He was the instructor of many noted military leaders and wrote valuable textbooks on fortification. He continued musical study with Balakirev and became a champion of the new Russian nationalistic school. He composed the operas *The Prisoner of the Caucasus, William Ratcliff, Angelo, The Saracen, The Captain's Daughter,* and *Le Filibustier;* also symphonies, orchestral and piano pieces, choruses, and songs.

Culbertson, Ely (1891-1955), American author, authority on bridge, worker for international peace, was born in Rumania. He was educated at Geneva and Paris. Best known as an expert and final authority on bridge, he devoted much effort to crusading for better understanding between nations. He was founder and president of "The World Federation, Inc." and the author of *Total Peace, The World Federation Plan,* and *Must We Fight Russia?* Within the special field of bridge playing, he was well known for such books as *Culbertson's Hoyle, Contract Bridge Complete, Culbertson Point-Count Bidding,* and *Culbertson's Self-Teacher.*

Cummings, Edward Estlin (1894-), American author and painter whose typographical affectations render his name "e e cummings," was born in Cambridge, Mass. He earned a B.A. and M.A. at Harvard, where his father taught English.

Cummings' first and most lasting literary fame came as a result of his experiences in the American Ambulance Corps in World War I. Erroneously suspected to be a spy, he was thrown into a French jail and kept there, incommunicado, for several months. The book he wrote about his experiences, *The Enormous Room,* brought him immediate recognition for the clear, calm, yet powerfully moving narrative. Cummings never again produced a work of the magnitude of *The Enormous Room.* Instead, he has contented himself to turn out a steady succession of first-class, often lyrically beautiful, experiments in poetry and drama. He has tried to make many of his poems visually as well as emotionally evocative with such devices as all lower-case type, lack of punctuation, and staggered layouts that attempt to indicate progression of time. Cummings studied art in Paris after World War I, and has devoted much of his time to painting. In addition to a collection of poems written between 1923 and 1954, he has published a book whose title, in characteristic lower-case letrers, is *six non-lectures* (1953).

Cunard (*kū-närd'*), **Sir Samuel (1787-1865),** civil engineer and founder of the Cunard steamship line, was born at Halifax, Nova Scotia; succeeded early as a merchant and shipowner, and removed to England in 1838; joined with George Burns, Glasgow, and David M'Iver, Liverpool, in founding, 1839, the Royal Mail Steam Packet Company; and obtained a contract for the mail service between Liverpool and Halifax, Boston, and Quebec. The first passage, 1840, was made by the *Britannia* in 14 days, 8 hours. Iron steamers were introduced in 1855, and paddle wheels gave way entirely to the screw after 1862. Cunard was created a baronet in 1859. Died at London.

Cunningham of Hyndhope, Andrew Browne Cunningham, Viscount (1883-), British naval officer. He entered the Royal Navy in 1898, and served in World War I at Gallipoli. Most of his subsequent service was in the Mediterranean. On the outbreak of World War II, he was placed in command of the British Mediterranean fleet, which played a key role in the defense of Malta and the defeat of Rommel's army in Egypt. He commanded the Allied fleet in Eisenhower's invasion of Africa, Sicily, and Italy. He was made admiral in 1941 and created a baronet in 1942. In 1943 he was made admiral of the fleet and was appointed first sea lord of the admirality and chief of the naval general staff. His brother, Sir Alan Cunningham (1887–), was the last high commissioner and commander in chief for Palestine, 1945-48.

Curie, Eve (1904-), French writer and lecturer, was born in Paris, the daughter of two famous scientists, Madame and Pierre Curie. Overshadowed at first by the world-wide reputation of her mother, she has become famous in her own right as an author and a patriotic interpreter of France in defeat and reconstruction. In her girlhood she received a complete general education but, unlike her mother and her sister Irene, Eve showed no special interest in science. As a concert pianist, music critic (under a pen name), and translator, she gained some local recognition, but the writing of *Madame Curie,* a biography of her mother, gave her an international reputation. Translated into English by Vincent Sheehan, it was a 1937 choice of the Literary Guild and won for its author the Clement Cleveland Medal awarded for distinction in the fight against cancer.

Curie (*kü'rē'*), **Madame (1867-1934),** nee Marie Sklodowska, Polish-French chemist and physicist, was born at Warsaw, Poland, where her father was professor of physics. She studied physical sciences at Warsaw and at the Sorbonne with Pierre Curie, whom she married in 1895.

In 1898, she discovered the element polonium and, with her husband, the element radium. In the investigations on radioactivity and radioactive substances which made her husband and herself renowned throughout the scientific world, she performed a fully equal share. She carried out with monumental patience the innumerable fractional crystallizations which at last yielded a minute quantity of pure radium salt and was thereby enabled to determine the exact atomic weight of radium. In 1903, with her husband and A. H. Becquerel, she was awarded the Nobel prize for physics. In 1906, she was appointed to the position at the Sorbonne made vacant by the death of her husband. In 1911, she was honored with the full Nobel prize in chemistry, the first woman scientist to win it and the only person at that time who had shared in two Nobel prizes. See *Radioactivity, Radium.*

Curie, Pierre (1859-1906), French chemist, was born in Paris. He was educated at the Sorbonne. In 1895, he became professor of physics at the Ecole Municipale, where, in 1896, he and his wife began a series of investigations upon the Becquerel rays which resulted in the discovery of polonium and radium. In 1901, they jointly received the La Case prize and, in 1903, the Davy medal. In 1903, they were awarded, with Becquerel, the Nobel prize for physics. In 1904, Curie was appointed professor of physics in the Sorbonne and, in 1905, was made member of the Institute of France. He was killed in a street accident.

Curran (*kŭr'ăn*), **John Philpot (1750-1817),** Irish legal and parliamentary orator, was born at Newmarket, Ireland. He was educated at Trinity College, Dublin. In 1773, he went to London and studied law at the Middle Temple. Two years later he was admitted to the Irish bar, where his humorous, flowery, and sarcastic speech secured him immediate success, which his attractive social qualities did much to extend. About 1782, he obtained a seat in the Irish Parliament, where he supported Catholic emancipation but was opposed to Anglo-Irish unification. His fearless defense of Robert Emmet led to his examination before the privy council in 1803. Fox appointed him to the privy council in 1806, from which he retired in 1813.

Currie, General Sir Arthur William G. (1875-1933), Canadian military leader and educational administrator, was born at Napperton, Ont.; was educated at Strathroy Collegiate Institute; and taught school in British Columbia. He volunteered for service on the outbreak of World War I and was made commander of an infantry brigade. Currie was promoted to the rank of brigadier general in 1915 and, in 1917, became commander of all the Canadian forces in France. The more decisive battles in which he took part were those in 1918 at Amiens, Arras, and Cambrai. In 1920, he resigned from the army and became principal of McGill University.

Currier, Nathaniel (1813-1888), American lithographer and print publisher, was born at Roxbury, Mass. In 1835, he founded the business of producing and selling prints of contemporary scenes. He took into partnership J. Merritt Ives, an artist, 15 years later and thereafter their

prints always carried the signature "Currier & Ives." Currier retired in 1880, but his son William carried on the business until the end of the century.

Curtice, Harlow H. (1893-), president of the General Motors Corporation, and one of the world's foremost industrialists, was born in Eaton Rapids, Mich. His first connection with General Motors was with the AC Spark Plug Division. In 1933, Curtice became president and general manager of the Buick Division, and in 1953 he became president of the giant General Motors Corporation, whose profits in that year alone exceeded half a billion dollars. Curtice took control at a crucial time; his firm's Chevrolet was competing strenuously with Ford for domination of the low-priced motor car market. The results were record production, and the raising of sales efforts to a high pitch. Throughout these hectic times Harlow Curtice, as an unofficial spokesman for the industry, repeatedly maintained his faith in the ability of the American economy to absorb an ever-larger number of automobiles.

Curtin, John (1885-1945), Australian statesman. He was a member of the Commonwealth house of representatives from 1928 and from 1934 was head of the Labor party, the parliamentary opposition. In October 1941 he became prime minister of Australia, taking also the portfolio of minister of defense. He organized the Australian defense against Japan in cooperation with General MacArthur, and withdrew the Australian army from the European theater to use in reconquering islands in the Southwest Pacific.

Curtis, Charles (1860-1936), American politician, was born at N. Topeka, Kansas, of Kaw Indian blood on his mother's side. His early upbringing was with the Kaw Indian tribe. Having studied law, he began practicing at Topeka in 1881. He was elected to Congress in 1892, serving in the House until 1907, when he entered the Senate. With one brief interruption in 1912-14, he continued as senator until 1928, being Republican leader of the Senate from 1924. In 1928, he was nominated to the vice presidency as the running mate of Herbert Hoover and was elected for the term 1928-32.

Curtis, Cyrus Herman Kotschmar (1850-1933), American publisher, was born in Portland, Me. He received his education in the public schools and removed to Philadelphia, where he became publisher of the *Tribune* and the *Farmer*. Later he established the *Ladies' Home Journal*, which, under his management, became one of the most successful periodicals in the United States. The Curtis Publishing Company, of which he became head, undertook the publication of the *Country Gentleman* and the *Saturday Evening Post*, the latter established in 1728 by Benjamin Franklin. Under the management of Curtis, the *Saturday Evening Post* attained a larger circulation than any other American periodical of the time. In 1913, he purchased, with John Gribbel, the Philadelphia *Public Ledger* and, in 1923, he acquired the New York *Evening Post*.

Curtis, George William (1824-1892), American journalist, essayist, and critic, was born at Providence, R. I. After four years in Europe and the Orient, he joined the staff of the New York *Tribune* and became one of the editors of *Putnam's Monthly* in 1852. He began the "Editor's Easy Chair" papers in *Harper's Monthly* in 1853 and became editor of *Harper's Weekly* on its establishment in 1857. He possessed an attractive, graceful style, and was a polished lecturer and orator. He was anti-slavery and favored woman suffrage. Among his numerous writings are *Lotus Eating*, *Potiphar Papers*, *Prue and I*, and *Trumps*.

Curtiss, Glenn Hammond (1878-1930), American aviator was born at Hammondsport, N. Y. He became interested in mechanics, and, in 1906, at Ormond Beach, Fla., in a special motorcycle of his own construction, he covered a mile in 26⅖ seconds. In 1907, he took up aeronautic experiment. In 1908, he won the *Scientific American* cup in airplane competition at Hammondsport, N. Y.; in 1909, the international cup in the airplane competition at Reims, France; in 1910, the New York *World's* $10,000 prize in a flight from Albany to New York in a biplane of his own design. In 1911, he invented and demonstrated the hydro-airplane and, in 1912, he invented the flying boat. In 1914, he built the *America*, designed for transatlantic flight; also the Navy-Curtiss machine, which was the first to fly across the Atlantic Ocean. He became actively engaged in the commercial side of aviation and, in 1915, established extensive works for making airplanes. With the exception of the Wright brothers, no one else accomplished so much for aviation in America. See *Airplane*.

Curtius (*kōōr'tsē-ōōs*), **Ernst (1814-1896)**, German archeologist, was born at Lübeck. He studied at Bonn, Göttingen, and Berlin; visited Athens in 1837; and later accompanied Otfried Müller in his travels through Greece. In 1844-50, he was tutor to the Crown Prince Frederick of Prussia, afterward Emperor Frederick III. In 1856, he became professor at Göttingen, whence he was called in 1863 to the University of Berlin. He was one of the most distinguished scholars of his day and a writer and teacher of great force and influence. Among his works are *Klassische Studien*, *Peloponnesos*, *Olympia*, *Ephesos*, *Altertum und Gegenwart*, *Griechische Geschichte*, and *Die Ausgrabungen zu Olympia*.

Curzon (*kûr'zŏn*) **of Kedleston, George Nathaniel Curzon, Baron (1859-1925)**, English statesman and author, was born in Kedleston. He was graduated from Balliol College, Oxford. In 1885, he was assistant private secretary to the Marquis of Salisbury and entered Parliament the next year as a Conservative. He became secretary of foreign affairs in 1895 and was made governor general of India in 1899, introducing numerous reforms in taxation and administration. He resigned in 1905 as a result of a disagreement with Lord Kitchener. As chancellor of Oxford University, in 1908, he revised the university's constitution. The same year, he was made a peer and became a member of the House of Lords, of which he was leader from 1916 to 1924. He advocated universal military service and opposed woman suffrage. During World War I, he was president of the British Air Board, and he served as secretary of foreign affairs, 1919-24. His publications include *Russia in Central Asia*, *Problems of the Far East*, and *Tales of Travel*.

Cushing, Frank Hamilton (1857-1900), American ethnologist, was born at Northeast, Pa. He entered the National Museum at Washington and, in 1875, began making collections of Indian relics for the department of ethnology. He lived among the Zuñi Indians and wrote extensively on their traditions, customs, and remains. He also discovered the remains of an aboriginal people on the cost of Florida in 1896. He wrote *Zuñi Fetiches*, *Adventures in Zuñi*, and *Zuñi Folk-tales*. Died at Washington.

Cushing, Harvey Williams (1869-1939), American surgeon, was born at Cleveland, Ohio. After being graduated from Yale University and Harvard Medical School and studying also at Johns Hopkins and European hospitals, he taught at Johns Hopkins University until 1911, then became professor of surgery at Harvard University. He developed the method of performing surgical operations with local anesthesia. He discovered the functions and disorders of the pituitary body and became known also for his operations on the nervous system and brain tumors. His *Life of Sir William Osler* in 1925 received a Pulitzer prize award.

Cushman (*kōōsh'măn*), **Charlotte Saunders (1816-1876)**, American actress, was born at Boston, Mass. She appeared first in opera in 1835 and later in the same year as Lady Macbeth, which she afterward made one of her most celebrated roles. Among her many parts, both tragic and comic, which included Bianca, Rosalind, Goneril, Nancy Sikes, Lady Teazle, and Cardinal Wolsey, her Meg Merrilies was of unusual distinction. In 1844, after a tour in America with Macready, she made a successful trip to England, which she revisited many times. In 1856, she went to Rome. Throughout her distinguished career she was esteemed not only as a great artist but as a noble woman. She retired from the stage in 1875. She was elected to the American Hall of Fame, 1915.

Custer, George Armstrong (1839-1876), American soldier, was born at New Rumley, Ohio. He was graduated from West Point in 1861 and served with distinction through the Civil War. As a cavalry commander in the West, he several times defeated the hostile Indians; but, on June 25, 1876, he attacked, on the Little Big Horn, Mont., a force of Sioux who outnumbered him ten to one, and he and five companies of cavalry were surrounded and killed to the last man. As a brilliant, daring, cavalry officer, Custer had few equals, but, in the Little Big Horn engagement, he undoubtedly permitted his impetuosity to master his judgment. His wife, Elizabeth Bacon Custer, accompanied him in many campaigns and became well known as the author of *Boots and Saddles*, *Tenting on the Plains*, and *Following the Guidon*.

Cuvier (*kü'vyā'*), **Georges Chrétien Léopold Frédéric Dagobert (1769-1832)**, French naturalist and the founder of comparative anatomy, was born at Mompelgard, now Montbeliard, France. In 1784, he was admitted to the Academy in Stuttgart, where he distinguished himself for great receptivity and brilliancy of mind.

At the age of 19, Cuvier became tutor to the only son of Count d'Héricy in Normandy. Here Cuvier became intimate with the Abbé Tessier, a noted authority on agriculture, who had fled from Paris during the Revolution to a small town near the residence of the Count. Under the stimulation of Tessier, Cuvier devoted himself assiduously to the study of natural phenomena.

In 1795, Cuvier was invited to Paris as a member of the commission of arts, newly organized by the Revolutionary government. At the Jardin des Plantes, he soon became professor of natural history and assistant super-

intendent of the botanical gardens. There he continued his studies on the structure of animals and, in 1798, produced his *Elementary View of the Natural History of Animals*. Other investigations made at this time enabled him subsequently to write the important *Researches on Fossil Bones*.

Cuvier was made a member of the National Institute of France in 1796, and, four years later, he was appointed professor of the philosophy of natural history in the College de France. He continued, however, to act as professor at the Jardin des Plantes. Napoleon soon detected Cuvier's administrative skill and made him one of six inspectors to establish public schools in the principal towns of France. Cuvier opened the lycees of Marseilles, Nice, and Bordeaux and organized the universities of Piedmont, Genoa, Tuscany, and Rome. His labors extended also into the Netherlands and the Hanseatic towns.

In 1814, Cuvier was appointed councilor of state, and, the following year, he became chancellor of the University of Paris. In 1817, he published *The Animal Kingdom* and, in 1818, was elected a member of the French Academy.

Through Cuvier's careful and laborious observation of the analogies of internal structure, the whole animal kingdom was brought into systematic arrangement. To him is due the conversion of natural history into a science of exact and severe induction. He originated the classification that is the basis of modern zoology. He is accredited also with the foundation of the new science of paleontology.

Cyrus the Great (c. 600 B. C. -529 B. C.), commonly called Cyrus the Elder, founder of the Persian empire. Much of a legendary character attaches to his birth and early youth. According to Herodotus, he was the son of Cambyses, a Persian noble, and of Mandane, daughter of Astyages, the Medo-Persian king. His birth was a source of alarm to his grandfather, Astyages, who had previously had a dream the interpretation of which portended that the offspring of Mandane would one day be the ruler of all Asia. He therefore contrived to get the infant into his own hands and gave it to Harpagus, his chief servant, with orders to put it to death. Harpagus promised to do so, but intrusted it secretly to the care of a herdsman, who brought it up together with his own children. The young Cyrus quickly distinguished himself among his companions.

Meanwhile the tyranny of Astyages had made him hateful to his subjects, and, by the help of the crafty Harpagus, Cyrus formed a party among the Medes favorable to his designs. Putting himself at the head of his Persian troops, Cyrus advanced into Media and overthrew the forces of Astyages, 550 or 549 B. C. After consolidating his dominions, Cyrus proceeded to conquer the surrounding nations. The kingdom of Lydia first yielded, 546 B. C., and its king, the famous Crœsus, fell into his hands. Ultimately, the whole of Asia Minor was subdued.

Cyrus's crowning triumph, however, was his capture of the city of Babylon, the metropolis of Assyria, 538 B. C. The city is said to have fallen without fighting. Through the instrumentality of Cyrus, the Jews were delivered from their captivity and were allowed to return to Palestine. While attacking the Massagetæ, a tribe dwelling to the northwest of the Caspian, Cyrus was defeated and slain.

Cyrus the Younger (c. 424 B. C.-401 B. C.), son of Darius and governor of the western provinces of Asia Minor. After unsuccessfully plotting against his elder brother, Artaxerxes, he raised a large army, including about 13,000 Greek soldiers, and marched against him. Cyrus was slain in the moment of victory at Cunaxa, 401 B. C. The victory was due mainly to Cyrus's Greek force, which, after being treacherously deprived of its generals and reduced in number to about 10,000, was led back to Greece by Xenophon.

Czerny (*chĕr'nê*), **Karl (1791-1857),** Austrian pianist and composer, was born in Vienna. He received his first musical instruction from his father. He was a favorite pupil of Beethoven and studied also under Clementi. At an early age, he won great fame both as a pianist and as a teacher, numbering among his pupils Liszt, Thalberg, and Kullak. He was a prolific composer and his instructive works, such as *The School of Velocity, Daily Studies, The School of Virtuosity,* and *The School of Fingering,* are of permanent value. At his death, his fortune was left largely to the Vienna Conservatory.

Daguerre (*dà'gâr'*), **Louis Jacques Mandé, (1789-1851),** French inventor, was born at Cormeilles. He discovered the daguerreotype process of photography, by which the portrait was fixed on a plate of copper thinly coated with silver, by the successive action of the vapors of iodine, bromine, and mercury; in this invention he was associated with M. Niépce. He was also celebrated as a dioramic painter; was named by the French government as an officer of the Legion of Honor; and was granted a pension of 6000 francs. Died near Paris.

Daingerfield, Elliott (1859-1932), American religious and landscape painter, was born at Harpers Ferry, Va.; studied drawing and painting at the Art Student's League, New York. He first exhibited at the National Academy of Design, 1880; studied in Europe, 1897; and later became professor of painting in the school of design, Philadelphia. Among his religious subjects are the paintings in the Church of Saint Mary the Virgin, New York, a "Madonna and Child" and "The Story of the Madonna." His landscapes include "Slumbering Fog," in the Metropolitan Museum, New York; "The Midnight Moon," Brooklyn Museum; and "Pearls of the Morning."

Daladier (*dà'là-dyā'*), **Edouard (1884-),** French statesman, was born at Carpentras, Vaucluse, France. Educated at Lyons, he taught school until World War I, in which he served, rising to the rank of captain. He was elected a deputy in 1919 as a radical socialist. His first cabinet position was the ministry of war in 1925. Becoming leader of his party in 1927, he held various cabinet posts and headed two short-lived governments prior to 1938. In that year, as prime minister, he participated in the "appeasement" conference with Hitler at Munich. He led France, as an ally of Great Britain, into war against Germany in 1939. His government fell in early 1940. After the defeat of France he was arrested by the Vichy government. Released at the end of the war, he was elected a member of the National Assembly.

Dalberg-Acton, Sir John Emerich Edward. See *Acton, Baron.*

D'Albert. See *Albert, Eugen Francis Charles d'.*

D'Alembert. See *Alembert, Jean le Rond d'.*

Dali (*dä'lê*), **Salvador (1904-),** Spanish artist, was born in Catalonia. His paintings, depicting Freudian dream symbols with brilliant draftsmanship and imagination, express "Surrealism" more exactly than any other art form. These works, along with his personal showmanship, have made him world-famous, and have made "Daliesque" a well-known adjective.

Salvador Dali studied at the Madrid Academy of Fine Arts, where his experiments were too extreme for the faculty. He exhibited first at Barcelona in 1925, and became a sensation. He went to Paris, where he became a friend of the artists Picasso and Miro, and began his consummate interest in Freudian psychology. Dali has lived mainly in the United States since 1940. His most famous paintings are "The Persistence of Memory," which shows melted watches in an eerie beach setting, and a portrait of his wife. He has designed memorable ballet scenery and costumes. His remarkable versatility has also reached into advertising and jewelry designing.

Dallin, Cyrus Edwin (1861-1944), American sculptor, was born at Springville, Utah. In his early years, he was closely associated with Indian life, in the portrayal of which he has excelled all other American plastic artists. He studied under Truman Bartlett in Boston and under Chapu in Paris. His "Signal for Peace," now in Lincoln Park, Chicago, was inspired by a visit of Buffalo Bill's wild west show to Paris. "The Medicine Man," in Fairmount Park, Philadelphia, is ranked among the most notable efforts of American sculptural art. Among his other works are a statue of Sir Isaac Newton in the Congressional Library, "Don Quixote," "Peace or War," "The Appeal to the Great Spirit," and "The Spirit of Life."

Dalou (*dà'lōō'*), **Jules (1838-1902),** French sculptor, was born in Paris. He studied sculpture under Carpeaux and Duret and, in 1867, exhibited examples of his work at the French Salon. During the troublous period of the Commune, 1871, he took refuge in England. Through his appointment as instructor in the National Art Training School at South Kensington, he rapidly won a high reputation and took a leading part in the revival of English sculpture. While in England, he executed "Maternity," "The Reader," and "Woman Telling Her Beads."

After Dalou's return to France in 1879, he produced a long series of notable sculptural works, including the "Triumph of Silenus," in the Luxembourg, and "The States General," in the Chamber of Deputies, Paris. His most elaborate achievement, "The Triumph of the Republic," erected after 20 years' work, was executed for the City of Paris. For his later work Dalou chose subjects chiefly among peasants and artisans.

Dalton (*dôl'tŭn*), **John (1766-1844),** British chemist and physicist, was born near Cockermouth. He taught mathematics and physics in Manchester; made his first appearance as an author in 1793 in a volume of his observations and essays; and, in 1808, published *A New System of Chemical Philosophy.* In this work he set forth for the first time the main features of the atomic theory, which revolutionized the science of chemistry and led to many of the most valuable developments in physical science. He set forth also the law of the expansive force of steam and other gases, which is known as Dalton's Law, or the law of partial pressures. See *Atom.*

Daly, John Charles, Jr. (1914-), radio correspondent and news analyst, was born at Johannesburg, South Africa, and came to the United States in 1923. After attending Boston College, he joined the Columbia Broadcasting Company as a reporter and news commentator. He was White House correspondent and special events reporter from 1937 to 1941, and during and after World War II acted as correspondent for CBS in Europe, Africa, and South America. In 1949 he joined the American Broadcasting Company in the same capacity, and has since become vice president of that organization in charge of public affairs and sports. Daly is well known, not only for his news broadcasts, but also for his work as a moderator of television programs on various networks of which perhaps the most popular is "What's My Line?"

Dam (*dăm*), **Henrik (1895-)**, Danish-American biochemist, was born at Copenhagen, Denmark. He taught at the University of Copenhagen from 1920, becoming professor of biochemistry in 1929. Leaving Denmark when Germany conquered it in 1940, he was made professor *in absentia* at the Copenhagen Polytechnic Institute in 1941. In 1942 he became senior research associate at the University of Rochester's School of Medicine, where he continued researches, previously begun, which led to his discovery of Vitamin K, a substance which controls the clotting of blood. In 1943, he received half the Nobel prize in medicine for this discovery.

Damien de Veuster (*dă'myăN' dē vû'stâr'*), **Joseph (1840-1889)**, better known as "Father Damien," Roman Catholic missionary, was born near Louvain, Belgium. Sent on a mission to Honolulu and learning of the neglected state of the lepers, he volunteered to cast his lot with theirs. He long worked single-handed, but was ultimately joined by other priests. In 1885, the malady appeared in him, yet he continued unabated his heroic labors until near his death. In 1936 his remains were sent to Belgium.

Damrosch (*dăm'rŏsh*), **Leopold (1832-1885)**, composer and conductor, was born in Posen, Prussia. In 1854, he gave up medicine to study music. In 1855, he appeared as a concert violinist in Magdeburg. He became director in Posen and in Breslau. In 1871, he came to New York as director of the Arion Society, where, in 1873, he founded the Oratorio Society and, in 1877, the Symphony Society. In 1884, he successfully established German opera at the Metropolitan Opera House, producing *Fidelio, Tannhäuser, Lohengrin, Die Walküre*, and other works. His musical compositions comprise works for the violin, an overture, several cantatas, and songs. He died at New York.

Damrosch, Walter Johannes (1862-1950), American musician, son of Leopold Damrosch, was born in Breslau, Prussia. He began to study the piano under his father before coming to the United States in 1871. He continued his musical education in New York and, in 1881, was made conductor of the Harmonic Society of Newark, N. J. In 1882, he became organist of Plymouth Church, Brooklyn, and, in 1885, succeeded his father as conductor of the Oratorio and Symphony societies. In 1894, he organized the Damrosch Opera Company, devoted chiefly to the production of Wagner opera, which appeared under his direction in many cities of the United States. Through his efforts in 1903, the New York Symphony Society was reorganized as a permanently established orchestra, and he was its director until 1927. The next year he became music counsellor for the National Broadcasting System. In 1932 he was elected to the American Academy of Arts and Letters. His musical compositions include three operas, *The Scarlet Letter, Cyrano de Bergerac*, and *The Man Without a Country; Manila Te Deum*, a sonata for violin and piano; and a number of songs. He re-formed the bands of the American expeditionary force in World War I. He wrote *My Musical Life*.

Dana (*dā'nă*), **Charles Anderson (1819-1897)**, American journalist, was born at Hinsdale, N. H. From 1849 to 1862, he was managing editor of the New York *Tribune* and, from 1863 to the close of the Civil War, was assistant secretary of war. In 1868, he became part owner and editor in chief of the New York *Sun*, and for the remainder of his life continued the successful management of that paper in the interests of the Democratic party. By his brilliant intellect, incisive style, and thorough knowledge of the art of newspaper making, he became one of the foremost journalists of his time. Together with George Ripley he planned and edited the *American Cyclopædia*.

Dana, James Dwight (1813-1895), American geologist and educator, was born at Utica, N. Y., and was graduated from Yale, 1833. From 1838 to 1842, he was a member of the Wilkes exploring expedition, sent out by the United States government. His collections, chiefly from little-known parts of the Pacific Ocean, were so extensive that he devoted almost 13 years to their study and described nearly 900 new species of marine life. In recognition of his important service to science, he was made professor of natural history at Yale and occupied the chair with distinction from 1855 to 1890.

Dana possessed a vivid scientific imagination and remarkable keenness of perception and analysis. His discussions of continents, mountain building, and volcanoes establish his position among the most eminent scientists of the 19th century. He was an inspiring instructor and the author of numerous scientific works, including *A System of Mineralogy, Manual of Geology, Corals and Coral Islands*, and *The Geological Story Briefly Told*.

Dana, Richard Henry (1815-1882), American lawyer and author, was born at Cambridge, Mass. He entered Harvard College in 1832, but suspended his studies in 1834 on account of the weakness of his eyes. He then shipped as a common sailor on a Pacific voyage, a record of which is given in his narrative *Two Years Before the Mast*, a book of sailor life which has become a classic. He was graduated at Harvard, 1837; studied law and was admitted to the bar in 1840; in 1861, was United States attorney for Massachusetts; and, in 1867-68, was counsel for the United States government in the proceedings against Jefferson Davis. He published *The Seaman's Friend* and *To Cuba and Back* and edited Wheaton's *International Law*.

Daniels, Josephus (1862-1948), American editor and politician, was born at Washington, N. C. He was educated at the Collegiate Institute at Wilson, N. C., where he became editor of the *Advance* in 1880. Later he studied law and was admitted to the bar in 1885. He subsequently became editor of the Raleigh *State Chronicle*, which he combined in 1894 with the *News and Observer*. From 1887 to 1893, he was state printer and, from 1893 to 1895, was chief clerk in the Department of the Interior at Washington. He was made Democratic national committeeman from North Carolina in 1895 and, in 1912, managed the publicity department of Woodrow Wilson's presidential campaign. He was appointed secretary of the navy by President Wilson in 1913. In this capacity, he favored a large navy; provided training in various trades for enlisted men; and abolished the sale of intoxicating liquors within the navy. In 1921, he resumed his editorial activities. He was ambassador to Mexico, 1933-41.

Dannecker (*dăn'ĕk-ĕr*), **Johann Heinrich von (1758-1841)**, German sculptor, was born near Stuttgart; was educated by the Duke of Württemberg, who had become his patron; and was made professor of sculpture in the Academy at Stuttgart. His earlier subjects were from Greek mythology, and his later ones were religious, the principal of the latter being a colossal "Christ." He executed many fine busts of contemporaries, such as those of Schiller, Lavater, and Gluck. "Ariadne on the Panther" is his best-known work. He was one of the most eminent sculptors of the classic school. His work, which reveals a continual struggle between the classic and the naturalistic style, stands between that of Canova and that of Thorvaldsen.

D'Annunzio. See *Annunzio, Gabriele d'*.

Dante (*dăn'tē*; It., *dän'tā*) **Alighieri (1265-1321)**, Italian poet, was born in Florence, Italy. His father was a lawyer, whose family was of honorable though not of noble descent. Of Dante's youth little is known. The first fact of importance is the extraordinary affection he conceived, when only nine years of age, for Beatrice Portinari. He is said to have studied at Bologna, Padua, and Paris; Boccaccio described him as skilled in painting and music. About 1297, some years after the death of Beatrice, Dante married Gemma Donati, a lady of noble family.

Political Career. All Italy was then divided between the Guelphs and the Ghibellines. Florence was also distracted by dissensions between the Whites, the party of the ennobled rich led by the Cerchi family, and the Blacks, the conservative nobility supported by the proletariat and led by the Donati family.

Dante appears to have taken an active part in public affairs. In Italian politics, he sided with the Guelphs, and, as a citizen of Florence, he was one of the Whites. When quite young, he fought against the Ghibellines at Campaldino in 1289 and also in the wars against the Pisans in 1290. In that year, the Whites came into power in Florence. The fame of Dante's studies and his reputation for inviolable firmness and honesty raised him, in the prime of life, to the highest dignities of the republic. In 1300, he was elected one of the priors of Florence, and, probably in that year, he began the *Divine Comedy*.

His political honors were short-lived. That same year, the party of the Whites was overthrown, and Dante was banished. He found himself forced to wander for several years, afflicted by poverty. In 1306, he was at Padua; in 1307, at Casentino; in 1309, at Paris; in 1313, at Pisa. When, some time later, he was offered permission to return to his beloved Florence, he refused in a magnificent letter that is still extant. The last of his wanderings, apparently, led him to the house of Guido Novello da

Polenta in Ravenna. Through the influence of Guido, Dante was sent as ambassador to the republic of Venice in 1321. Failing to obtain an audience, he returned to Ravenna, where he spent the few remaining months of his life.

Works. The dates and sequence of Dante's various works are matters of conjecture. Doubtless, the *New Life* is the earliest. It is an account of his love for Beatrice, written after her death. This exquisite little book is the outpouring of the incense of Dante's soul in gratitude to God for the joy of loving. Its prose is a finished model of language and style.

The *Banquet*, which takes the form of a commentary on some short poems of the author, is one of Dante's most important works. *On Monarchy*, in Latin, expounds his theory of the divinely intended government of the world by a universal emperor acting in harmony with a universal pope.

By far the most celebrated of Dante's works is the *Divine Comedy*, in which he gives a description of hell, purgatory, and heaven. It is expressed in the sublimest and most exquisite poetry. This poem may be said to have made the Italian language, which before was so rude and unformed that Dante himself, hesitating to employ it on such a theme, is said to have begun his poem in Latin. Probably no work in the world, except the Bible, has given rise to so vast a literature. The poem, as a whole, is a complete personification of the intense religious spirit of the middle ages, and it fully justifies the title "the Christian Homer," which posterity has bestowed upon its author. See *Divine Comedy*.

Danton (*dăn'tôn'*), **Georges Jacques (1759-1794),** French Revolutionist, was born at Arcis sur Aube, France. He was one of the most prominent figures in the first French Revolution and one of its most famous orators. As a member of the National Convention, he used all his influence to hasten the execution of Louis XVI; subsequently, as the president of the committee of public safety, he united with the other Revolutionary leaders to establish the revolutionary tribunal under whose authority persons believed to be opposed to the Revolution were disposed of. He quarreled, however, with Robespierre, by whom he was supplanted; and, by that very tribunal which he himself had established, he was condemned and guillotined.

Darius I (*da-ri'ŭs*) **(558 B. C.-486 B. C.),** became king of Persia (Iran) in 521 B. C. He captured Babylon after a siege of 20 months and conquered Thrace, but an expedition which he led against the Scythians failed. He sent two armies to Greece to avenge the destruction of Sardis by the Athenians, the first of which was repulsed by the Thracians and the second by the Athenians at Marathon in 490. He died while organizing a third expedition. He was a ruler of marked caution, skill, and energy.

Darius III, Codomannus (?-330 B. C.), the last ruler of the Persian empire, 336-30 B. C. Shortly after ascending the throne, he had to resist the advance of the Greeks under Alexander. His satraps were defeated at the river Granicus in 334, and Darius, having collected an immense army, was himself defeated at Issus, 333, where his mother, wife, sister, and other members of his family were made captive. At the battle of Arbela, 331, the Persian army was completely routed. Darius fled to Ecbatana, where he collected a new force. Alexander pursued him there, but, before being overtaken, Darius was assassinated.

Darling, Grace Horsley (1815-1842), English heroine. With the assistance of her father, who was keeper of the Longstone lighthouse on one of the Farne Islands, she rescued nine of the survivors of the wreck of the steamer *Forfarshire*, September 7, 1838. By a remarkable exhibition of courage, strength, and skill, the father and the daughter reached the sinking vessel and returned with five survivors. This deed of daring made Grace Darling and her father famous.

Darrow, Clarence (1857-1938), American lawyer and lecturer, was born at Kinsman, Ohio. Educated in the public schools, he was admitted to the bar in 1878. In his earlier years he rose to prominence in litigation against monopolistic corporations and in defense of labor leaders. Later, he defended many famous murder cases with extraordinary skill. He was convinced that crime is basically a social disease, and requires cure rather than punishment. A bitter foe of organized Christianity, he attained to wide celebrity as a lecturer on evolution, a mechanistic view of life, and related topics.

Dart, Raymond (1893-), educator and anthropologist, was born in Australia. Before completing his medical studies he served as demonstrator of anatomy at St. Andrew's College, Sydney, and, in 1918-19, was a captain in the Australian army medical corps. In 1928 he became professor of anatomy at the University of Witswatersrand, Johannesburg, South Africa. He has made extensive studies of fossil man and is president of the anthropological section Pan-African Congress. As a result of his discoveries of ape-man remains in South Africa he has been credited with adding an important new chapter to the story of evolution.

Darwin, Charles Robert (1809-1882), English naturalist and biologist, was born at Shrewsbury, England. His father was a physician and wished his son to adopt that profession. Accordingly, Darwin, at the age of 16, entered the University of Edinburgh; but repugnance to the practice of medicine sent him, in 1828, to Christ's College, Cambridge, with the expectation of preparing for the ministry. There he became acquainted with Henslow, the professor of botany, who did much to mold Darwin's dominant qualities and to shape his career.

Career. His zeal and proficiency in every department of natural science won Darwin the opportunity of traveling with Captain Fitzroy on the surveying voyage of the *Beagle*. After receiving his bachelor's degree, he sailed in December 1831 and did not return until October 1836. During this long voyage to the southern islands and South America, Darwin obtained an intimate knowledge of the fauna, flora, and geology of many climes. His contributions to geology, made in his subsequent reports to the government, showed his unlimited patience and careful habits in reaching conclusions through personal observation.

In 1839, Darwin married his cousin, Emma Wedgwood. In the same year, he published *Journal of Researches* and was made a member of the Royal Society. In 1842, he settled at Down, Kent, where he carried on experiments in greenhouse, garden, and paddock. Here he collected a library and wrote his books. Possessed of an ample private fortune, he had no need to undertake any teaching work or to expend his energy in gaining a livelihood. Darwin's impaired health in his later years limited his work.

Scientific Achievements. As early as 1834, while seeking to formulate an explanation of diversity in animals having the same ancestry, Darwin conceived that "by patiently accumulating and reflecting on all sorts of facts that could possibly have any bearing on the matter, some light might be thrown on the origin of species." This became the chief object of his investigations. In 1859, he published *On the Origin of Species by Means of Natural Selection*. The work created a profound sensation both in the scientific and in the nonscientific world.

Upon the specific doctrine laid down in *The Origin of Species*—particularly that of "natural selection," or the "survival of the fittest"—has been founded what is commonly known as "Darwinism." The popular conception that Darwinism is simply the theory of evolution applied to the origin of man is far from correct. Its novelty lies, not in the conception of evolution, but in an exposition of a probable cause of evolution so clear and cogent as to remove the theory from the sphere of philosophical speculation to that of practical life.

Darwin continued to work unremittingly on a great series of supplementary treatises. *The Fertilization of Orchids* appeared in 1862, *The Variation of Plants and Animals under Domestication* in 1868, and *The Descent of Man* in 1871. The last named work, hardly less famous than *The Origin of Species*, derives the human race from a hairy quadrumanous animal belonging to the great anthropoid group and related to the progenitors of the orangutan, chimpanzee, and gorilla. In it Darwin also developed his theory of sexual selection.

In addition to these and other volumes. his *Emotion in Man and Animals* was published in 1872, *Movement in Plants* in 1880, and *The Formation of Vegetable Mould* in 1881. He wrote many papers, besides, on minor phases of the great scientific issues of the day. To the end of his life he continued his painstaking and elaborate researches into the facts of nature. He died at Down and was buried in Westminster Abbey. See *Biology, History of*.

Darwin, Erasmus (1731-1802), English poet and physician, was born in Elton, Nottinghamshire. He studied at Cambridge, obtained a degree in medicine at Edinburgh, and settled at Lichfield as a physician. He was a man of great and varied talent, and, although some of his opinions were deemed extravagantly eccentric at the time, his ideas have been appreciated and utilized by later writers. His *Botanic Garden* was admired as a fine specimen of polished verse, and his *Zoonomia, or The Laws of Organic Life*, though discredited at the time, anticipated some of the tenets of the modern theory of evolution. He died at Derby. His third son, Robert Waring Darwin, an eminent physician, was the father of the famous Charles Robert Darwin.

Daubigny (*dō'bēn'yē'*), **Charles François (1817-1878),** French landscape painter, the youngest of the five great landscape artists of the Barbizon school, was born in Paris. He first studied art under his father and with an uncle; entered the studio of Delaroche in 1840; and thereafter exhibited almost annually at the salon. From the first, he was a landscape painter and became noted for his pictures of river scenery, fields, orchards, and the coasts of the English Channel. He chose subdued light effects, which he

executed with a fine sense of color values and of harmony. Among his best-known paintings are "Lock of the Optevoz," "Springtime," and "The Vintage," in the Louvre; also "Pool of Gylien," "The Harvest," "Beach at Villerville," "The Sheepfold," "Banks of the Oise," "Moonrise," and "Apple Orchard." Examples of his work are found in leading American galleries. Died in Paris.

Daudet (*dō'dā'*), **Alphonse** (**1840-1897**), French novelist and humorist, was born at Nimes, France; was educated at the Lyon Lycée; and, when only 17, settled in Paris. In the charming extravaganzas *Tartarin de Tarascon, Tartarin sur les Alpes,* and *Port Tarascon,* he good-naturedly caricatured his fellow southerners of the Provence. He described the sufferings of his early life in *Le petit chose* and in *Jack.* His *Lettres de mon moulin* and *Contes du lundi* contain prose sketches which rank among the greatest French classics. Daudet is noted for his charming, polished style, marked originality, and fine sense of humor. His characters are real and typical, and, like Dickens, whom he has been charged with imitating, he possessed the gift of laughter and tears. Among his other works are *Fromont jeune et Risler aîné, Le nabob, Les rois en exil, Sapho, La Belle Nivernaise, Trente ans de Paris,* and *Souvenirs d'un homme de lettres.* Died in Paris.

Davenport, Homer Calvin (**1867-1912**), American cartoonist, was born in Silverton, Ore. In his early life, he was at different times jockey, railroad fireman, and clown in a circus. In 1892, he was employed on the San Francisco *Examiner;* was taken to New York by W. R. Hearst, 1895, and placed on the New York *Journal;* originated the Mark Hanna $-mark suit of clothes and the giant figure of the trusts in 1899. While sometimes crude in draftsmanship, his cartoons are noted for vigor, directness, and stern satire. His "Uncle Sam" ranks among the best ever produced. He was the author of *Davenport's Cartoons; The Bell of Silverton, and Other Short Stories of Oregon;* and *The Diary of a Country Boy.*

Davey, John (**1846-1923**), American tree surgeon, was born in Somersetshire, England, and was largely self-educated. He learned floriculture and landscape architecture in Torquay, England, 1866-72. In 1873, he came to the United States, first settling at Warren, Ohio, whence, in 1881, he moved to Kent, Ohio, which became his permanent place of residence. In 1890, he introduced tree surgery, and, in 1908, organized the Davey Institute of Tree Surgery and also the Davey Tree Expert Company, of which he was president. Among his writings are *The Tree Doctor, A New Era in Tree Growing,* and *Primer on Trees and Birds.*

David (*dȧ'vēd'*), **Félicien César** (**1810-1876**), French composer, was born at Cadenet. He was a chorister and later chapelmaster in the Cathedral at Aix, and, at the age of 20, entered the Paris Conservatory. He became a member of the sect of Saint Simonists and later spent two years in Turkey, Egypt, and Syria. In 1844, his symphonic ode *The Desert* scored a notable success, followed in 1851 by an opera, *The Pearl of Brazil,* and in 1867 by *Herculaneum.* He became known as the "musical orientalist," and his use of oriental melodies inaugurated a new movement in French music. He greatly influenced Bizet, Massenet, and Delibes.

David, Jacques Louis (**1748-1825**), French historical and portrait painter, founder of the modern French classical school, was born at Paris; studied at Paris and Rome; and, during the Revolution, was artistic superintendent of grand national fêtes and solemnities. In 1804 Napoleon appointed him his first painter. His art is cold and severe but grand and noble. His paintings excel in composition and draftsmanship. Among them are: "Napoleon Crossing the Alps" and other historic portraits of Napoleon, "Rape of the Sabines," "Death of Socrates," "Leonidas at Thermopylæ," and a portrait of Madame Récamier. He died at Brussels. See *Paintings.*

David, Pierre Jean (**1789-1856**), French sculptor, known also as David d'Angers, was born at Angers, France. In spite of the opposition of his father, a wood carver, he resolved to become an artist. Tramping to Paris in 1808, he placed himself under Jacques Louis David, the painter. In 1811, his *rilievo* of the "Death of Epaminondas" gained the *grand prix,* and David proceeded to Rome, where he became intimate with Canova. In 1816, he returned to France. A statue of the great Condé established his reputation. While trained in the classical school, he portrayed nature with freedom and truth, excelling in portrait sculpture, in which he was the first to insist upon contemporary costume. Among his works are busts of Washington and Lafayette, a statue of Jefferson, and the tomb of Marco Bozzaris, at Missolonghi, Greece.

Da Vinci, Leonardo. See *Vinci, Leonardo da.*

Davis, Bette (**Ruth Elizabeth**) (**1908-**), actress, was born at Lowell, Mass., and was educated at Cushing Academy, Ashburnham. She began work in motion pictures in 1931, and appeared in *Of Human Bondage, Dangerous, Jezebel, Elizabeth and Essex,* and other pictures. She received the award of the Moving Picture Academy of Arts and Sciences as the best actress of the year in 1935 and 1938.

Davis, Elmer (**Holmes**) (**1890-**), American writer, was born at Aurora, Ind. He attended Franklin College, and held a Rhodes scholarship at Oxford. From 1914 to 1924 he was on the staff of the *New York Times.* In 1939 he became news analyst with the Columbia Broadcasting System and gained a high reputation for soundness and accuracy. In June 1942 he was appointed head of the Office of War Information, with authority over the dissemination of official news and propaganda and held this position through the war. His writings include *Morals for Moderns, Show Window, Not to Mention the War,* and *But We Were Born Free.*

Davis, Jefferson (**1808-1889**), American statesman and soldier, was born in Kentucky; was graduated from West Point, 1828; and later represented the state of Mississippi in the House and Senate. Leaving Congress he acquired distinction in the Mexican War. When Pierce was elected president in 1853, Davis was appointed secretary of war. At this period, he exercised a powerful influence in the administration—ruling, in fact, the president as well as the greater number of the members of the cabinet.

When Buchanan became president, Davis left the cabinet, but was returned to the Senate by the legislature of Mississippi, which office he retained until the secession of his state. In February, 1861, Davis was chosen president of the Confederate states for one year and, in 1862, was re-elected for six years. The manner in which the new constitution was drawn up by Davis, his military skill, administrative capacity, and unwearied activity fully justified the choice; his disinterestedness endeared him to the South. After the fall of Richmond, in 1865, he was captured when endeavoring to escape and was imprisoned in Fort Monroe for two years. He was released on bail in 1867 and was finally set at liberty by the general amnesty of 1868. He published *The Rise and Fall of the Confederate Government,* 1881.

Davis, or **Davys, John** (**c. 1550-1605**), English navigator, was born at Sandridge, near Dartmouth. During 1585-87, he undertook three arctic voyages in search of a northwest passage to Asia. In the last voyage, he sailed as far as 73° N.; explored the coasts of Baffin Bay and Greenland; and discovered Davis Strait. He next made a voyage to the South Seas and discovered the Falkland Islands in 1592. After his return, he published *The Seaman's Secrets* and *The World's Hydrographical Description.* He invented the Davis quadrant, long used by navigators. With Baffin and Hudson, he ranks as one of the greatest early arctic explorers. While serving as pilot of an English ship, he was killed by Japanese pirates off Bintang, near Sumatra.

Davis, Rebecca Harding (**1831-1910**), American novelist, was born at Washington, Pa. In 1863, she married L. Clarke Davis, a Philadelphia journalist. Her sons, Richard Harding Davis and Charles Belmont Davis, achieved literary success while she was still an active writer. She was the earliest American author to introduce the labor question into fiction. Her numerous writings embrace novels, short stories, and sketches, including *Life in the Iron Mills, A Law unto Herself, Dr. Warrick's Daughters, Bits of Gossip,* and *Silhouettes of American Life.*

Davis, Richard Harding (**1864-1916**), American novelist and journalist, son of Rebecca Harding Davis, was born in Philadelphia. He was graduated from Lehigh University; subsequently studied at Johns Hopkins; and began his journalistic career on Philadelphia papers. He served as war correspondent in the Turko-Greek, Spanish-American, South African, Russo-Japanese, and World I wars. His novels and stories, which abound in incident and adventure, are fresh and animated in style. His works of fiction and travel include *Soldiers of Fortune, Three Gringos in Venezuela, Cuba in War Time, Exiles, The King's Jackal, The West From a Car Window, In the Fog, The Bar Sinister, With the Allies,* and *Somewhere in France.* He wrote also the following plays: *Taming of Helen, The Dictator, Blackmail,* and *Zone Police.* He died from a disease brought on by the hardships he suffered in the retreat from Serbia when with the British and French armies there.

Davisson, Clinton Joseph (**1881-**), American physicist, was born at Bloomington, Ill. After being graduated from the University of Chicago and Princeton University, he taught physics at the Carnegie Institute of Technology for six years, beginning in 1911, and then joined the technical staff of the Bell Telephone laboratories. Among his many discoveries is the diffraction of electrons by crystals, for which reason chiefly he was awarded half the Nobel prize for physics in 1937. This discovery created a new tool for investigation of atoms.

Davitt (*dȧv'it*), **Michael** (**1846-1906**), Irish journalist and political leader, was born at Straid, Ireland. The family emigrated to Haslingden in Lancashire, England, 1851. In

1857, the boy lost his right arm through a machinery accident. He joined the Fenian movement, and was sentenced in 1870, to 15 years' penal servitude. He was released in 1877, and began an anti-landlord crusade, which culminated in the Irish Land League, 1879. In 1881-82, Davitt was again imprisoned. His *Leaves From a Prison Diary* was published in 1885. He was elected to Parliament in 1892, where he favored a more extreme Irish policy than that supported by Parnell. Died in Dublin. See *Land League.*

Davout (*dȧ'vōō'*), **Louis Nicolas (1770-1823),** French marshal, was born at Annoux, France; was educated with Bonaparte at the Military School of Brienne. As general, he accompanied Bonaparte to the East. and was chiefly instrumental in winning the victory at Abukir. Created a marshal of France in 1804, he acted a brilliant part at Australitz, Auerstadt, Eckmuhl, Wagram, and in the Russian campaign of 1812. After Waterloo, Davout received the command of the remnant of the French army. At the Second Restoration, he was deprived of all his titles; but, in 1817, these were restored, and, in 1819, he was made a peer of France.

Davy, Sir Humphry (1778-1829), English chemist, was born at Penzance, in Cornwall. He was educated at various local schools and, in 1798, was made laboratory assistant in Beddoes Institution at Bristol. Two papers in 1801 on nitrous oxide, which he had discovered the previous year, led to his appointment as lecturer at the Royal Institution, London, and, in 1802, he was made professor. His Bakerian lecture in 1806 entitled *On Some Chemical Agencies of Electricity* advanced the view that chemical affinity is the mutual electrical attraction of the ultimate particles of matter, a viewpoint which marked a turning point in the development of the science.

Davy's electrolytical experiments enabled him to decompose potash and to secure the pure metal potassium in 1808. In 1809, he obtained the metal sodium and alloys of calcium, strontium, and barium, and proved that hydrochloric acid is a compound of hydrogen and chlorine. In 1815, he invented the miner's safety lamp, one of the most valuable gifts of science to humanity. He was knighted in 1812, made a baronet in 1818, and elected president of the Royal Society in 1820. His chief works are *Elements of Chemical Philosophy* and *Elements of Agricultural Chemistry.*

Dawes (*dôz*), **Charles Gates (1865-1951),** American financier, soldier, statesman, and diplomat, was born at Marietta, Ohio. He was educated at Marietta College and the Cincinnati Law School; practiced law from 1887 to 1894; and thereafter became financially interested in the gas business in a number of American cities. Supporting McKinley's presidential candidacy in 1896, he was made comptroller of the currency from 1897 to 1901, thereafter becoming president of a trust company founded by himself. In 1918, he was made a brigadier general and chairman of the general purchasing board for the American army in France, later serving on the liquidation commission of the Allies.

Under an appointment in 1921, he organized a budget system for the United States government. In 1923, an international committee under his chairmanship drew up the so-called Dawes plan for solving the economic problems connected with German reparations, an accomplishment that brought him one-half the Nobel peace prize in 1925. He was elected vice president of the United States in 1924. In 1929, he accepted an invitation to reorganize the financies of the Dominican Republic. In the same year, he was appointed ambassador to Great Britain. When President Hoover organized the Reconstruction Finance Corporation in 1932, Dawes was chosen to head it, but he resigned the same year to conserve his threatened banking interests in Chicago.

Dawson, Sir John William (1820-1899), Canadian geologist and naturalist, was born at Pictou, Nova Scotia; studied at Edinburgh; and afterward devoted himself to the natural history and geology of Nova Scotia and New Brunswick. He was appointed superintendent of education in Nova Scotia, 1850; from 1855 to 1893, he was professor of natural history and vice chancellor of McGill University, Montreal. He was knighted in 1884. He was an authority on Canadian geology and one of the ablest opponents of the Darwinian theory of the origin of life forms. Among his works are *Archaia, Story of the Earth and Man, Dawn of Life, Origin of the World,* and *Relics of Primeval Life.* Died at Montreal.

Day, Edmund Ezra (1883-1951), American economist and educator, was born at Manchester, N. H. After being graduated from Dartmouth College and Harvard University, he taught economics at Dartmouth, 1907-10, and at Harvard from 1910 to 1923, when he was made professor of economics at the University of Michigan. From 1927 to 1937, he was associated with foundations supported by Rockefeller funds, directing the flow of financial assistance for research in social sciences. In 1937, he was made president of Cornell University.

Deák (*dā'ȧk*), **Ferencz (1803-1876),** Hungarian statesman, was born at Sojtor, Zala, Hungary; practiced as an advocate; entered the national diet in 1832; and played the part of a moderate in the revolution of 1848. He did more than anyone else to establish, in 1867, the Austro-Hungarian empire and is regarded as one of the ablest European statesmen of his century. As an orator, he won distinction by the sheer force of his logic.

Deakin (*dē'kĭn*), **Alfred (1856-1919),** Australian statesman and orator, was born in Melbourne, Australia; was graduated from Melbourne University; and practiced law. He was elected to the parliament of Victoria in 1879. He took a leading part in the organization of the Commonwealth of Australia and became its first attorney general in 1901. In 1903, he became premier and continued to hold that office, with two interruptions, until 1910, when he led the opposition party. He favored a protectionist policy and the development of a navy. For many years, he was a reconciling influence between the Conservatives and the Labor party. His published writings include *Temple and Tomb* and a number of works on irrigation.

Debs (*dĕbz*), **Eugene Victor (1855-1926),** socialist, writer, lecturer, and labor organizer, was born in Terre Haute, Ind.; received a common school education; and, after some years spent as a workman and a clerk became a member of the Indiana legislature, 1885. In 1893 he organized and headed the American Railway Union, which, in the Pullman strike of 1894, ordered the trainmen not to move Pullman cars. A federal court injunction, one of the first issued in a labor case, forbade such interference, and Debs received a prison sentence for violating the injunction. He was nominated as the candidate of the Social Democratic party for president in 1900 and as the Socialist party's presidential candidate in succeeding presidential elections. In 1918 he protested against numerous arrests of pacifists and was himself arrested for sedition, being sentenced to 10 years' imprisonment. He was pardoned in 1921 and resumed his activities in behalf of the Socialist party.

Debussy (*dē-bü'sē'*), **Claude Achille (1862-1918),** French composer, was born at Saint Germain. At the age of 11 years, he entered the Paris Conservatory. In 1884, he won the *grand prix de Rome* with his cantata *L'Enfant prodigue.* This was followed by a symphonic suite, *Printemps,* which was pronounced unduly modern. His next compositions were *La Demoiselle élue,* for female voices and the orchestra; *Petite Suite,* for the piano; and *Suite Bergamesque.* In 1902, his symphonic poem *L'Après-midi d'un faune* elicited much discussion but enhanced his reputation. This was followed in the same year by his first dramatic work, *Pelléas et Mélisande,* which gave him unquestioned leadership of the new French school. It came to be recognized as one of the most important musico-dramatic works since the death of Wagner.

Debussy's later important works include three symphonic sketches entitled *La Mer;* the ballets *Jeux* and *Crimen Amoris; Chimène; Histoire de Tristan; Le diable au Beffroi;* and *La chute de la maison Usher.* He also composed a number of piano pieces and songs. He excels in refined, fascinating instrumentation and, by using the higher overtones and the whole-tone scale, has achieved many new musical effects. In particular he evoked new effects from the piano, exerting an influence in that respect unmatched since Chopin.

Decamps (*dē-kăN'*), **Alexandre Gabriel (1803-1860),** French painter, was born at Paris and studied in a desultory manner under Pujol, David, and Ingres. In 1827-28, he journeyed in Italy and the Levant. He excelled in genre and landscape pictures, in which he introduced Oriental subjects saturated in sunlight and rich, warm color. With Delacroix, he laid the foundation of orientalism in French art. His "Defeat of the Cimbri" had a great success. Other well-known works from his brush are "Cafe in Asia," "Street of a Roman Village," and "The Monkey Connoisseurs." Many fine examples of his paintings are in the Louvre, Paris; in the Wallace collection, London; and in the Metropolitan Museum, New York.

De Candolle (*dē kăN'dôl'*), **Augustin Pyrame (1778-1841),** Swiss botanist, was born at Geneva and studied in Geneva and Paris. He first lectured on botany at the Collège de France in 1804. His *Flore Française* appeared in 1805. He traversed France and Italy in 1806-12, investigating their botany and agriculture and, in 1807, was appointed to a chair at Montpellier. In 1816, he retired to Geneva, where a professorship of botany was founded for him. His chief work, which has been of great value to the botanists of the world, was his monumental *Prodromus Systematis Regni Vegetabilis,* of which he was able to complete only 7 volumes. To these his son Alphonse de Candolle added the remaining 14 volumes.

Decatur (*dē-kā'tŭr*), **Stephen (1779-1820),** United States naval officer, was born at Sinnepuxent, Md. and entered the navy in 1798. In 1804, he led a small party which burned, in the harbor of Tripoli, the American frigate *Philadelphia* after its capture by the Tripolitans. For this exploit, which Admiral Nelson pronounced "the most daring of the age," he was raised to the rank of captain. Having taken command of the frigate *United States*, he captured the British frigate *Macedonian*, 1812. In 1815, he captured two Algerine vessels of war and compelled the Dey of Algiers to sue for peace. He was killed in a duel by Commodore James Barron.

Decker, Sarah Platt (?-1912), American woman suffragist and social reformer, spent her early years in Holyoke, Mass.; later removed to Denver, Colo., where she first came into prominence as president of the Women's Club of that city. In 1898, she was elected first vice president of the General Federation of Women's Clubs and afterward served four years as president of the organization. She took an active interest in civic affairs, doing effective work for five years as president of the Colorado State Board of Charities and Corrections. She also became a member of the State Civil Service Commission, the first woman to hold an office of this character.

Defoe (*dē-fō'*), **Daniel (c. 1660-1731),** English novelist and political writer, was born in London. In 1685, he took part in the rebellion of the duke of Monmouth, but luckily escaped being punished on its suppression. After this, he engaged in trade, but a series of misfortunes finally led him to forsake it. About 1697, he became a prolific writer of pamphlets on political and religious subjects. In 1701, he published a satirical poem, *The True-born Englishman*, which was written in vindication of King William. In 1703, he was pilloried and imprisoned on account of statements in his pamphlet, *The Shortest Way With Dissenters*. In 1704, he established a newspaper, *The Review*, and also acted as a secret agent for Lord Oxford. In 1719 appeared *Robinson Crusoe*, the most popular of all his works, which has become one of the world's classics of fiction. Defoe, in rapid succession, produced other notable works of fiction, including *Moll Flanders*, *Journal of the Plague Year*, *Adventures of Roxana*, and the *Memoirs of a Cavalier*.

De Forest, Lee (1873-), American inventor, was born at Council Bluffs, Iowa. He was graduated from Yale University in 1899 and, devoting his attention to wireless telegraphy, became one of the pioneers of its scientific and industrial development in America. Among his many inventions is the so-called audion, by means of which the long-distance telephone and radio broadcasting became possible. He invented also a system of sound recordings on films making practicable motion pictures with sound. He made the first radio news broadcast in 1916. By reason of his basic inventions and his early installations of radio stations, he is sometimes referred to as the "father of radio."

Degas (*dē-gä'*), **Hilaire Germain Edgar (1834-1917),** French painter, was born in Paris. Famous for his warmly colorful paintings, he was destined by his father to be a lawyer, but gave this up for art. His long career spanned the births and the passings of many schools and art techniques, but Degas retained the basic impressionism that he helped to create with Manet, Monet, and Renoir, and used it with brilliant success. Critics appreciate Degas for his striking, yet basically delicate, color, and for the moods that his paintings evoke. His famous paintings of ballet dancers and of Parisian theater scenes are said to represent perfectly the mood of the era in which he lived. His work influenced Toulouse-Lautrec, Paul Gauguin, and Pablo Picasso. Degas, always misanthropic, committed suicide in Paris at the age of eighty-three.

De Gasperi (*dĕ gäs-pĕ'rē*), **Alcide (1881-1954),** Italian statesman, was born in Trent (then part of Austria) and was educated at the University of Vienna. He served in the Austrian parliament and later in the Italian. In 1926 he was sentenced to four years' imprisonment for anti-Fascist activities. He worked with the underground during the German occupation. In 1944 he was appointed minister without portfolio in the first Italian cabinet after the fall of Rome, and later became foreign minister. He was prime minister from December 1945 until July 1953, and sometimes also foreign minister. He not only rebuilt Italy after the war but restored it as an essential part of Europe.

De Gaulle, Charles (1891-), French soldier, was graduated from the St. Cyr Military College in 1914. In World War I he was wounded, captured, and escaped. He became an expert on tank warfare and spent twenty years vainly endeavoring to impress on leaders of the French army the importance of mechanization in warfare. Finally, in May 1940, he was elevated to the rank of general in time to see France conquered by the methods he had advocated for French use. DeGaulle escaped to England and organized the resistance of the "Free French." The Vichy government condemned him to death *in absentia*, but DeGaulle's influence with his countrymen brought him to the leadership of the provisional government. The first constituent assembly chose him interim president, but he resigned, January 1946. He opposed both the constitutions put forward for the Fourth Republic, believing they left the executive too weak for the needs of the country. In 1947 he formed a new party, Reunion of the French People, advocating a stronger government.

De Kalb. See *Kalb, Johann, Baron de.*

De Koven (*dē kō'vĕn*), **Henry Louis Reginald (1861-1920),** American light opera and song composer, was born in Middletown, Conn.; graduated at Saint John's College, Oxford, England, 1879; and studied music in Stuttgart, Florence, Paris, and Vienna. Upon returning from Europe in 1882, he located in Chicago and subsequently in New York. In 1902, he founded the Washington Symphony Orchestra, which he conducted until 1904, thereafter serving as musical critic for the New York *World* and other publications. His opera *Robin Hood* was notably successful, and several of his songs, including "Oh, Promise Me," have become widely known. Among his operas are *The Begum*, *Don Quixote*, *The Fencing Master*, *The Mandarin*, *Papa's Wife*, *The Golden Butterfly*, *The Beauty Spot*, and *The Canterbury Pilgrims*.

De Kruif (*dē krīf'*), **Paul (1890-),** American bacteriologist and writer, was born at Zeeland, Mich. Graduating from the University of Michigan, he taught there until 1917 and after serving in World War I as sanitary expert, he was on the staff of the Rockefeller Institute from 1920 to 1922. In 1925 he collaborated with Sinclair Lewis on *Arrowsmith* and thereafter worked as reporter for the Curtis Publishing Company. In a series of very readable books, he dramatized the struggle of science against disease. His works include *Microbe Hunters*, *Men Against Death*, *Why Keep Them Alive*, and *The Fight for Life*.

Delacroix (*dĕ-lä'kwä'*), **Ferdinand Victor Eugène (1798-1863),** French painter, chief of the romantic school, was born near Paris. At the age of 18, he entered the studio of Pierre Guerin. In 1822, his first work, "Dante and Virgil," attracted much attention; his second picture, "Massacre of Chios," won him fame. He subsequently painted many Moroccan canvases with novel effects of light and costumes. He also decorated many public buildings and churches. As a colorist, he ranks with the foremost masters of all times, being frequently compared to Rubens, whose style notably influenced him. Among his best pictures are "Milton and his Daughters," "The Barricade," "Algerian Women," "Jewish Wedding in Morocco," "The Bark of Don Juan," and "The Abduction of Rebecca." Died at Paris.

Delambre (*dĕ-läN'br'*), **Jean Baptiste Joseph (1749-1822),** French astronomer, was born at Amiens; he studied under Delille and Lalande. After the discovery of the planet Uranus by Herschel in 1781, he computed tables of its motion, which obtained the annual prize of the Academy of Sciences. He later constructed new solar tables and, at a still later period, tables of the motions of Jupiter and Saturn. He was appointed by the French government, in 1792, to measure the arc of the meridian between Dunkirk and Barcelona. This task was completed in 1799, and the results appeared in his *Basis of the Decimal Metric System*. In 1807, he was appointed to the chair of astronomy at the Collège de France. Died at Paris.

Deland (*dē-länd'*), **Margaretta Wade (1857-1945),** nee Campbell, American novelist, was born at Allegheny, Pa.; was educated at private schools in New Rochelle, N. Y.: and married, 1880, Lorin F. Deland, Boston. While she is most widely known for her stories of "Old Chester," which are grouped around a village character, Dr. Lavendar, she produced also novels and verse which established her position among the foremost American woman writers. Among her works are *The Old Garden and Other Verses*, *The Iron Woman*, *The Voice*, *The Hands of Esau*, *The Rising Tide*, *The Vehement Flame*, and *Old Chester Days*.

Delano, William Adams (1874-), American architect, was born in New York City. After being graduated from Yale University and the Ecole des Beaux Arts in Paris, he joined the firm of Delano and Aldrich in 1903. This firm designed many well-known public structures, including the new Post Office and Japanese Embassy buildings in Washington, D. C. He was elected in 1937 to the American Academy of Arts and Letters. As a member of the planning commission for parks and buildings in Washington, D. C., from 1929, he took a prominent part in the great program of improvement extending over the next decade. He directed design for the New York World's Fair of 1939-40.

De la Ramée. See *Ramée, Louise de la.*

De la Rive (*dĕ lä rēv'*), **Auguste Arthur (1801-1873),** Swiss physicist, was born at Geneva. He was made professor of natural philosophy at the Academy of Geneva at the age of 22. He devoted himself for a time to investigations on the specific heat of gases and on the temperature

of the earth as disclosed by operations in artesian wells. He then turned his attention entirely to electricity, making original discoveries in connection with magnetism, electrodynamics, the properties of the voltaic arc, and the passage of electricity through rarefied air and gases. He presented a new theory of the aurora borealis and discovered a method of electrogilding for which he was awarded the *grand prix* by the French Academy of Sciences.

Delaroche (*dē-là'rôsh'*), **Hippolyte** (commonly called Paul). **(1797-1856),** French historical painter, was born at Paris and studied under Watelet and Gros. Many of his subjects are drawn from English and French history, and they are usually of a somber character. They include "The Children of Edward IV in the Tower," "The Death of Lady Jane Grey," "The Death of Queen Elizabeth," "Joan of Arc," "Napoleon at Saint Bernard," "Strafford Going to the Scaffold," and "Napoleon at Fontainebleau." His most important work is the hemicycle depicting great artists of all ages which covers the semicircular wall of the hall in the Ecole des Beaux-Arts, Paris. He sought to combine the strong points of the classic and romantic schools, uniting the excellent line of the one with the fine color of the other.

Dell, Floyd (1887-), American author, was born at Barry, Ill., and was educated in the public schools. After four years spent as a reporter in Davenport, Iowa, and in Chicago, he joined the editorial staff of the Chicago *Evening Post* in 1909. He was associate editor of *The Masses*, New York, in 1914-17 and, 1918-24, was an editor of *The Liberator*. From 1935, he was engaged in editorial duties for the federal work relief program. Among his published works are *Women as World-Builders* and *Love in the Machine Age;* various plays; and the novels *Moon-Calf, Briary-Bush, Janet March, Runaway*, and *Diana Stair*.

De Mille, Cecil B. (1881-), theatrical producer for motion pictures and the radio, was born in Mass., the son of a producer who collaborated with David Belasco. After a few years' experience as actor and play broker, he went to California and formed a partnership with Jesse L. Lasky to produce films. From modest beginnings he went on to organize his own "Pictures Corporation" and, later, to direct plays for Metro-Goldwyn-Mayer and Paramount. He has been particularly successful with Biblical and historical plays using a large cast and presented with sensational scenic effects.

Democritus (*dĕ-mŏk'rĭ-tŭs*) **(c. 470 B. C.-?),** Greek philosopher, called "the laughing philosopher," was born at Abdera, in Thrace. He lived seven years in Egypt and traveled widely in the East. Showing, throughout his long life, a tireless zeal for knowledge, he collected numerous works of earlier philosophers and developed a system of his own, known as the atomic system. He taught that matter consisted of innumerable atoms, which, by their different motions and arrangements, produced the varied phenomena known collectively as nature. Even consciousness and the gods were explained as the result of the concourse of atoms. Only a few fragments of his works are extant. The date of his death is unknown.

De Morgan, William Frend (1839-1917), English novelist, was born in London. He was educated at University College, London, and studied art in the School of the Royal Academy. From about 1864 to 1871, he worked on stained glass and then, for a period of 30 years, he devoted himself to pottery, making numerous experiments in glazes and luster. He also invented a bicycle and a smoke-consuming grate, wrote articles on pottery, and illustrated fairy tales. In his 66th year, he wrote the long novel *Joseph Vance*, which won immediate success on its appearance in 1906, and others followed with increasing popularity. He excels in naturalness of dialogue, in picturing groups of people, and in his sketches of children. His novels include *Alice-for-Short, It Never Can Happen Again, An Affair of Dishonor, A Likely Story*, and *When Ghost Meets Ghost*.

Demosthenes (*dē-mŏs'thē-nēz*) **(c. 384 B.C.-322 B. C.),** Greek orator, was born at Pæania, Attica. His father, a cutler and cabinetmaker, died when the boy was seven years old, leaving him well off. His property was squandered, however, by his guardians, whom Demosthenes, on attaining his majority, prosecuted in the law courts at Athens. Encouraged by the success of this lawsuit, he ventured to speak before the Athenian assembly, but his feeble voice and ungraceful gestures excited general ridicule. Determined to succeed, he subjected himself to the most rigorous training in voice culture and rhetoric. He again appeared in public in 355 B. C., this time with such success that he was generally acknowledged to be an orator second to none in the city of Athens. The remainder of his life was devoted to the task of rousing the Athenians to combat the power of Macedon, then ominously threatening the liberties of the free cities in Greece.

Demosthenes strove in vain to inspire his countrymen with the ardor and energy of former days. His crowning triumph came when he confronted the ambassadors of Philip of Macedon at Thebes and, by his patriotic eloquence, prevailed upon the Thebans to join the Athenians in striking a last blow for the liberties of Greece. The allied cities were defeated in 338 B. C. at Chæronea, and Demosthenes' chief hope was thus extinguished.

After the accession of Alexander as king of Macedon in 336 B. C., Demosthenes still continued his efforts in behalf of Athenian independence. In 324, however, his enemies had him convicted of accepting a bribe from Alexander's agent. He was imprisoned, but escaped to Ægina. When Alexander died in 323 B. C., Demosthenes returned and succeeded in persuading the Greeks to revolt. The insurrection was quickly suppressed, and the conquerors demanded the surrender of Demosthenes. The orator made his escape, however, to the island of Calauria.

The name of Demosthenes is a synonym for eloquence. He possessed a gift of keen satire, a vivacious humor, and a majesty of style that entitle him to rank among the foremost orators of the world. His courage, his disinterested patriotism, and his services as a statesman distinguish him as one of the noblest men of antiquity. The story of his declaiming by the sea with pebbles in his mouth in order to overcome an impediment of speech has passed into tradition as the classic example of persistent and energetic application to self-improvement.

The orations upon which chiefly rests Demosthenes' fame as a statesman are the three *Philippics*, three *Olynthiacs, On the Peace, On the Embassy, On the Affairs of the Chersonese*, and *On the Crown*. The last is a defense of his career and by many is considered his masterpiece. Died on the island of Calauria, where he is believed to have taken poison in order to avoid falling into the hands of the Macedonians. See *Philippic*.

Depew, Chauncey Mitchell (1834-1928), American lawyer, railroad executive, legislator, and orator, was born at Peekskill, N. Y.; was graduated from Yale College in 1856; studied law; and was admitted to the bar in 1858. He began his career as a railroad official and attorney for the New York and Harlem railroad and subsequently was prominently connected with various other railroads, becoming, in 1898, chairman of the consolidated board of directors of the New York Central system. In 1888, he was candidate for the presidential nomination in the Republican national convention. He was elected to the United States Senate in 1899 and was re-elected in 1905. He won an international reputation as an orator; was a famous after-dinner speaker; and delivered many addresses of public importance, including the oration at the unveiling of the Statue of Liberty in New York harbor. He is the author of *My Memories of Eighty Years*.

De Quincey, Thomas (1785-1859), English essayist, was born in Manchester, England. He was educated at Bath, where, at 15, he read and spoke Greek fluently, and afterward at Winkfield and the Manchester Grammar School, from which he ran away, subsequently encountering the adventures and privations which he described, in 1821, in the *Confessions of an English Opium Eater*. In 1803, he entered Oxford, which he left after five years' study without taking the final examinations for a degree. He soon after became acquainted with Coleridge and Wordsworth; took a cottage at Grasmere; and became a member of the famous "lake school." He subsequently resided in London and Edinburgh. While at Oxford he acquired the habit of taking opium by using it to cure an attack of neuralgia but finally shook it off after years of misery.

De Quincey's literary works fall into two classes,—critical articles and autobiographical sketches, nearly all contributed to magazines. These reveal profound scholarship and remarkable keenness of intellect, and are written in a brilliant, luminous style which, at its best, is unsurpassed in English prose. He made the famous distinction between "the literature of knowledge and the literature of power," the former to *teach*, the latter to *move*, maintaining that the literature of power is "triumphant for ever as long as the language exists in which it speaks." Besides the *Confessions*, the following works may be mentioned: *Literary Reminiscences, Autobiography Sketches, Murder Considered as One of the Fine Arts, Suspiria de Profundis, Joan of Arc*, and *The English Mail Coach*.

Derby (*dâr'bĭ; dûr'bĭ*), **Edward George Geoffrey Smith Stanley, 14th Earl of (1799-1869),** British statesman, was born at Knowsley, Lancashire, 1799. He entered Parliament in 1820 and, in 1827-28, was undersecretary for the colonies. In the reform government of Lord Grey, he became, in 1830, chief secretary for Ireland and, in 1833, secretary of state for the colonies. In 1841, he was made colonial secretary in Peel's cabinet. In 1844, he was called to the House of Lords as Baron Stanley and assumed the leadership of the Conservative party in that body. He was prime minister three times for from one to two years, in 1852, 1858, and 1866.

He was a statesman of great ability; advocated free trade with the colonies, in which he assisted toward the abolition of slavery; and, with Disraeli, transformed the

Tories into the modern Conservative party. He was also a distinguished scholar, famous for his Latin speeches. In 1852, he became chancellor of Oxford University and, in 1864, published a translation of the *Iliad* in blank verse. He died at Knowsley.

Derzhavin (*dyĕr-zhä'vĕn*), **Gavril (1743-1816),** Russian lyric poet and statesman, was born at Kazan. He rose from the ranks as a common soldier to high offices in the state under the Empress Catherine II, and was made minister of justice by Alexander I. In 1803, he retired to private life and gave himself up to poetry. He is best known by his *Address to the Deity.* For sublimity of thought and expression, this ode has rarely been surpassed. He was the greatest and most highly original Russian poet before Pushkin and is most widely known as the "singer of Catherine."

Descartes (*dā'kärt'*), **René du Perrot (1596-1650),** French philosopher and founder of modern philosophy, was born at La Haye, near Tours, France. When about eight years of age, Descartes was sent to the Jesuit College at Le Flèche, where he devoted himself to physics, philosophy, mathematics, and poetry. Later, in Paris, he acquired the general education usually given to a youth of noble origin.

He was early influenced by a desire to see an entire reconstruction of all sciences. After two years of solitude and study, he entered the military profession. What philosophy failed to teach him, he hoped to learn through personal experience. He served as a soldier in the Netherlands in 1617 and later took part in the Thirty Years' War. In 1621, he returned to France to pass his time in meditation and the study of mathematics. In 1624–25, he made excursions into Switzerland and Italy and finally, in 1629, he settled in Amsterdam. In this retreat, he composed all his principal works. His *Discourse on Method* he published in 1637, *Speculations on Fundamental Philosophy* in 1641, and *Principles of Philosophy* in 1644.

Descartes devoted himself to mathematics, optics, meteorology, anatomy, chemistry, and mechanics, as well as to the reform of philosophy itself. He attracted many disciples and became involved in several learned controversies. In 1649, he went to Sweden as private tutor to Queen Christina.

Descartes departed from the prevailing custom of publishing all learned works in Latin. His own appeared in French, thereby being made accessible to a wider public. His *Discourse on Method,* a work intended to guide scientific investigation, rejects dogmatism and sets forth the value of doubt. His general views, however, owe much to scholasticism. He held that the only basis of absolute certainty was the consciousness of mental activity. This belief he expressed in the memorable sentence, "I think, therefore I am."

With the new criterion that "Whatever is clearly and distinctly thought, must be true," he passed to the study of material and spiritual phenomena. His doctrine gave rise to the system called occasionalism. His intellectual vigor left its marks on many departments of knowledge, and his method ruled universally until his physical theories and metaphysical conclusions were brought into disfavor by Newton's results in physics and by Locke's philosophy of sensationalism. His application of algebra to geometry, which is the basis of analytical geometry, has been pronounced the most important mathematical invention of the 17th century. He died at Stockholm.

Desmoulins (*dā'mōō'lăN'*), **Camille Benoit (1760-1794),** French Revolutionist, was born at Guise, France. A speech delivered by him in 1789, telling the populace of Paris that the popular Necker had been dismissed by Louis XVI, touched off the French Revolution. Two days later the Bastille was stormed. As the Revolution proceeded, he inclined with Danton to a policy of clemency and was sent with him to the scaffold by Robespierre, a one-time schoolmate of Desmoulins.

De Soto. See *Soto, Hernando de.*

De Staël. See *Staël, Madame de.*

D'Estaing. See *Estaing, Charles Hector, Count d'.*

D'Estournelles de Constant. See *Estournelles de Constant, Paul Henri Benjamin Baron d'.*

Detaille (*dĕ-tä'y'*), **Jean Baptiste Edouard (1848-1912),** French military painter, was born at Paris. He was a pupil of Meissonier; his pictures, chiefly of soldiers and battle scenes, have gained him much fame. Among them are "A Reconnaissance," "Salute to the Wounded," "Victims to Duty," "Evening at Rezonville," "The Conquerors," "Bonaparte in Egypt," "The Retreat," and "The Soldier's Dream." His "Passing Regiment" is owned by the Corcoran Gallery, Washington, and his "Defense of Champigny," called by the artist his best work, is in the Metropolitan Museum, New York. He served in the Franco-Prussian War, during which he made many sketches for his pictures. His work is finished and accurate like Meissonier's but broader in style and with better atmospheric effects.

De Tocqueville. See *Tocqueville, de.*

De Valera (*dĕv-ŭ-lē'rä*), **Eamon (1882-),** Irish Republican leader, was born in New York City, the son of a Spanish father and an Irish mother. His childhood was spent in Ireland, where he was educated, specializing in languages and mathematics. He taught in several Catholic colleges of Dublin prior to 1916, when he took part in the so-called Easter rebellion. He was captured and was condemned to death by the British government, but, being released the following year, became the most popular leader in the campaign for an independent Irish republic. He was rearrested in 1918, but escaped to the United States in 1919.

Although De Valera conducted the negotiations leading to the treaty by which the Irish Free State was established in 1922, he refused to assent to the terms. He led a rebellion, which was suppressed in 1923. In 1932, he was elected president of the Irish Free State and proceeded to abolish the oath of allegiance to the king as well as repudiating certain financial agreements with Great Britain. Under his leadership a new constitution was adopted in 1937. He was prime minister from 1937 to 1948. In 1938, he was president of the League of Nations Assembly. In World War II he clung to neutrality.

De Vigny. See *Vigny, Comte de.*

De Vinne (*dĕ vĭn'ē*), **Theodore Low (1828-1914),** American printer and writer on the printer's art, was born at Stamford, Conn.; learned the printer's trade; and was an employee, later a partner, of Francis Hart, New York. After the latter's death, the firm, in 1883, became Theodore L. De Vinne and Company. He began to print the *Saint Nicholas Magazine* when it was established in 1873, and the *Century Magazine* when it was founded in 1874. He organized the National Typothetae Society and became its president in 1896.

De Vinne made notable improvements in American typography; his publications ranked as the best examples of American presswork; and his firm achieved an international reputation. He wrote *Invention of Printing, Historic Types,* and *Book Composition.*

Devonshire, Victor Christian William Cavendish, Duke of (1868-1938), was educated at Eton and at Trinity College, Cambridge, and sat in Parliament from 1891 to 1908, when he succeeded his uncle as 9th duke of Devonshire. After holding various distinguished offices in England, he was, in 1916, appointed governor general of Canada. Returning to England in 1921, he served as secretary of state for the colonies from 1922 to 1924.

De Voto, Bernard Augustine (1897-1955), American writer, was born at Ogden, Utah, educated at Harvard, and served in World War I. He taught English at Northwestern University and at Harvard, 1929-36. He conducted the *Editor's Easy Chair* in Harper's Magazine, 1935-55. He wrote extensively on Mark Twain; his other works include several volumes of essays, *The Year of Decision: 1846,* and *Across the Wide Missouri.*

De Vries (*dĕ vrēs*), **Hugo (1848-1935),** Dutch botanist was born at Haarlem. He was educated at Leiden, Heidelberg, and Würzburg. In 1871, he became lecturer, and later professor of botany, at the University of Amsterdam. His most notable work was done in connection with researches on the theory of mutations as a method of evolution. These contain the most satisfactory explanation of organic evolution advanced since Darwin proposed the theory of natural selection. To De Vries also belongs the credit of discovering, and revealing to the scientific world, the importance of the unnoticed publications of Mendel which now constitute the basis of modern genetics. He also changed the method of studying evolution from observation to experimental work. Among his publications the following are widely known: *Intracellular Pangenesis Die Mutationstheorie,* and *Plant Breeding.* See *Mendel's Law.*

Dewar (*dū'ĕr*), **Sir James (1842-1923),** British scientist, was born at Kincardine, Scotland, and was educated at Dollar Academy and Edinburgh University. In 1875, he was made professor of experimental philosophy at Cambridge University and, two years later, became professor of chemistry at the Royal Institution, London. With Sir Frederick Abel he invented cordite. He was the first to liquefy and solidify hydrogen and oxygen gases. By evaporating hydrogen under reduced pressure he obtained the lowest temperature then reached, —170° F. He also introduced the thermos bottle. He was knighted in 1904.

De Wet (*dē vĕt'*), **Christian Rudolf (1854-1922),** Boer general. He acquired fame in the Transvaal War of 1880–81; and, in the South African War, 1899–1902, he was of all the Boer commanders the most audacious, the swiftest in movement, and the most fertile in expedients. After the submission, he went to Europe as a commissioner to raise money for the distressed Boer families. In 1907, he became member of the new parliament of the Orange River colony and also minister of agriculture; in 1912, he was appointed to the South African council of defense. In World War I

he rebelled against British rule, but was defeated. He wrote *Three Years' War*, a work on the South African War.

Dewey, George (1837-1917), American admiral, was born in Montpelier, Vt. He was graduated from the United States Naval Academy in 1858 and began active service on the Mediterranean station. He took part in Farragut's naval operations leading up to the capture of New Orleans in 1862. In the succeeding years, he held various commands and was promoted to the rank of commodore in 1896.

In 1898, on the outbreak of the Spanish-American War, Dewey was made commander of the Asiatic station. He destroyed the Spanish fleet in Manila Bay without any loss on his part. For this action, Congress immediately appointed him rear admiral. He subsequently co-operated in the capture of Manila. On his return to the United States, he was made "admiral of the navy," the only man who ever held that title, Farragut and Porter having been admirals but not admirals of the navy. His remains were transported to the National Cathedral, Washington, D. C., in 1925.

Dewey, John (1859-1952), American philosopher and educator, was born in Burlington, Vt. He was educated at the University of Vermont and Johns Hopkins University. He was professor of philosophy at the University of Minnesota in 1888–89 and at the University of Michigan, 1889–94. He then became professor of philosophy at the University of Chicago, where he was also director of the School of Education from 1902 to 1904. He held the chair of philosophy in Columbia University from 1904 to 1930, resigning to devote himself to the cause of liberalism in politics.

Dewey devoted much study to educational theory with the view of relating teaching more closely to the environment of pupils. On the invitation of the Chinese government, he spent three years in China, where he was engaged on adaptations of his methods to the Chinese educational system. His *School and Society*, outlining his educational views, has been translated into nearly every European language as well as Japanese.

With William James, Dewey ranked as one of the two foremost American leaders of the pragmatic movement in modern philosophy. He equated truth with success of an idea or belief framed to accomplish a purpose; intelligence with flexibility of mind which can readjust past experience to novel situations; the chief virtue with growth in adaptation to, and influencing of, one's environment. His publications include *Significance of the Problem of Knowledge*, *How We Think*, *Influence of Darwin on Philosophy*, *Interest and Effort in Education*, *The Quest for Certainty*, *Logic: The Theory of Inquiry*, and *Culture and Freedom*. See *Educational Reformers*.

Dewey, Melvil (1851-1931), American librarian and educator, was born at Adams Center, N. Y. He was graduated in 1874 from Amherst College, where he was acting librarian until 1876. In that year, he published *Decimal Classification and Relative Index*, in later editions called the *Decimal Classification*, which sets forth the system now adopted throughout the world as the standard for classifying books in libraries. He also established the *Library Journal* in the same year and was active in founding the American Library Association, serving twice as president and for 14 years as secretary. In 1883, he was made librarian at Columbia College. In 1887, he established a school of library economy, which was transferred to Albany in 1890 and, reorganized as the State Library School, remained under his directorship until 1906. From 1889 to 1900, he was secretary of the University of the State of New York and, from 1888 to 1906, was director of the New York State Library.

Dewey, Thomas Edmund (1902-), American lawyer and politician, was born at Owosso, Mich. After being graduated from the University of Michigan and Columbia University, he practiced law in New York from 1926 to 1931, when he was made assistant United States attorney. His shrewd vigor in prosecution led to his selection for a number of special assignments, the most important of which was his appointment in 1935 as prosecutor for New York in a campaign against organized crime. His success in securing the conviction of leaders in an elaborate and widely ramified crime ring won him a national reputation. In 1938 he was defeated for the governorship of New York but was elected in 1942 and re-elected in 1946 and 1950. He did not run in 1954. In 1944, and again in 1948, he received the Republican nomination for the presidency, but was defeated.

De Witt (*dē vĭt'*), **Jan (1625-1672),** Dutch statesman, was born at Dort, Netherlands. He became the leader of the oligarchical states-rights party against the party of federal power and democracy led by the House of Orange. William II of Orange having died, De Witt succeeded in having himself elected grand pensionary of the province of Holland in 1653, in which position he led the entire country until shortly before his death.

Finding his country engaged in a disastrous war against Cromwell, De Witt made peace in 1654 and succeeded in extending Dutch commercial supremacy in the Indies. A secret article of the treaty barred the House of Orange from state offices. De Witt's position was threatened, however, by the restoration in England of the Stuarts, who favored the House of Orange. Despite victories over the British in 1665–67 and conclusion of an alliance with England and Sweden in 1668 to keep Louis XIV out of the Netherlands, the people turned to William III, of Orange, as leader when Louis XIV invaded the country in 1672. De Witt was slain by a mob.

Diamond, David (1915-), was born at Rochester, New York. He studied at the Cleveland Institute of Music (1928–30) and the Eastman School of Music at Rochester (1930–34). He has used many musical forms for his works. His compositions include symphonies, concertos, string quartets, preludes and fugues, chamber music, sonatas, and chorals. He has received many prizes and awards and his music has been played by notable orchestras in this country and abroad.

Diaz (*dē'ăs*), **Armando (1861-1928),** Italian general. Following the disastrous battle of Caporetto, October 24, 1917, in which all the fruits of earlier campaigns were lost, Diaz succeeded Cadorna as commander in chief of the Italian armies. In nine days, June 15–23, 1918, Diaz decisively repulsed a great Austrian offensive designed to crush the Italian armies, driving the Austrians back across the Piave and inflicting enormous losses. After four months' preparation, Diaz began, October 24, a tremendous offensive against the Austrian lines in Italy. A series of increasing successes resulted, at the end of 10 days, in the total collapse and rout of the Austrian forces. When Austria, on November 4, accepted terms of truce, the Italian armies under Diaz had captured 300,000 prisoners, 5000 guns, and military booty valued at about a billion dollars. This victory by Diaz ranks as one of the most overwhelming in military history. He was made Duke of Victory in 1921; served as minister of war, 1922–24; and received the title of marshal in 1924.

Diaz (*dē'ăs*), or **Dias, Bartholomew (?-1500),** Portuguese navigator, flourished in the 15th century. His residence at the court of John II of Portugal brought him into contact with many scientific men, and, in 1487, the king gave him the command of three vessels to follow up the discoveries already made on the west coast of Africa. Driven by a violent storm, he sailed round the southern extremity of Africa and the Cape of Good Hope, without immediately realizing the fact, and discovered Algoa Bay. The discontent of his crew compelled him to return, and he arrived in Lisbon, December 1488. He joined the expedition of Cabral, the discoverer of Brazil. In May 1500, he was lost in a storm off the great cape that he had discovered.

Diaz (*dē'ăs*), **Porfirio (1830-1915),** Mexican statesman, was born at Oaxaca. He studied law; was an officer in the war between Mexico and the United States; and, in 1863, was military governor of the state of Vera Cruz and the Mexican commander in the war with France. He was captured and sent to France, but escaped and was in command of the army which overthrew Maximilian in 1867, thus ending the war with France. In 1876, he rebelled and overthrew the president Lerdo de Tejada and was himself made president in the same year. In 1884, he was re-elected president and served continuously until May 1911. Mexico prospered greatly under his administration, and his achievements entitle him to a high place among the world's statesmen. Opposition to his rule culminated in a successful revolution led by Francisco Madero. He then resigned and went to Europe.

Diaz de la Peña (*dē'ăz' dē lä pĕn'yä'*), **Narcisse Virgile** called **Diaz (1808-1876),** French landscape painter of the Barbizon School, was born at Bordeaux, of Spanish parentage. Left an orphan at 10, he was educated by a Protestant pastor at Bellevue, near Paris. A poisonous insect bite received while wandering in the woods necessitated the amputation of one of his legs. At 15, he was apprenticed to a porcelain painter, and, in 1831, he began to exhibit in the salon. In 1841, he formed a friendship with Rousseau, who taught him how to paint trees in the forest of Fontainebleau. He then devoted himself chiefly to landscape painting, winning both fame and fortune. He equipped a magnificent studio in Paris and was noted for his hospitality.

While his personality was less powerful than that of Dupre, Rousseau, or Corot, he was a painter of exquisite taste in both design and coloring. Many of his pictures are found in the Metropolitan Museum, New York; in the Art Institute, Chicago; and in other American collections. Among his best pictures are "The Fairy with Pearls," "Sunset in the Forest," "The Storm," and "The Forest at Fontainebleau." He died at Mentone.

Dick, George Frederick (1881-), American pathologist, was born at Fort Wayne, Ind. After being graduated from Rush Medical College, Chicago, in 1905, he practiced medicine in Chicago. With his wife, Gladys R.

Henry, whom he married in 1914, he isolated the germ which causes scarlet fever and devised the skin test, known as the Dick test, for determining whether individuals are susceptible to the disease. He was made professor of medicine in the University of Chicago in 1933.

Dickens, Charles (1812-1870), English novelist and humorist, was born at Portsmouth, England. He was first a parliamentary reporter and soon became distinguished for his uncommon ability. After a literary apprenticeship on the *True Sun,* he attached himself to the staff of the London *Chronicle.* In this newspaper, he gave the first evidence of his talents in the lively essays entitled *Sketches by Boz,* published in 1836. This was followed by the immortal *Pickwick Papers, Oliver Twist,* and *Old Curiosity Shop.* After a visit to the United States, he published, in 1842, his *American Notes,* followed by *Martin Chuzzlewit,* the greatest of his humorous works since the *Pickwick Papers.*

In his later novels Dickens's humor, except in some rich creations such as Mr. Micawber, was no longer so apparent, while, on the other hand, his wit and pathos increased. *Dombey and Son* was below the standard of his other works, but for this he made amends in *David Copperfield,* which is considered by many his greatest work. *Bleak House, Hard Times, Little Dorrit, Tale of Two Cities, Great Expectations, Our Mutual Friend,* and other equally celebrated novels followed, and an audience larger than that of any other English author awaited each.

His unparalleled popularity was due to the directness of his appeal to simple and common emotions and to his gift for caricature. Besides arousing a sentiment that made for many reforms in prisons, workhouses, and schools, he wrote the finest Christmas stories in the language, and, by his appreciation of the dignity and the worth of homely virtues, gave the common people in all English-speaking lands a new pride in themselves. In 1867, he again visited the United States, gave numerous readings, and met with a brilliant reception. His last novel, *The Mystery of Edwin Drood,* was left unfinished. He was buried in Westminster Abbey. See *Literary Plots, Characters, and Allusions* under the titles of his principal works.

Dickinson, Emily (1830-1886), American poet, was born at Amherst, Mass. She attended South Hadley Female Seminary and Amherst Academy between her 16th and 20th years. On a visit to Philadelphia in 1854, she experienced an unhappy love affair, of which the details are unknown. But, in a spirit of self-abnegation, she renounced her love and immured herself in the family home for the rest of her life. Here she wrote over 1000 poems, many of them ranking among the most poignant love lyrics ever written. Only three or four of her poems were published during her lifetime, and a few more in 1892, six years after her death. She was virtually unknown by the reading public until 1924, when most of her poems and her letters became generally accessible. These revealed "flashes of wholly original and profound insight into nature and life."

Diderot (*dēd'rō'*), **Denis (1713-1784),** French encyclopedist and philosophical writer, was born at Langres, France. He was joint editor with D'Alembert of the *Encyclopédie,* published in 28 volumes, 1751–72. Besides revising all the articles, Diderot wrote the departments of history, ancient philosophy, and mechanical arts. While not primarily written in the interests of any school of ethics or philosophy, it became a most influential organ of intellectual freedom.

Diderot also wrote dramas, novels, and art criticisms on the annual exhibitions at the salon. Toward the end of his life he determined to sell his library to provide a dowry for his daughter. The Empress Catherine of Russia, having been informed of his intention, bought the library, on condition that he himself should be librarian and undertake the care of it at a yearly salary. He devoted his remaining years to writing.

Diesel, Rudolf (1853-1913), inventor of the Diesel engine, was born in Paris of German descent. On the outbreak of the Franco-Prussian War in 1871, his parents took him to London. Later he attended school in Germany and studied engineering at the University in Munich. In 1892 he patented the internal combustion engine which bears his name. Adolphus Busch, the St. Louis brewer, backed him financially and had the first Diesel engine built in the United States. After Diesel's success, he disappeared one night from the ship on which he was crossing the English Channel, and his death, whether accidental, homicidal, or suicidal, has never been explained. See *Diesel Engine.*

Diesterweg (*dēs'tĕr-vāĸ*), **Friedrich Adolf Wilhelm (1790-1866),** German educator, was born at Sigen. He was educated at the universities of Herborn and Tübingen and became a tutor at Mannheim, where he first endeavored to apply the methods of Pestalozzi. Later, at Frankfort and at Elberfeld, he was greatly influenced by other followers of Pestalozzi. In 1820, he became head of the Teachers' Seminary at Mors, where he worked out a course of study which became a model for all other Prussian training schools. In 1838, he was made director of the Berlin Teachers' Seminary, where he established a practice school and revolutionized elementary school methods in the city.

The dominant idea in his system was the principle of self-activity. He labored unwearyingly for the freedom of the school and the betterment of the teacher. He emphasized the social function of the school.

Dietrich, Marlene (1904-), actress, born in Berlin, Germany. She began as a violinist, but turned to acting, appearing in Berlin and Vienna. She was for four years with Max Reinhardt's School of the Theater. In 1924 she married Rudolf Sieber. Her first notable motion picture was *The Blue Angel.* Since coming to the United States in 1930, she has starred in many Hollywood films. She became an American citizen in 1937.

Dillon, John (1851-1927), Irish politician and leader, was educated at the Catholic University of Dublin. He early identified himself with the Parnellite movement and, in 1880, was elected to the British Parliament for County Tipperary, where, with a brief interruption in 1883–85, he sat for over 35 years. In Parliament, he distinguished himself by the violence of his language. He was one of the chief promoters of the "plan of campaign," a political conspiracy, and was imprisoned in 1891. Between 1891 and 1896, he opposed Parnell's leadership and, in the latter year, succeeded Justin McCarthy as head of the Irish Nationalist party. With the rise of the Sinn Fein party in Ireland, Dillon's leadership appeared too moderate and he was defeated at the polls in 1918. He then devoted himself chiefly to journalism.

Diocletian (*dī'ô-klē'shăn*), or **Valerius Diocletianus. (245 A.D.-313),** Roman emperor, was born in Dalmatia and reigned from 284 to 305. He entered the army and held important commands under the emperors Probus and Aurelian. After the death of Numerianus, he was chosen emperor by the troops at Chalcedon. With his reign began a new form of administration. He appointed Maximian as his companion in authority under the title Augustus and, soon after, he appointed Constantine and Galerius as subordinate rulers, each with the title of Cæsar. Each of the four rulers had a different capital and governed a different region. His reign is memorable for the persecution of Christians and for the substitution of highly centralized authority for local autonomy. In the year 305, Diocletian resigned as emperor and went to Salona, in Dalmatia, where he died.

Diogenes (*dī-ŏj'ê-nēz*) **(c. 412 B. C.-323 B. C.),** Greek philosopher of the school of cynics, was born at Sinope, Asia Minor. Becoming a citizen of Athens, he made himself conspicuous by his abnegation of all social laws and customs, lived upon alms, and took up his abode in a tub. His life was a protest against the conventions. Of his cynicism many well-known anecdotes are related. Died at Corinth.

Dionysius (*dī'ô-nĭsh'ĭ-ŭs*), **the Elder (c. 431 B. C.-367 B.C.),** tyrant of Syracuse, in Sicily. When Sicily was invaded by the Carthaginians, he became a general in the service of Syracuse, which was then a republic. In the year 405, he made himself tyrant of Syracuse. He engaged in many military expeditions and was one of the most distinguished rulers of his time. He wrote poems and tragedies, and, at one time, gained a prize at Athens for the tragedy *Ransom of Hector.* He died at Syracuse.

Dior, Christian (1905-), French dress designer, was born in Normandy, France. First known as the proprietor of a Parisian art gallery, he became interested in the artistic possibilities of the *haut couture,* and opened his own dressmaking firm in 1946. The showings of Christian Dior's yearly collections are major and often sensational events in the world of fashion. Dior's greatest coup, one that will probably affect women's dresses for over a decade, came in 1949, when he decreed that hemlines be radically lowered. Dior's influence is world-wide, and he has opened branches in New York City and in Venezuela.

Dioscorides (*dī'ŏs-kŏr'ĭ-dēz*), **Pedanius,** Greek physician, was born in Anazarbus, Cilicia, and flourished in the 1st century A. D. As physician to the Roman armies, he traveled through many countries and gathered a vast mass of information concerning plants which he embodied in his great work entitled *De Materia Medica,* in five books. This work described all of the medical substances then known, together with their properties. For 1500 years, this work was an undisputed authority in botany and materia medica and is still highly regarded by the Turks and the Moors.

Disney, Walt (er E.) (1901-), American cartoonist, was born at Chicago, Ill. After a high school education, he enlisted and served in ambulance work in France during World War I. Returning, he secured a job in Kansas City as a commercial artist, but soon began adapting the cartoon to motion pictures, producing animated cartoons. From 1923 to 1926, he produced a series known as the *Alice Comedies,* in which the pictures combined a live girl with animated cartoons. He created the

cartoon picture character *Oswald the Rabbit* for Universal Films, 1926–28. Then forming his own company, and utilizing sound effects also, he produced *Mickey Mouse* and *Silly Symphony* cartoons, which almost immediately obtained great popularity throughout the world. *Snow White and the Seven Dwarfs*, produced in 1938, and its successor *Ferdinand the Bull*, revealed previously unexplored possibilities in the new art, in which Disney was the unchallenged master. His *Fantasia*, the musical accompaniment to which was worked out by Leopold Stokowski, was an impressive achievement of pictorial symbolism. His nature films of *True Life Adventure* have proved extremely popular with television audiences. In 1954 he founded "Disneyland" in California as a base for his television productions.

Disraeli (*dĭz-rā'lĭ*), **Benjamin (1804-1881),** Earl of Beaconsfield, English statesman and novelist, was born in London, of Jewish parentage. He entered the House of Commons in 1837 and remained a member until his elevation to the House of Lords in 1878. He made himself famous by his brilliant attacks upon Sir Robert Peel. He became the leader of the old Tory, or protectionist, party on the death of Lord George Bentinck in 1848. As chancellor of the exchequer, he was chiefly instrumental in carrying the Reform act of 1867. The following year, he became premier. Defeated at the polls the same year, his party again came into power in 1874. His administration was notable for its vigorous foreign policy. He acquired control of the Suez Canal and made Queen Victoria Empress of India. He retired from leadership in 1876 and was created Earl.

Disraeli was an orator and debater of unusual skill and his statesmanship was of a high order. In his domestic policy, while a Tory in theory, he was a Liberal in practice. His many novels, chiefly political, are remarkable for their brilliancy and for their epigrammatic style.

Ditmars, Raymond Lee (1876-1942), American naturalist, was born at Newark, N. J. Having been graduated from the Barnard Military Academy, he worked as assistant curator in the American Museum of Natural History, New York, 1891-96 and was court reporter on the New York *Times* in 1898-99. In the latter year he became curator of reptiles for the New York Zoological Park, and from that time the study of reptiles became his specialty, although he was made curator of mammals in 1910 and of insects in 1941. Among the fruits of his studies and expeditions are a number of books popularizing the lore of snakes, insects, and other animals. They include *Forest of Adventure*, *The Book of Living Reptiles*, *The Making of a Scientist*, and *The Book of Insect Oddities*.

Dixon, Thomas (1864-1946), American lecturer, novelist, and playwright, was born in Shelby, N. C.; graduated from Wake Forest College, N. C., and from Greensboro Law School; and was admitted to the bar in 1886. After studying a year at Johns Hopkins University, he was elected to the North Carolina legislature in 1885, but resigned the next year to enter the Baptist ministry. He occupied important pastorates in Raleigh, Boston, and New York, and became a popular lyceum lecturer. Among his books are *The Leopard's Spots*, *The One Woman*, *The Clansman*, *The Traitor*, *The Foolish Virgin*, *The Sun Virgin*, and *The Flaming Sword*. In 1915, his novel, *The Clansman*, was made the basis of the highly successful motion picture play *The Birth of a Nation*.

Dodds, Harold W. (1889-), educator, was born in Utica, Pa., and received his education at Grove City College, Princeton, and the University of Pennsylvania. Because of his special interest in economics and political science, he has been both a teacher of these subjects and a member of government commissions in which his knowledge could be utilized. From 1933 to 1957 he was president of Princeton University. He was president of the Association of American Universities, 1952-54 and chairman of the Personnel Task Force of the Committee on Organization of the Executive Branch of the Government, 1954-55. Besides many articles and reports, he has published a book, *Out of This Nettle, Danger*.

Dodge, Mary Elizabeth Mapes (1838-1905), American editor, poet, and juvenile writer, was born in New York. She married William Dodge, after whose death she devoted herself to literature. From 1873, she ably edited the juvenile periodical *Saint Nicholas*. She also wrote several volumes of juvenile verse and prose, of which the more noteworthy include *Hans Brinker, or The Silver Skates; Theophilus and Others; The Land of Pluck;* and *The Golden Gate*.

Dodgson, Charles Lutwidge. See *Carroll, Lewis*.

Dolbear (*dōl'bēr*), **Amos Emerson (1837-1910),** American educator and inventor, was born at Norwich, Conn.; was graduated from Ohio Wesleyan University, 1866; and became professor of physics at Tufts College, 1874. He made valuable investigations and inventions in connection with the writing telegraph, the electric gyroscope, the magneto-telephone, wireless telegraphy, and the application of electric waves to photography. In 1873, he discovered the convertibility of sound into electricity, a discovery basic to the entire fabric of modern communication systems.

Dollond (*dŏl'ŭnd*), **John (1706-1761),** English optician, inventor of the achromatic object glass for telescopes, was born in London. He was a silk weaver of Spitalsfield, London, but studied science and, with his son, established a manufactory of optical instruments. After many years of experiment and research, he succeeded in constructing lenses where a concave lens of flint glass was fitted to a convex lens of crown glass, with the result that images were formed without any colored border. This was the greatest improvement made in the telescopic lenses.

Domenichino (*dō-mā'nē-kē'nō*), or **Domenico Zampiere (1581-1641),** Italian painter of the eclectic school, with Guido Reni the greatest of the pupils of the Carracci, was born at Bologna. His masterpiece is the "Communion of Saint Jerome," now honored with a place opposite Raphael's "Transfiguration" in the Vatican and considered one of the great pictures of the world. Other noted works painted by him are "Diana and Nymphs" and "Cumæan Sibyl," Borghese Gallery, Rome; "Guardian Angel," Naples Gallery; "Saint John," Hermitage Gallery, Leningrad; and the "Four Evangelists," in the cupola of Sant' Andrea della Valle, Rome.

Dominic (*dŏm'ĭ-nĭk*), **Saint (c.1170-1221),** founder of the order of monks called Dominicans, was born at Calaroga, Old Castile, Spain. He studied at the University of Palencia and, about 1195, became canon of the cathedral at Osma. In 1204, he went to Languedoc, France, and preached with much vehemence against the Albigenses. As a result of this crusade, he founded the order of the Dominicans, which was confirmed by papal decree in 1216 and was placed in charge of the Inquisition. He was a self-denying man, tireless and earnest in his efforts for the faith. He died in Bologna and, in 1234, was canonized by Gregory IX.

Donatello (*dŏn'ă-tĕl'lō*), properly **Donato de Betto Bardi (c. 1386-1466),** one of the revivers of sculpture in Italy, was born in Florence. An associate of Ghiberti and Brunelleschi, he became the most important sculptor of the early Renaissance. He was a realist who broke away from classic models and is considered the founder of modern sculpture. He did not hesitate to delineate character even at the sacrifice of beauty and excelled in portraying dramatic action. His immense influence on the sculpture of the Renaissance reached its culmination in the art of Michelangelo. Among his very numerous works are the statue "Saint George," in the National Museum, Florence; the statues "Saint Peter," "Saint Mark," "John the Baptist," and "David"; and the fine rilievos "Worshipping Angels," "Burial of Christ," "The Ascension," and the "Annunciation." He died in Florence.

Donizetti (*dō'nē-dzĕt'tē*), **Gaetano (1797-1848),** Italian operatic composer, was born at Bergamo, Lombardy, and studied at Bologna. In 1835, he settled in Paris and wrote for the French stage. He devoted himself chiefly to dramatic music and produced over 60 operas. His *Lucia di Lammermoor*, *Daughter of the Regiment*, *Lucrezia Borgia*, and *La Favorita* are well known and possess a melodic quality of the first order.

Donnay (*dō'nā'*), **Maurice Charles (1859-1945),** French dramatist, was born in Paris. He was educated in Paris and early displayed a talent for literature. However, following the wishes of his parents, he entered a contractor's office, where he worked six years. On account of having recited some of his own verses in a cabaret in Montmartre, he was compelled to resign his place. He then appeared for two years at the "Chat Noir," where his graceful verses and dialogues gave him much local popularity.

Donnay's first play, *Lysistrata*, produced in 1892, was an adaptation from Aristophanes. His *Lovers*, still his best-known and most highly esteemed play, appeared in 1895 and gave him national fame. He was elected to the French Academy in 1907. He produced about 20 dramas, all essentially Parisian in tone and treatment. The list includes *Family Hotel*, *The Emancipated Woman*, *A Prince's Education*, *The Clearing*, *The See-saw*, *The Other Danger*, *Birds of Passage*, and *The Man Hunt*.

Donovan, William J. (1883-), soldier and lawyer, was a much-decorated member of the "Fighting 69th" New York regiment during World War I and was destined to play a notable part also in World War II. First as U. S. coordinator of information and later as director of the Office of Strategic Services, he carried out many special assignments for the Allies and won the appointment of major general in the U. S. Army. The mysterious and often daring nature of his exploits made him a legendary figure. On his return from war service, he resumed law practice in his native city of Buffalo. In 1953 he was appointed United States Ambassador to Thailand.

"Dooley, Mr." See *Dunne, Finley Peter*.

Doolittle, James H. (1896-), American aviator and air force commander, was born in Alameda, Cal., and spent part of his boyhood in Alaska. His first flying was done in World War I, in which he won a commission as second lieutenant in the signal reserve corps, aviation section. He continued in the air service, broadening his training by stunt flying, by studies in engineering, and by test flying.

From 1930 to 1940 he was manager of the aviation department for the Shell Oil Company. In 1931 he was awarded the Bendix trophy for a coast-to-coast flight at an average of 225 miles an hour. In World War II his various assignments culminated on April 18, 1942, in his leadership of a bombing raid on Tokyo from an undisclosed base mysteriously referred to by President Roosevelt as "Shangri-La." Promoted to the rank of general, he then went to Europe to organize the 18th Air Force. After the war he returned to the Shell Oil Company as vice president and director.

Dora d'Istria (*dō'rä dēs'trē-ä*). See *Ghika, Helena.*

Doré (*dō'rā'*), **Paul Gustave (1833-1883)**, French painter and illustrator, was born at Strasbourg and was educated at a Parisian Lycée. He became known by his illustrations of *Rabelais* and *Don Quixote* and, for some years was a constant contributor to the *Journal pour Rire.* At the time of the Crimean War, he produced "Alma" and "Inkermann"; in 1861, he published the first of his popular illustrations to Dante's *Divine Comedy.* These were followed by illustrations to the Bible, *Paradise Lost, The Ancient Mariner,* and *The Idylls of the King.* These works secured for him a greater reputation in England than was accorded to him in his native country. He afterward devoted himself to the production of large pictures on religious and historical subjects, such as "Christ's Entry into Jerusalem," "Francesca da Rimini," and "The Neophyte,"

Dorr, Thomas Wilson (1805-1854), American politician, was born at Providence, R. I., and was graduated from Harvard, 1823. He was the leader of a party, 1840–41, whose object was to extend the right of suffrage in Rhode Island. The charter granted by King Charles had arbitrarily fixed the legislative representation of the parts of the state. With the growth of population, the more populous parts had fewer representatives than the less populous.

Under Dorr's leadership, a new constitution was drawn up, submitted to the electors, and declared to have been carried. In April 1842, an election for state officers was held under this constitution, and Dorr was chosen governor. His attempts to assume power were resisted by the regular state government, although there was no actual fighting. Dorr was arrested, tried for treason, and sentenced to imprisonment for life, June 1844. In 1845, he was released and later was restored to civil and political rights. The abuses which he had opposed were soon rectified in large part.

Dos Passos (*dŏs păs'ŏs*), **John Roderigo (1896-)**, American novelist, was born at Chicago, Ill. After graduation from Harvard University he served in World War I in ambulance work. His *Three Soldiers,* grounded on his war experiences, revealed him as an observer almost photographic in his objectivity. His later books, including *Manhattan Transfer, 42d Parallel, 1919,* and *U. S. A.,* exhibit a motion picture technique of transferring the reader swiftly from scene to scene in an effort to present a bird's-eye view of American society before and after World War I. "Flash backs" reveal in swift narrative the lives of significant or typical persons. Always pervasive in the background is a note of social protest. His later works include *District of Columbia* (1952), *The Head and Heart of Thomas Jefferson* (1954), *The Theme Is Freedom* (1956), and *The Men Who Made the Nation* (1957).

Dostoiévsky (*dŏs'tô-yĕv'skê*), **Fiódor Mikháylovitch (1821-1881)**, Russian novelist, was born at Moscow. His *Poor Folk* had not long appeared when he was imprisoned in 1849, for association with liberal groups. A bogus sentence of death was carried through just short of the final volley, when the actual sentence of exile to Siberia was read. The experience greatly aggravated a tendency to epilepsy. In 1855 he was permitted to return and, in 1861–62, published *Memoirs of a Dead House,* describing his life in prison. His masterpiece, *Crime and Punishment,* is one of the most powerful realistic works of modern fiction. His characters, many of them demoniacal but convincing, rank among the most unforgettable in literature. His writings evince passionate sympathy for the humiliated and an intense interest in morbid psychology. Practically all his novels have been translated into English. They include *Injury and Insult, The Idiot, The Friend of the Family, The Gambler, The Permanent Husband, Uncle's Dream,* and *The Brothers Karamazov.*

Dou, Dow, or **Douw, Gerard (1613-1675)**, Dutch genre painter, was born at Leiden. He studied under Rembrandt in 1628–31 and at first occupied himself mainly with portraiture, but soon turned to genre. Dou excelled in small pictures, representing scenes or subjects from Dutch peasant life, soft and harmonious in color, with picturesque light effects, carefully drawn with great exactness of detail. He ranks high among the Dutch masters of painting. His numerous works, represented in all the great European collections, include his own portrait; that of his wife; "The Poulterer's Shop," in the National Gallery, London; and his celebrated "Woman Sick of the Dropsy," in the Louvre.

Dougherty, Dennis J. (1865-1951), American prelate, was born in Girardville, Pa. He was ordained as a priest of the Roman Catholic Church in 1890; became bishop of Nueva Segovia, P. I., in 1903; was transferred to Buffalo, N. Y., in 1915; and, in 1918, was appointed archbishop of Philadelphia. In 1921, he was created cardinal priest.

Doughty, Charles Montagu (1843-1926), English writer and traveler, was born in Suffolk, Eng. He was educated at the Portsmouth Naval School and Cambridge University. His *Arabia Deserta,* written after a period of travel in the Near East, is one of the most graphic books of travel in the English language. Its author was presented with a medal by the Royal Geographical Society. His other works include *The Dawn in Britain, Adam Cast Forth,* and *Mansoul, or the Riddle of the World.*

Douglas, Stephen Arnold (1813-1861), American statesman, styled the "little giant," was born at Brandon, Vt. His early youth was one of poverty; but he managed to spend three years at the Canandaigua Academy, having the study of law in view. In 1833, he settled in Jacksonville, where he entered the practice of law. He was soon chosen state's attorney; was elected to the legislature; and, in 1840, became secretary of state for Illinois. He was judge of the Illinois Supreme Court, 1841 to 1843, when he resigned and was elected to Congress as a Democrat.

Douglas was at once recognized as one of the ablest men of his party. He denied the right of the Federal government to legislate on slavery in the territories; favored the Mexican War and the annexation of Texas; opposed the Wilmot Proviso; and defended the compromise measure of 1850. In 1854, he introduced the Kansas-Nebraska bill, which created civil war in Kansas.

In 1858, he was a candidate for the United States Senate and held a series of notable debates with Abraham Lincoln, his opponent. He won the senatorship, but was forced by Lincoln to make statements which doomed his presidential ambitions to defeat. In 1860, the Democratic party split into two divisions, one of which nominated Douglas for president and the other John C. Breckinridge. Douglas was strongly opposed to secession and, after the outbreak of the Civil War following Lincoln's inauguration, staunchly supported the Union cause. Died at Chicago.

Douglas, William Orville (1898-), American administrator and jurist, was born at Maine, Minn. Educated at Whitman College, in Washington state, and at Columbia University, he lectured in law at the latter university and, after 1927, at Yale University. Specializing in the law of bankruptcy and finance, he undertook studies for the Securities and Exchange Commission, of which he was appointed chairman in 1936. His vigorous and fearless conduct in enforcing federal laws in this labyrinthine field recommended him for nomination by President Roosevelt to the Supreme Court of the United States, in which he was confirmed in 1940. His decisions marked him as one of the more liberal justices on the bench.

Douglass, Frederick (1817-1895), American orator, a mulatto slave, was born at Tuckahoe, near Easton, Md. In 1838, he escaped from a Baltimore shipyard to the Northern states and changed his name from Lloyd or Bailey to Douglass. He lectured on slavery with great success during 1845–47 in Great Britain, where £150 was collected to buy his freedom. In 1847, he established *The North Star,* afterward called *Frederick Douglass's Paper,* a weekly Abolition newspaper, at Rochester, N. Y. In 1855, he rewrote his earlier autobiography, which was published later as *The Life and Times of Frederick Douglass.* After the outbreak of the Civil War, he was one of the earliest to propose the use of Negro troops by the United States. He served in various offices under the government, 1871–91. He died at Washington. A bronze statue of Douglass stands in a public square of Rochester, N. Y.

Doumergue (*dōō'mĕrg'*), **Gaston (1863-1937)**, French statesman, was born at Aigues Vives, France. He was educated at Nimes and Paris, qualifying for a legal career. After practicing at Nimes from 1885 to 1890, he served as colonial magistrate in Indo-China and in Algeria. Returning to France, he was elected in 1893 as a Radical-Socialist to the Chamber of Deputies, of which he was secretary in 1905–06. After holding various other ministerial posts, he was prime minister in 1913–14; minister for the colonies, 1914–17; president of the Senate, 1923–24; and from 1924 to 1931, was president of the French republic. He was again made prime minister in 1934.

Dowie, John Alexander (1847-1907), religious leader, was born in Edinburgh, Scotland, and studied in the University there. His family removed to Sydney, Australia, in 1860, and he entered the ministry of the Congregational Church in South Australia. He went into evangelistic work in 1878 and later began faith healing. He came to the United States in 1888 and, in 1896, organized a group of converts, who, in 1901, settled 42 miles north of Chicago at a place given by Dowie the name Zion City. In 1906, Dowie was suspended from the Church by his followers, who charged him with tyranny, misuse of investments, and polygamy.

Doyle, Sir Arthur Conan (1859-1930), British novelist and physician, was born at Edinburgh and was educated at Stonyhurst and Edinburgh University. From 1882 until 1890, he was a practicing physician, in the meantime writing short stories. He also traveled in the arctic regions and in western Africa. In 1887, he wrote *A Study in Scarlet*, in which he created the famous detective Sherlock Holmes, who also appears in *The Sign of the Four*, *The Hound of the Baskervilles*, and many other detective stories. In imaginative invention, fascinating mystery. and power to create an atmosphere of horror, these tales rival those of Poe.

In 1888, he published *Micah Clarke*, his first successful historical novel, which was followed by *The White Company*, *The Refugees*, *The Great Shadow*, *Rodney Stone*, *The Adventures of Gerard*, and *Sir Nigel*. Among his volumes of short stories are *Round the Red Lamp*, *The Stark Munro Letters*, and *The Green Flag and Other Stories*.

During the Boer War, Doyle served as head physician in a field hospital in South Africa. Upon his return, he wrote a military history, *The Great Boer War*, and a defense of British policy, entitled *The Cause and Conduct of the War*, which was translated into many languages. For his services during this period, he was knighted in 1902. His later works include *The Crime of the Congo*, *The Poison Belt*, *History of the British Campaign in France and Flanders*, and *The Wanderings of a Spiritualist*. In 1920, he began lecturing in support of the belief that it is possible to communicate with the spirits of those who have died. See *Sherlock Holmes*.

Draco, Athenian lawgiver, lived in the last half of the 7th century B. C. He set a certain limit to the tyranny of the powerful citizens by committing the laws to writing and establishing the ephetæ, or court of appeal, 621 B. C. His code, which prescribed death for nearly all offenses, appeared harsh to later ages, but was probably a mere codification of contemporary usage. The laws, written "not in ink but in blood," were repealed by Solon, with the exception of the law on homicide. It is said that Draco was smothered to death in the theater by the hats and cloaks showered on him as a popular mark of honor for reducing the laws to writing.

Drake, Edwin L. (1819-1880), American oil producer. In August 1859, he sank, at Titusville, Pa., the first oil well in America. He died in 1880 and was buried in Woodlawn Cemetery, Titusville, where he is commemorated by a monument erected in 1902 and further adorned in 1923 by a statue, "The Driller."

Drake, Sir Francis (c.1545-1596), English admiral and navigator, was born of obscure parentage at Tavistock, England; he first commanded at sea under Sir John Hawkins, his relative. From 1570 to 1572, he commanded three expeditions to the West Indies and the Spanish Main, in the last of which he gained large booty. He next fought with such bravery in Ireland under Essex that he was introduced to Queen Elizabeth. With five small vessels, he sailed, in 1577, to attack the Spaniards in the South Seas. In this expedition, he ravaged the Spanish settlements, coasted the North American shore as far as Puget Sound, and took possession of the country under the name of New Albion. He then returned home by the Moluccas and the cape, after a voyage of nearly three years, the first Englishman to circumnavigate the globe.

Elizabeth dined on board his ship at Deptford, and knighted him in 1580. In 1585–86, he successfully attacked the Spaniards in the West Indies; in 1587, destroyed many ships at Cadiz; and, in 1588, as vice admiral, participated in the destruction of the Spanish armada. He died off Porto Bello.

Draper, John William (1811-1882), chemist, physiologist, and author, was born in England. He was educated at London University and the University of Pennsylvania, and became professor of natural sciences in Hampden-Sidney College, Virginia. In 1841, he was made professor of chemistry in New York University, and, in 1850, was chosen professor of physiology. For many years he was president of the New York Medical College. He was a noted investigator in spectrum analysis and in photography. His improvements on Daguerre's crude methods made photography of the human countenance possible. He took his first photograph in 1839. Of his numerous works the following are the chief: *Human Physiology, Statical and Dynamical; History of the American Civil War; Textbook on Chemistry;* and *History of the Intellectual Development of Europe.*

Dreiser (*drī'sĕr*), **Theodore (1871-1945),** American editor and author, was born in Terre Haute, Ind. He received his education in the public schools of Warsaw and at Indiana University. He began newspaper work in Chicago in 1892, and was traveling correspondent for Saint Louis newspapers, 1892–94. He then engaged in special work for magazines; became editor of *Smith's Magazine* in 1905; managing editor of the *Broadway Magazine* in 1906; and editor in chief of the *Butterick* publications, 1907–10.

His first novel, *Sister Carrie*, was suppressed because of its realistic treatment of prostitution. *The Financier* and *The Titan* are studies of ruthless industrial magnates. *An American Tragedy* reveals Dreiser's qualities at their best—deep sympathy but a strict objectivity in narration, the events themselves providing the comment. He wrote also *Tragic America* and the two autobiographical works *Book about Myself* and *Dawn*.

Drew, John (1853-1927), American comedian, was born in Philadelphia, Pa., of a family of distinguished actors. He made his first theatrical appearance at Philadelphia, 1873, under his mother's management, in *Cool as a Cucumber;* joined Augustin Daly's company, 1875, as Bob Ruggles in *The Big Bonanza;* joined Edwin Booth, 1876, in Shakespearean plays; supported Fanny Davenport, 1877–78; and played in *Diplomacy*, 1878–79. Other plays in which he appeared include *The Masked Ball*, *The Butterflies*, *His House in Order*, *My Wife*, *The Scrap of Paper*, and *The Prodigal Husband*. He excelled in portraying society characters of a half-serious, half-ironical type.

Dreyfus (*drā'fŭs'*), **Alfred (c.1859-1935),** French army officer, the son of a rich Jewish manufacturer, was born at Mülhausen in Alsace. He was an artillery captain, attached to the general army staff, when, in 1894, on a charge of delivering to a foreign government documents connected with the national defense, he was court-martialed, degraded, and transported to Devil's Island, French Guiana.

The efforts of his wife and friends to prove him an innocent victim of malice, injustice, and forgery plunged France into a chaos of militarism and anti-Semitism. Early in 1898, the novelist Emile Zola came to his defense with his famous *J'accuse* (*I Accuse*), and soon afterward an officer in the war department confessed the forgery of documents incriminating Dreyfus. In 1899, President Loubet pardoned Dreyfus and, in 1903, he was restored to his former rank and promoted major by vote of the legislature—an outcome which was regarded as a triumph over anti-Semitism and militarism in France.

Drinkwater, John (1882-1937), poet and dramatist, was born in England. For twelve years, he was employed by various assurance companies. Turning his activities toward the drama, he became a founder and manager of the Pilgrim Players and of the Birmingham Repertory Theater. Among the best known of his numerous plays are *Pawns*, *Loyalties*, *Abraham Lincoln*, *Robert E. Lee*, and *Bird-in-Hand*, a comedy. Numerous poems from his pen were published in periodical literature, principally in England. He published also *The Muse in Council*, a collection of essays.

Drummond, Henry (1851-1897), Scottish clergyman and author. He became famous by the publication of *Natural Law in the Spiritual World*, a book which had an enormous sale. This was succeeded by *Tropical Africa*—a book of travel—and by a series of booklets commencing with *The Greatest Thing in the World*, intended to expound tialed, degraded, and transported to Devil's Island,

Drummond, William Henry (1854-1907), poet, was born in Ireland, but came to Canada at an early age. Obtaining a medical education at McGill University and at Bishop's College, Lennoxville, Quebec, he established a practice in a French Canadian community. He was especially successful in portraying the French habitant. Among his best-known works are *The Habitant and Other French-Canadian Poems* and *The Voyageur and Other Poems*.

Drusus (*drōō'sŭs*), **Nero Claudius (38 B. C.-9 B. C.),** commonly called Drusus Senior, was stepson of the Emperor Augustus and younger brother of the Emperor Tiberius. He began his public career in 19 B. C., distinguishing himself by the defeat of the Rhætians and other Alpine tribes. In 13 B. C., he was sent into Gaul, then in revolt, and, after crushing the rebels there, he pushed across the Rhine in pursuit of their German allies. In this campaign, he subdued the Sicambri and Frisii and forced his way to the North Sea, being the first Roman general who had done so. From this time, he made it the business of his life to establish the Roman supremacy in Germany, partly by conquest and partly by the execution of great military works. A fall from his horse cut short his brilliant career.

Dryden, John (1631-1700), English dramatist, poet, and critic, was born in Aldwinkle, Northamptonshire. After

being graduated from Cambridge, he entered upon a literary career and succeeded Sir William Davenant as poet laureate in 1870. His *Essay on Dramatic Poesy* established his reputation as a critic. Dryden, by his dramas and political satires, especially his *Absalom and Achitophel*, occupies a high place among English poets. He also made numerous translations from the classics, especially Virgil, Juvenal, and Ovid. His finest poem, *Alexander's Feast*, was written in 1697. By his new uses of the heroic couplet in poetry, his direct prose style, and his development of literary criticism, he became the foremost writer of the Restoration and exercised a great influence on 18th century English literature.

Du Barry (*dü bà'rē'*), **Marie Jeanne Bécu, Countess (1746-1793)**, favorite of Louis XV of France, was born at Vaucouleurs, the natural child of a tax collector. She was educated in a Paris convent. As Mademoiselle Lange, she assisted Count Jean du Barry in entertaining guests who came to his house for gambling. In 1769, she won the notice of Louis XV, who kept her as his mistress, though formally marrying her to Count Guillaume du Barry, brother of her former protector. Her influence henceforth reigned supreme until the death of Louis in 1774, when she was dismissed from court. She was tried before the revolutionary tribunal for having wasted the treasures of the state and for having worn mourning for the late king, and was guillotined.

Du Bois, William Edward Butghardt (1868-), American Negro writer, was born at Great Barrington, Mass. Educated at Fisk, Harvard, and Berlin universities, he was professor of economics at Atlanta University from 1896 to 1910. In the latter year he resigned to edit and direct the *Crisis* and other publications for the advancement of colored people. He returned to the university as professor of sociology, 1933–1944. Among his best known books are *The Suppression of the Slave Trade, The Philadelphia Negro, John Brown, Quest of the Silver Fleece, The Negro, The Dark Princess*, and *Dusk of Dawn*.

Dudevant (*düd'väN'*), **Aurore.** See *Sand, George.*

Dufay (*dōō'fà'*), **Guillaume (c. 1400-1474)**, Flemish composer, was born probably at Chimay. He was a singer in the papal chapel, 1428–37, and lived in Paris from 1442 to 1449. He was the leading master of the earliest Flemish school of composers and developed four-part writing to such a degree that his work is regarded as the foundation of all choral writing. He died at Cambrai.

Duffy, Francis P. (1871-1932), clergyman and army chaplain, was born in the province of Ontario, Canada. Graduating from St. Michael's College, Toronto, he went to New York as a teacher in St. Francis Xavier's College. In 1896, he was ordained a priest in the Catholic Church. Two years later he became first lieutenant and chaplain of the 69th infantry regiment of the national guard. In the Spanish-American War, in hostilities on the Mexican border in 1913, and in World War I, he won an unusual degree of respect and popularity as chaplain among the soldiers, and was decorated for valor by the American and French army commands. After the armistice in 1918, Father Duffy returned to Holy Cross Church, Times Square, New York, where he had previously officiated, and became widely known both within and outside Church circles. A statue in his honor was erected at Times Square shortly after his death.

Du Gard, Roger Martin. See *Martin du Gard, Roger.*

Du Guesclin (*dü gĕ'klăN'*), **Bertrand (1320-1380)**, French general. He gained his first reputation as a soldier in 1338 at a tournament in celebration of the marriage of Charles de Blois with Jeanne de Penthievre. He unseated all the famous competitors.

Becoming a soldier of fortune under Charles, he gained great distinction at the siege of Vannes in 1342. He was knighted and, in 1354, went with the lords of Brittany to England in order to secure the release of his captive master. He gallantly relieved Rennes in 1356, and, by his help, the city held out until the truce of Bordeaux, 1357. He soon took service under the French king and, after several brillant actions, was made Marshal of Normandy and Count of Longueville. In 1370, he was made constable of France and, for ten years, was active and successful in driving the English from the south and west of France. In 1373, he seized and held most of the strongholds in the Duchy of Brittany.

Dulles, John Foster (1888-), American lawyer and diplomat, was born at Washington, D. C., the son of Allen M. Dulles, professor of theology, and the grandson of John W. Foster, who was secretary of state under President Benjamin Harrison. Mr. Dulles was senior partner in a New York firm of corporation lawyers but gave much of his time to international diplomacy. He was a member of the U. S. delegation to the San Francisco Conference on World Organization in 1945, and later a member of the delegation to the general assembly of the United Nations. In 1949 he was appointed interim U. S. senator from New York, and in 1950 became adviser to the State Department. He was made special representative of President Truman with the rank of ambassador to negotiate the Japanese peace treaty in 1951. In 1953 he was appointed secretary of state in President Eisenhower's cabinet. He is the author of *War, Peace, and Change* and *War or Peace* (1950).

Dumas (*dü'mä'*), **Alexandre, the Elder (1802-1870)**, French novelist and dramatist, was born in Villers Cotterets, son of General Dumas, a Creole. After his father's death in 1806, he led for a time a desultory life until, driven by poverty, he went to Paris to seek his fortune. He early made his mark in literature and became perhaps the most prolific and widely read story-teller in the world. His capacity for production was prodigious, and in addition he employed assistants to write portions of books under his direction. In all, he was responsible for nearly 300 closely printed volumes, including a series of historic romances, or "Chronicles of France," comprising nearly 100 volumes.

Dumas reached the climax of his fame in *Monte Cristo* in 1844 and in *The Three Musketeers*, which followed soon after. His creative faculty was greater than his artistic genius, although he found many admirers among cultured readers. Besides producing novels, he was a forceful writer of romantic drama, and, by his *Antony* in 1831, he introduced the modern social play. He was unhappy in his marriage, and he squandered his enormous earnings in reckless extravagance. His last years he spent at Dieppe, broken in health and impaired in intellect, ministered to by his son and his daughter. See *Three Musketeers, The.*

Dumas, Alexandre, the Younger (1824-1895), French dramatist, was born in Paris. He was an illegitimate son of the preceding, and, like him, became a distinguished novelist and dramatist. After a neglected and bitterly unhappy childhood, he became the companion and literary associate of his brilliant but Bohemian father, whose bankruptcy in 1848 left the son penniless, facing a debt of 50,000 francs. He then renounced his unfortunate associations; vividly described the world in which he had been living in a celebrated novel, *La dame aux camélias;* and devoted himself industriously to authorship. He won both fame and fortune.

By dramatizing *La dame aux camélias* in 1852, he popularized the realistic study of social problems which has profoundly modified all subsequent drama. He created the so-called problem play, of which he wrote a notable series beginning with *Le demi-monde* in 1853 and including *Le fils, naturel, La question d'argent, La femme de Claude, Monsieur Alphonse, Une visite de noces*, and *L'Etrangere.*

As a moralist, Dumas took himself very seriously, and his dramas with their incisive prefaces are frank and forceful social sermons. As a dramatist, he possessed great gifts, and, with Augier and Sardou, whom he excelled in purposefulness and vigor, he dominated the French drama during the latter half of the 19th century. In 1874, he was elected to the French Academy. He died near Paris.

Dumas, Jean Baptiste Andrē (1800-1884), French chemist, was born at Alais. He was apprenticed to an apothecary in Geneva, and engaged in some scientific investigations that attracted the attention of De Candolle and Prévost. In 1821, he went to Paris, where he became professor of chemistry in the Athenæum, afterward at the Sorbonne. and was made a member of the Academy of Sciences. He determined the atomic weights of about 30 elements. This with his researches on sulphuric ether and the law of substitutions in organic compounds attracted the attention of all Europe. In 1848, he was a member of the Legislative Assembly and, in 1849–51, held the portfolio of agriculture and commerce. After the *coup d'etat*, he was made a member of the Senate. He died at Cannes.

Du Maurier, (*dü mō'ri-ā*), **Daphne (1907-)**, English writer, was born at London, and was educated at Paris. She is a daughter of Sir Gerald Du Maurier, British actor-manager, and a granddaughter of George Du Maurier, English artist and novelist. She began writing short stories and articles when she was twenty-one, and her first novel, *The Loving Spirit*, appeared in 1931. Among her other novels are *Jamaica Inn* (1936), *Rebecca* (1938), *Frenchman's Creek* (1941), *Hungry Hill* (1943), *The King's General* (1946), *The Parasites* (1950), *My Cousin Rachel* (1952), *Kiss Me Again, Stranger* (1953), *Mary Anne* (1954), and *Scapegoat* (1957). Her non-fiction works include a biography of her father, *Gerald, a Portrait* (1934) and *The Dumauriers* (1937). In 1932, she married Lieutenant General Sir Frederick A. M. Browning.

Du Maurier, George Louis Palmella Busson (1834-1896), British artist and novelist, was born in Paris and was educated in London, Belgium, and the Netherlands. For many years, he was a valuable art contributor to *Punch*, at the same time illustrating many other books and magazines. His mode of satirizing the extravagances of the so-called æsthetic school and other society foibles procured for him a high reputation. In 1892, he published the novel *Peter Ibbetson*, followed in 1894 by *Trilby*, which was a great success and was

dramatized in both England and America. In 1897, *The Martian* was published posthumously. See *Little Billee.*

Dumouriez (*dü'mōō'ryā'*), **Charles François** (**1739-1823**), French general, was born at Cambrai; entered the army in 1757; and served in Germany during the Seven Years' War. In 1791, he became lieutenant general in the army of the north, commanded by Marshal Luckner. A winter campaign in Belgium followed, and, in 1792, he overthrew the Austrians at Jemappes. The campaign of 1793 aimed at the complete conquest of the Netherlands, but at Neerwinden he sustained a severe defeat from the Austrians under Coburg, with whom he entered into a plot to restore the monarchy. Reports of his meditated treason reached the government at Paris and an order of arrest was issued against him, but he escaped across the border. A reward of 300,000 francs was set upon his head, but, after wandering through many countries of Europe, he finally settled in England, where he died an exile.

Dunant (*dü'näN'*), **Jean Henri** (**1828-1910**), Swiss philanthropist, was born in Geneva. While visiting the scene of the battle of Solferino, he determined to found a society for aiding wounded soldiers. The result was the establishment of the Red Cross Society. He wrote *Un souvenir de Solferino* in 1862 and lectured, advocating relief in war. These efforts led to the Geneva convention in 1864 and, after the co-operation of ten governments had been secured, the International Red Cross Society was officially established. In 1901, he shared the first Nobel peace prize with Frederic Passy. Dunant devoted his entire fortune to the establishment and support of various charities.

Dunbar, Paul Laurence (**1872-1906**), American poet of the African race, was born at Dayton, Ohio. After being graduated from the Dayton High School in 1891, he worked as an elevator boy, mechanic, and journalist. In 1897, he was employed on the staff of the Congressional Library, resigning in 1898 to give his attention entirely to literary work. His earliest volume of poems appeared under the title of *Oak and Ivy;* but his poetical genius was first introduced to American readers by W. D. Howells, who contributed an introduction to his *Lyrics of Lowly Life,* published in 1896.

Dunbar's dialect poems of the soil, exemplified their best in "When Malindy Sings," form a distinctive contribution to American literature and fairly entitle their author to leadership as the poet of his race in America. Besides the foregoing, the volumes of verse entitled *Majors and Minors, Poems of the Cabin and Field, Lyrics of the Hearth Side, Li'l Gal,* and *Lyrics of Sunshine and Shadow* were collected in his *Complete Poetical Works,* published in 1913.

Duncan, Isadora (**1878-1927**), American dancer, was born in San Francisco, Cal. Reared in poverty and untaught, she improvised dances from early childhood. Her first stage appearance was as a fairy in *A Midsummer Night's Dream* at Daly's Theater, New York, in 1895. With her sister and brother she went on a cattle boat to Europe and sought recognition for a new type of dancing. Her art discarded the conventionalized dances of the day and returned for inspiration to ancient Greek dances as depicted in art and to the rhythmic motions of wind and wave and the flight of birds and bees. After a period of extreme privation, success came to her in European capitals, and she opened a school of classical dancing in 1904 near Berlin and another in Paris in 1914. She left a lasting influence upon the art.

Her visits to America were fraught with mixed success and criticism, admirers being attracted by her genius as a dancer and detractors being repelled by the unconventionality of her character, which became more erratic after the accidental drowning of her two children in Paris in 1913. She espoused the cause of the Russian Revolution and opened a school in Moscow on Lenin's invitation in 1921. Her last years, spent in France and Germany, were darkened by poverty. She was killed in an automobile accident.

Dunne, Finley Peter (**1867-1936**), American humorist, was born in Chicago, and, after a public school education there, entered newspaper life as a reporter in 1885. He served on various Chicago papers and first attracted attention by sketches in which he passed humorous comment upon topics of the day in the crisp Irish brogue of one Martin Dooley, a publican of the great Chicago thoroughfare, Archey Road. His *Mr. Dooley in Peace and War* was widely read in America and England and placed him high in the rank of American humorists. His works include also *Mr. Dooley in the Hearts of his Countrymen, Mr. Dooley's Philosophy,* and *Mr. Dooley Says.*

Dunsany (*dŭn-sā'nĭ*), **Edward John, Baron** (**1878-**), Irish author, was born at London. He was educated at Eton and Sandhurst; took part in the South African War; and was wounded in World War I. His fantastic tales of gods and men are written in simple but colorful language. They include *The Gods of Pegana, Tales of Wonder,* and *The Curse of the Wise Woman.* Among the dramas of his authorship are *The Glittering Gate, A Night at an Inn, The Laughter of the Gods, The Prince of Stamboul,* and *Golden Dragon City.* Later works are *The Man Who Ate the Phoenix* (1949), *The Last Revolution* (1951), and *The Sword of Welleran* (1954).

Duns Scotus (*dŭnz skō'tŭs*), **John** (**c. 1265-1308**), Franciscan monk and divine, one of the greatest thinkers of the Middle Ages. He appears to have been educated at Oxford, where, in 1301, he became professor of theology. He afterward removed to Paris and then to Cologne. Duns Scotus, as one of the most eminent of the Franciscans, was a chief opponent of the teachings of the Dominicans, the two parties representing at that time two different schools of theology. He was also a chief advocate of realism as opposed to nominalism. For his defense of the doctrine of the Immaculate Conception, since declared a dogma of the Roman Catholic Church, he was styled "*doctor subtilis.*" His writings comprise many volumes.

Dunstable, John (**c. 1370-1453**), English composer, was born probably at Dunstable, Bedfordshire. A three-part song, *O Rosa Bella,* was his only known surviving work until about 1900, when several of his compositions were discovered in the libraries of Oxford, London, Bologna, and Modena. The most important discovery was that by Haberl, of six volumes of manuscript in the Cathedral Library at Trent, which included masses, motets, and natiphons; also French and Italian songs with instrumental accompaniments. These reveal a high development of musical art in England during the early part of the 15th century. Dunstable was buried at Saint Stephen's in London.

Dunstan (*dŭn'stăn*), **Saint** (**c. 925-988**), English prelate, was born at Glastonbury. Under several kings, he wielded great influence. He was made Archbishop of Canterbury in 959 by Edgar. On Edgar's death, he raised Edward to the throne, but, on the accession of Ethelred, his power was broken. Dunstan built up the power of the Church; introduced the Benedictines into England; and manifested sagacity and farsightedness in matters of state.

Du Pont, (Thomas) Coleman (**1863-1930**), American manufacturer, was born at Louisville, Ky. Educated as an engineer at the Massachusetts Institute of Technology, he engaged in coal mining, steel manufacturing, street railway operation, and the manufacture of explosives, serving as president of the E. I. du Pont de Nemours Powder Company, 1902–15, during which time the company's annual income increased from 10 million to 200 million dollars. Du Pont purchased a controlling interest in the Equitable Life Insurance Company, erecting the Equitable Building, New York City, and operated a chain of famous hotels. He was made, 1921, a senator from Delaware, to which state he had donated a 4-million dollar highway constructed at his own expense. Ill health led to his resignation in 1928.

His cousin, Pierre Samuel du Pont (1870–1928), became, in 1915, the executive head of the Du Pont Company, which expanded its activities to the manufacture of other products, including rayon, ammonia, varnishes, paints, celluloid, dyes, and industrial alcohol. This company was the controlling interest in the re-organization of the General Motors Corporation, 1920, a merger of about 60 automobile companies. He donated over $4,500,000 for the building of public schools in Delaware.

Dupré (*dü'prā'*), **Jules** (**1812-1889**), French painter, was born at Nantes. He studied in Paris and formed a fast friendship with Rousseau who greatly influenced his style of painting. He became one of the foremost landscape painters of the Barbizon School and excelled in portraying the terrible and the tragic aspects of nature. His "Old Oak," "Hay Wagon," "Summer," and "Midday" are in the Metropolitan Museum, New York.

Durand, Asher Brown (**1796-1886**), American painter and engraver, was born at South Orange, N. J. Early in life he became an apprentice of the engraver Maverick, with whom he later formed a partnership. His engravings of Trumbull's "Declaration of Independence" and of Vanderlyn's "Ariadne" brought him wide reputation. After 1841, he painted landscapes chiefly and, with Thomas Cole, founded the American School of Landscape Painting.

Durant, Will(iam) James (**1885-**), American writer, was born at North Adams, Mass. Educated at St. Peter's College, Jersey City, and Columbia University, he taught Latin and French for some years and, in 1914, became director of Labor Temple School, New York, serving until 1927. In the previous year, he had published *The Story of Philosophy,* which made its author widely known. Sections of his monumental work, *The Story of Civilization,* which have already appeared include *Cæsar and Christ* (1944), *The Age of Faith* (1950), and *The Renaissance* (1953).

Duranty, Walter (**c. 1887-**), newspaper correspondent, was born in England. After being graduated

from Cambridge University in 1907, he led a roving existence traveling, writing, and teaching, until 1914. Then as Paris correspondent of the New York *Times*, he reported World War I. Having lost a foot in a railroad accident in France, he received a pension, which made him financially independent. Duranty was then sent to Russia, and for more than 13 years he sent to the New York *Times* bulletins on the evolution of the world's first Socialist government. The impartiality and grasp of these reports brought him an international reputation. Of books from his pen, *I Write as I Please* attained wide popularity.

Dürer (*dū'rĕr*), **Albrecht (1471-1528),** German artist, was born at Nüremberg. He was apprenticed to a painter in his native town and, some years later, began designing on wood and engraving on copper. In 1505, he went to Venice, where he formed a friendship with Bellini. Titian and Raphael greatly admired his work. He executed a number of commissions for the emperor Maximilian I and was appointed court painter by Charles V.

Dürer was the most important and the most representative artist that his country has produced. He possessed creative imagination, marked originality, and endless capacity for minute details. He was not only the most prominent engraver of his time but one of the world's greatest engravers. The invention of etching and of printing woodcuts in two colors is also ascribed to him.

Besides portraits, his works include "Crucifixion," Dresden Gallery; "Four Pillars of the Church," Munich, said to be the first Protestant picture; "Burial of the Savior" and "Nativity," also at Munich; "Adoration of the Trinity," Belvidere Gallery, Vienna; "Adoration of the Magi," Uffizi Gallery, Florence; and "Adam and Eve," Gallery at Madrid.

Duse (*dōō'zā*), **Eleonora (1859-1924),** Italian actress, was born in Vigevano. She appeared about 1880 on the Italian, chiefly the Roman, stage as leading lady in the plays of Dumas and Sardou, but afterward played parts of greater depth. She earned high praise by her combined force and gracefulness. In 1892, she appeared at Vienna and Berlin and, later, in New York and England. While acting chiefly in tragedies, her versatility enabled her to please in the lighter vein of Dumas's *Francillon* and as the hostess in Goldoni's *Locandiera*. Her later successes included D'Annunzio's *Francesca da Rimini*. She died at Pittsburgh, Pa., her remains being sent to Italy for burial.

Duveneck (*dū'vĕn-ĕk*), **Frank (1848-1919),** American painter and sculptor, was born at Covington, Ky. He studied at Munich, where he lived over ten years and formed a school of influential artists. After 1881 he spent much of his time in Florence, Italy, although he was also director of the McMicken Art School in Cincinnati, Ohio. His style at first was marked by great brilliancy and dash, but later became quiet in color. Representative of his better known works are "A Circassian" and "The Professor." The Cincinnati Museum contains the largest collection of his paintings in America.

Dvorák (*dvôr'zhāk*), **Antonin (1841-1904),** Bohemian composer, was born at Mühlhausen, Czechoslovakia. His *Stabat Mater*, first produced in London in 1883, won for him the ear of all Europe. His most ambitious work is orchestral and choral—a cantata, *The Spectre's Bride*, an oratorio, *Saint Ludmilla*, and several operas, also much chamber music and many sacred compositions. His piano music includes the well-known *Humoresque*. In 1892–95, he was director of the National Conservatory at New York, where he wrote his beautiful *New World Symphony*. He subsequently lived at Prague, where he died.

Dwight, Theodore William (1822-1892), American jurist, was born at Catskill, N. Y.; was graduated from Hamilton College, 1840; and studied at Yale Law School. In 1846, he was elected Maynard professor of law in Hamilton College, and there he established a law school. In 1858, he was chosen professor of municipal law in Columbia College and founded its School of Law, of which he served as warden until 1891. His important publications include *Trial by Impeachment* and, with E. C. Wines, *Prisons and Reformatories in the United States*.

Dwight, Timothy (1752-1817), American educator and theologian, was born at Northampton, Mass., and was graduated from Yale, 1769. He became an army chaplain during the Revolutionary War and was minister of Greenfield Hill, Conn., 1783, where he also successfully conducted an academy. In 1795, he was elected president of Yale College, which position he held until his death. His principal works are his *Theology Explained and Defended; The Conquest of Canaan*, an ambitious epic poem; and *Travels in New England and New York*.

Eads (*ēdz*), **James Buchanan (1820-1887),** American engineer, was born at Lawrenceburg, Ind. He constructed the steel arch bridge over the Mississippi River at Saint Louis, completed in 1874; developed and carried out a plan of deepening the Mississippi by means of jetties; and was engaged, at the time of his death, in planning a ship railway over the Isthmus of Tehuantepec. He was elected to the American Hall of Fame in 1920.

Earhart, Amelia. See *Putnam, Amelia Earhart.*

Early, Jubal Anderson (1816-1894), American soldier and lawyer, was born in Franklin County, Va. He practiced law in Virginia and saw service in the Seminole and Mexican wars. At the opening of the Civil War, he was appointed a colonel in the Confederate army. Proving his ability as a military officer at Bull Run and Williamsburg, he was promoted to the rank of major general and held important commands at Fredericksburg and Gettysburg. In 1864, operating against Sheridan, he was defeated near Winchester and at Fishers Hill, Va., and, in 1865, was routed by General Custer at Waynesboro. He subsequently practiced law in Richmond and published *A Memoir of the Last Year of the War for Independence in the Confederate States*. He died at Lynchburg, Va.

Eastlake, Sir Charles Lock (1793-1865), English painter, was born at Plymouth. From 1809, he studied in the Royal Academy Schools and in Paris. When the *Bellerophon* put into Plymouth with the captive Napoleon on board, Eastlake took rapid sketches from a shore boat and produced a full-length portrait of Napoleon. From 1817 to 1830, he lived in Rome, executing pictures of banditti and various other subjects. In 1839 appeared "Christ Blessing Little Children," now in the National Gallery, London. He was knighted in 1850 and, in 1855, was appointed director of the National Gallery. He died at Pisa.

Eastman, George (1854-1932), American inventor, was born in Waterville, N. Y., and was educated in Rochester, N. Y. He carried on a series of experiments in photography, perfecting a process for making dry plates, and, in 1880, began to manufacture dry plates on a small scale. He invented the kodak and entered extensively into its manufacture, becoming head of the Eastman Kodak Company, Rochester, N. Y. He donated and bequeathed to the University of Rochester over 54 million dollars, including over 6 million to the School of Music. His benefactions to the Massachusetts Institute of Technology totaled over 19 million dollars. He endowed dental clinics in a number of European cities. Afflicted with an incurable disease, he shot himself. See *Photography*.

Eastman, Joseph Bartlett (1882-1944), American administrator, was born at Katonah, N. Y. Educated at Amherst College, he became an expert on the relation between transportation services and governmental bodies. He was secretary of the Public Franchise League, Boston, 1906–13; acted as counsel for employee groups in wage arbitration cases involving street railways; and served on the Massachusetts Public Service Commission, 1914–19. On the advice of Justice Brandeis, Eastman was appointed to the Interstate Commerce Commission in 1919. His expert knowledge made him a leader in this body and led to his selection to serve in the advisory post of Federal Coordinator of Transportation in 1933–36, after which time he returned to the Commission.

Eaton, Timothy (1835-1907), Canadian merchant, was born at Clogher, Ireland. He emigrated to Canada in 1857 and opened a store at Kirkton, Ont., later at Saint Marys, Ont., and finally in Toronto. The last venture proved eminently successful and his business developed into the largest department store and mail order house in Canada, with branches at Winnipeg, Montreal, and elsewhere.

Ebert (*ā'bĕrt*), **Friedrich (1871-1925),** first president of the German Republic, was born at Heidelberg. For some years, he was a saddler by trade. Becoming an editor of a Socialist paper, he rose rapidly to a position as head of the Socialist party in Germany. In 1919, he was elected president of the German Republic, in which capacity he exerted his influence for a general policy of moderation.

Ebner-Eschenbach (*āb'nĕr-ĕsh'ĕn-bāĸ*), **Marie, Baroness von (1830-1916),** Austrian novelist and poet, was born in Moravia. Her fame rests on her prose fiction, which was begun in *Erzählungen* in 1875 and was continued in *Lotti die Uhrmacherin, Alte Schule, Agave*, and *Die arme Kleine*. She wrote also a popular collection of *Aphorismen* and *Parabeln, Märchen und Gedichte*. She possessed remarkable power of description, keen humor, and polished precision of style.

Eccles, Marriner Stoddard (1890-), American banker, was born at Logan, Utah. After being graduated from Brigham Young College, he spent two years traveling and then entered the investment business, beginning with managing the family estate. He directed enterprises in lumber, sugar, food, and real estate, and organized a bank holding company. He relinquished these interests in 1934 to become governor of the Federal Reserve Board and, when it was reconstituted with greater powers in 1936, he was made chairman of its board of governors. He held this position until 1948, when he was removed as chairman, but remained a member of the board. Eccles held that the banking system should be used consciously as an instru-

ment of national policy, and with that view promoted the Banking Act of 1936.

Echegaray (*ā'chā-gā-rī'*), **José (1832-1916)**, Spanish dramatist, was born in Madrid. He was educated in Madrid, and, after a brief experience as an engineer, he was appointed professor of mathematics in Madrid. Becoming interested in politics, he took an active part in the revolution of 1868 and served as minister of education and finance for seven years. Upon the restoration of the monarchy, he withdrew from politics and won a reputation in literature.

His first success was with the drama *At the Hilt of the Sword*, which was followed by a long series of tragedies, comedies, and thesis plays. In Spain, he is ranked as the greatest dramatist since Lope de Vega and Calderón, and he occupies a high position among the modern dramatists of the world. In 1904, he shared with Frédéric Mistral the Nobel prize for literature. See *Great Galeoto*.

Eckener, Hugo (1868-1954), German airship designer and navigator, was born at Flensburg. He took up the study of the construction and navigation of Zeppelins in 1908, and was instructor in their use during World War I. He conducted the *Los Angeles* from Germany to the United States in 1923 and delivered it to the American government. In 1928, as commander of the *Graf Zeppelin*, he was the first to circumnavigate the globe by airship.

Eddington, Sir Arthur Stanley (1882-1944), English astronomer, was born at Kendal, Eng. After being graduated from Cambridge University, he was made chief assistant at the Greenwich Observatory in 1906 and in 1913, accepted a professorship at Cambridge, becoming director of the Observatory there in the following year. His studies on the internal temperature of stars and his application of the theory of relativity to astronomy made him a leader in the field. Both scientific generalization and lucidity of expression characterized his works, among which were: *Space, Time and Gravitation; The Expanding Universe;* and *The Philosophy of Physical Science.*

Eddy, Mary Baker (1821-1910), nee Mary Baker, founder of Christian Science, was born in Bow, N. H. In 1866 she announced her discovery of Christian Science, following experiences in connection with what she described as a miraculous recovery from an accident pronounced fatal by a physician. She embodied the principles of Christian Science in *Science and Health, with Key to the Scriptures*, which was published in 1875. This and later works outline the possibility of healing through the understanding that Spirit alone is real and that matter and disease are subjective states and delusions.

Hitherto connected with the Congregational Church, Mrs. Eddy, with her followers, founded in 1879 the Church of Christ, Scientist, in Boston, which was reorganized and named the First Church of Christ, Scientist. It is also known as the Mother Church. All churches and societies subsequently founded are considered branches. In 1908, at the age of 87, Mrs. Eddy founded *The Christian Science Monitor*, international daily newspaper. Besides *Science and Health*, her writings include the *Church Manual, Miscellaneous Writings, Retrospection and Introspection, Unity of Good, No and Yes*, and *Rudimental Divine Science.*

The Christian Science movement has spread widely to nearly all countries of the world.

Eden, Sir (Robert) Anthony (1897-), English diplomat. After finishing his schooling at Eton and Oxford University, he served in the British army in France, 1915–19, and, in 1923, was elected to the House of Commons as a Conservative. As secretary to Austen Chamberlain, he was made familiar with foreign affairs and in 1935 became secretary of state for foreign affairs. It was due largely to his efforts that the League of Nations in 1935 imposed economic sanctions on Italy for her aggression against Ethiopia. When this policy failed, Eden, who had been knighted in 1936, urged revision of the League's constitution and a rapid increase in Britain's fighting strength. In 1938, he resigned from the cabinet in protest over British acquiescence in Germany's extension of power over Austria. On the outbreak of war with Germany in 1939, he was made colonial secretary. From 1940 to 1945 he was foreign secretary and leader of the Commons. He was deputy leader of the opposition, 1945–51, when as a result of the general election he again became foreign secretary. Following the resignation of Sir Winston Churchill as prime minister in 1955, Sir Anthony succeeded him but resigned January 9, 1957, owing to the failure of his Suez Canal policy and his own ill health. See *Suez Canal Crisis.*

A book of selected speeches by Eden was published in 1949 under the title *Days for Decision.*

Edinburgh, Philip Mountbatten, Duke of (1921-), husband of Elizabeth II of Great Britain whom he married November 20, 1947, was born in Corfu. He is the son of Prince Andrew and Princess Alice of Greece, a grandson of George I of Greece, great-grandson of Christian IX of Denmark, and great-great grandson of Queen Victoria. He was educated in France, Scotland, and England, and during World War II served in the Royal Navy. On becoming a naturalized British subject in 1947, he adopted his mother's family name of Mountbatten. He was created a Duke with the title His Royal Highness in 1947. In addition to continuing his service with the Navy, he has aided the Queen in her ceremonial and political tasks in Great Britain and in diplomatic visits to foreign countries and to states of the British Commonwealth. In 1957 Queen Elizabeth raised him to the rank of Prince.

Edison, Thomas Alva (1847-1931), American inventor and manufacturer, was born at Milan, Ohio, whence his family removed to Port Huron, Michigan, in 1854. He was employed on the Grand Trunk railway when 12 years of age, first as newsboy and later as telegraph operator.

Edison's first important invention was a device by which a telegraphic message could be transmitted automatically from one wire to another without the presence of an operator. It was followed shortly by others, including a vote recorder. The lack of demand for such an instrument led him afterward to investigate the need of any invention before reducing it to a practicable form. His subsequent success placed him at the head of those who apply scientific truths to practical ends.

In 1869, Edison came to New York City. He obtained patents for a device making possible quadruplex telegraphy, by which four messages could be transmitted on a wire at the same time. He established a laboratory at Newark, N. J., removing in 1886 to Orange, N. J. The long list of his inventions includes the carbon telephone transmitter, the megaphone, the phonograph, the incandescent lamp with a carbon filament, and improvements in the cinematograph. During World War I, he built and operated several chemical plants for the government. See *Motion Pictures, Phonograph.*

Edmund, or **Eadmund (c.981-1016)**, known also as Ironside, king of the English. He was the son of Ethelred "the Unready," and was chosen king by the Londoners on his father's death, 1016, while Canute was elected at Southampton by the witan. Edmund hastily levied an army in the West, defeated Canute twice, raised the siege of London, and again routed the Danes. Levying a fresh army, he defeated them at Oxford—his last victory. At Assandun in Essex, after a desperate fight, he was routed. By a compromise with Canute, the latter retained Mercia and Northumbria; Edmund received all the south and the headship, the survivor to succeed to the whole. A few weeks later Edmund died.

Edward or **Eadward (c.1004-1066)**, "the Confessor," king of the English, son of Ethelred "the Unready," and Emma, daughter of Richard "the fearless," Duke of Normandy. He was brought up at the Norman court and, after his accession in 1042, showed a preference for Norman customs and ideas. In 1052, Godwine, who had been outlawed, rose in rebellion, and, during the rest of the reign, all real power was in the hands of the house of Godwine. Edward codified the legal usages of the Anglo-Saxons.

Edward I (1239-1307), king of England, succeeded his father, Henry III, in 1272. Imbued with high notions of feudal sovereignty, he sought to establish his supremacy throughout the island of Britain. His expeditions against Llewelyn, Prince of Wales, 1282, and against the latter's brother David, 1283, resulted in the reduction of the principality, the government of which he settled by the statute of Wales, 1284. He made a partially successful attempt to conquer Scotland. A man of strictly legal but somewhat narrow mind, Edward secured order and good government. In his reign, Parliament met regularly for the first time, and to it was conceded the right of levying taxes. Although jealous of his royal prerogatives and cruel to the Jews, he was, on the whole, one of the most able and enlightened rulers of his age.

Edward II (1284-1327), king of England from 1307 to 1327, son of Edward I, was born at Carnarvon. In 1301, he was created Prince of Wales, being the first heir apparent to the English throne who bore that title. In 1308, he went to France to conclude a marriage with Isabella, daughter of Philip "the Fair," leaving the dissolute Piers de Gaveston in charge at home. The nobles rose against the latter and hanged him in 1312. Two years later, Edward invaded Scotland with an immense army, but was defeated at Bannockburn on June 24, 1314, by Robert Bruce.

The rest of his reign was a succession of disputes with the nobles and with Charles IV of France. Finally his queen and the nobles revolted against him successfully in 1327, and Edward was murdered in Berkeley Castle.

Edward III (1312-1377), king of England, eldest son of Edward II and Isabella of France. He was proclaimed king, 1327, during his father's captivity, and soon after marched with a large army against the invading Scots, but concluded an inglorious campaign by a treaty in which the entire independence of Scotland was recognized. The war was subsequently renewed by Edward, who several times invaded Scotland.

As the son of Isabella, daughter of Philip "the Fair," Edward claimed the crown of France against Philip of Valois. His subsequent invasion of France began the Hundred Years' War. Edward defeated a French fleet off Sluis, defeated Philip at Crecy, and captured Calais. King David of Scotland took advantage of Edward's French campaigns to invade England, but was defeated and captured. Edward then proceeded to ravage Scotland, and his son the Black Prince defeated and captured King John of France in 1356 at Poitiers. Edward's resources were exhausted, however, and he concluded peace with Scotland and France, restoring nearly all his conquests.

Edward IV (c. 1442-1483), king of England, was born in Rouen, the son of Richard, Duke of York. After the death of his father in 1460, Edward became the head of the Yorkist party, then struggling with the Lancastrians in the civil conflict known as the Wars of the Roses. He was declared king by his party in 1461.

Edward won a victory over the Lancastrian king Henry VI, at Towton, but, in 1470, he was compelled to flee to the Netherlands. Returning with foreign aid, he won the decisive victories of Barnet and Tewkesbury in 1471, and, on Henry's death a few months later, Edward's rule was generally acknowledged.

The remaining years of Edward's reign were comparatively peaceful. Printing and silk manufactures were introduced into England. The king was debonair and popular, yet he steadily pursued the policy of strengthening the royal power, thereby preparing the way for the absolute monarchy of the Tudors.

Edward VII (1841-1910), king of Great Britain and Ireland, eldest son of Queen Victoria, was born at Buckingham Palace. He studied at Edinburgh and subsequently at Oxford and Cambridge. In 1860, he visited the United States and Canada; in 1862, traveled with Dean Stanley in the East; in 1863, married Princess Alexandra, eldest daughter of Christian IX of Denmark. He constantly manifested a lively interest in exhibitions, charitable institutions, the housing of the poor, and agriculture. He assisted in promoting the Royal College of Music, and the Imperial Institute was founded at his suggestion. On January 22, 1901, he succeeded his mother as Edward VII. By visits to continental capitals, the king did much to allay international animosities and promote peace and good will, especially between Britain and France.

Edward VIII (1894-), ex-king of Great Britain, the only English monarch to abdicate voluntarily, was born at White Lodge, Richmond, England. He was baptized as Edward Albert Christian George Andrew Patrick David. As heir to the throne, he was designated Prince of Wales. His university course at Oxford was interrupted by World War I, in which he played an active part on the staffs of various divisions of the army. Thereafter he traveled widely on good-will tours throughout the world, winning popularity everywhere by his democratic affability.

On the death of his father, George V, he was made king of Great Britain, January 20, 1936. When it became known that he intended to marry Mrs. Wallis Simpson, American born wife of Ernest A. Simpson, from whom she had secured a preliminary decree of divorce, the cabinet indicated determined opposition. Edward accordingly abdicated on December 10, Parliament consenting and creating him Duke of Windsor. Many informed observers regarded the abdication as a means of avoiding a possible crisis due to Edward's alleged insistence on a more active role as king than the constitution countenanced. He served as liaison officer between the British and French armies in 1939–40, but was removed after the disastrous battle of Flanders in 1940 and later was appointed Governor of the Bahama Islands. He is the author of *A King's Story: The Memoirs of the Duke of Windsor* (1951) and *Crown and People* (1953), an essay on coronations and on the monarchy as a British institution.

Edward, the Black Prince (1330-1376), eldest son of Edward III, was created Prince of Wales in 1343. In 1346, though only a boy, he fought at Crecy, and is said to have won from his black armor his popular title. In 1355–56, he undertook two expeditions in France, the second signalized by the great victory of Poitiers. In 1361, he married his cousin, Joan, the "fair maid of Kent," who bore him two sons, Edward and the future Richard II; in 1362, his father created him Prince of Aquitaine; and, in 1363, he departed to take possession of his principality. In 1367, he espoused the cause of Pedro the Cruel and, at Navarrete, won a great victory, taking Du Guesclin prisoner; in 1370, he sacked Limoges.

Edwards, Jonathan (1703-1758), American preacher and theologian, was born at East Windsor, Conn. He was graduated from Yale in 1720 and was tutor there, 1724–26. He accepted an invitation to a church at Northampton, Mass., and was ordained in 1727. Here he labored with intense zeal for more than 23 years, at the end of which period he was dismissed by his congregation because of his insistence that no unconverted persons should be allowed to approach the Lord's table.

Edwards was a powerful and impressive preacher; somber, and even gloomy in his religious opinions and sentiments; but earnest, unaffected, and nobly conscientious. His fame as a theologian rests upon his defense and development of the evangelical system. In 1734, a local manifestation of religious enthusiasm took place in his parish, of which he published an account entitled *A Faithful Narrative of the Surprising Work of God in the Conversion of Many Hundred Souls in Northampton.* After his dismissal in 1750, he became a missionary among the Indians of Massachusetts. While residing at Stockbridge, in that state, he composed his famous treatises on the *Freedom of the Will* and *Original Sin.* The former is the most famous American book on theology. In 1757, he became president of Princeton College, but died in the following year. He was elected to the American Hall of Fame, 1900.

Eggleston (*ĕg'lz-tŭn*), **Edward (1837-1902),** American author, was born at Vevay, Ind. He became a Methodist preacher in 1856 and subsequently edited for various periods the New York *Independent* and *Hearth and Home.* In 1879, he retired from the ministry and devoted himself entirely to literature. Among his best-known books are *The Hoosier Schoolmaster, The Circuit Rider, Pocahontas and Powhatan, History of United States,* and *The Transit of Civilization.* Died at Lake George, N. Y. See *Shocky.*

Ehrenburg, Ilya (1891-), Soviet journalist and novelist, obtained his first experience as a military correspondent during World War I. He has lived much abroad, but his reports on other countries, as well as his articles and broadcasts from Moscow are written strictly from the Soviet point of view. He was awarded the Stalin prize for literature in 1942 and the Order of Lenin in 1944.

Ehrlich (*ār'lĭĸ*), **Paul (1854-1915),** German physician, was born in Strehlen, Silesia. He was educated at Breslau, Strasbourg, Freiburg, and Leipzig, graduating in medicine in 1878. In 1885, he became assistant in the University Clinic, at Berlin and, in 1890, was appointed professor in the university. In 1896, he was made director of the Royal Institute for Experimental Therapeutics at Frankfort.

Ehrlich's greatest achievement was the discovery of salvarsan and neo-salvarsan, arsenic compounds of marked efficacy in the treatment of syphilis. In 1908, he received the Nobel prize for medicine with Elie Mechnikov.

Eiffel (*ī'fĕl*), **Alexandre Gustave (1832-1923),** French engineer, was born at Dijon, and early gained a reputation for bridge construction. He constructed the iron bridge over the Garonne at Bordeaux in 1858, and was one of the first to utilize air caissons. The bridge over the Douro at Oporto, the great viaduct of Garabit in Cantal, and that over the Tardes near Montlucon were designed by him. In the huge framework erected by him for Bartholdi's Statue of Liberty may be seen the germ of the iron Eiffel Tower, 984 feet high, which he erected in 1887–89 on the Champ de Mars in Paris at a cost of $1,000,000. In 1893, he was condemned to a fine and imprisonment for breach of trust in connection with the Panama Canal works, but sentence was later annulled.

Einhard (*īn'härt*), or **Eginhard** (*ā'gĭn-härt*) **(770-840),** Frankish scholar and biographer of Charlemagne, was born at Maingau in east Franconia. He was sent to the court of Charlemagne, where he became a pupil of Alcuin and a favorite of the emperor. Louis, successor of Charlemagne, continued his father's favor. Einhard's *Vita Caroli Magni* is the greatest biographical work of the Middle Ages.

Einstein (*īn'stīn*), **Albert (1879-1955),** physicist, was born in Germany, of Jewish parentage. At the age of 16 he went to Switzerland and became a naturalized citizen. He early displayed a genius for mathematics and, after graduating at the University of Zurich, became a professor of theoretical physics there. In 1914, he was called to Berlin. He was given a stipend to enable him to devote himself exclusively to investigative work and was made director of the Kaiser Wilhelm Academy for Research. He accepted in 1932 the chair in mathematics at the Institute for Advanced Study at Princeton, N. J. In 1933, he severed his German connections in protest against the Nazi persecution of Jews and later became an American citizen.

Einstein propounded in 1905 the so-called theory of relativity, which he generalized in 1915. This theory is regarded as the most important contribution to physics since the discoveries of Isaac Newton. In 1921, he received the Nobel prize in physics. In 1929 he announced a theory unifying mathematically the gravitational and magneto-electric forces. See *Relativity.*

Eisenhower, Dwight David (1890-), American general and 34th president of the United States, was born at Denison, Texas. After being graduated from West Point in 1915, he served in the tank corps in World War I and afterwards continued his studies at army schools. As lieutenant-general with headquarters in London he planned and commanded the invasion of Africa in November 1942.

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DWIGHT D. EISENHOWER

UNITED STATES SUPREME COURT

Back row, left to right: WILLIAM J. BRENNAN, THOMAS C. CLARK, JOHN M. HARLAN, CHARLES E. WHITTAKER

Front row, left to right: WILLIAM O. DOUGLAS, HUGO L. BLACK, CHIEF JUSTICE EARL WARREN, FELIX FRANKFURTER, HAROLD H. BURTON

After the reconquest of French Africa and the invasion of Sicily and Italy, he was recalled to London. There he organized and later directed the invasion and reconquest of France in 1944, a sea-air-land operation whose scope was unprecedented in military history. He was made general of the army in December 1944. He was chief of staff of the United States army, 1945–47, when he resigned to accept the presidency of Columbia University. In 1950, he was appointed supreme commander of Western European allied forces, a post which he finally resigned in 1952 to become Republican candidate for the presidency. Elected by an unprecedented popular vote, he was inaugurated president in January 1953. In line with his declared policy of peace with firmness, he arranged for a truce in Korea while making a defensive alliance with the Chinese Nationalist government on Formosa. In December 1953 he placed his "Atoms for Peace" proposal before the United Nations Assembly. He appointed a special representative to negotiate with Soviet Russia and other countries, looking toward agreement on partial disarmament. He went one step further at the "Big Four" Conference in Geneva in the summer of 1955. Here he proposed to the governments of Britain, France, and Russia an "open sky" inspection of military installations as a safeguard against surprise attacks. He also advocated the unification of Germany. After recovering from a heart attack suffered in September 1955 he resumed his schedule of presidential duties the following winter. Again in 1956 he won the presidential election in a landslide victory over his Democratic opponent.

Eisenhower, Milton S. (1899-), was born at Abilene, Kansas. Before becoming a college president, first at Kansas State College of Agriculture and Applied Science, then at Pennsylvania State College and, in 1956, at Johns Hopkins University, he spent several years in journalism and in different branches of the public service. Some of the posts he held were vice consul at Edinburgh, Scotland; director of information for the U. S. Department of Agriculture; editor of *The Yearbook of Agriculture* (1929–36), director of the War Relocation Authority; and co-ordinator of news and propaganda for the U. S. Office of War Information, with headquarters in Morocco. His work in a different field paralleled closely that of his brother, Dwight D. Eisenhower. Milton is co-author of *The United States Department of Agriculture: Its Structure and Functions.* In 1953 he was appointed special ambassador and personal representative of the President on Latin-American affairs.

Elgar (*ĕl'gär*), **Sir Edward William (1857-1934)**, English musician and composer, was born at Broadheath, near Worcester. He succeeded his father as organist at St. George's in 1885. His first works, *The Black Knight, Lux Christi,* and others, brought him wide recognition. His oratorio, *The Dream of Gerontius,* written for the Birmingham Festival of 1900, placed him in the front rank of contemporary English composers. He was knighted in 1904 and, from 1905 to 1908, was professor of music in the University of Birmingham. Among his later works are *The Apostles, The Kingdom, Froissart,* and *Falstaff.*

Elgin (*ĕl'gĭn*) **and Kincardine** (*kĭn-kär'dĭn*), **James Bruce, Earl of (1811-1863)**, was born in London. He succeeded his father, the seventh earl, who, in 1812, brought from Athens the Elgin Marbles. As governor of Jamaica, 1842–46, and as governor-general of Canada, 1847–54, he displayed great administrative abilities. While on his way to China in 1857, as plenipotentiary, he heard at Singapore of the Indian mutiny, and diverted the Chinese expedition thither—thus delaying his own mission, which, after some military operations and diplomacy, issued in the Treaty of Tientsin in 1858. In 1861, he became governor general of India, where he died.

Eliot, Charles William (1834-1926), American educator, was born at Boston and was graduated from Harvard University in 1853. He taught mathematics and chemistry at Harvard and, in 1863, went to Europe to study chemistry and to investigate the educational institutions of that continent. In 1865, he was chosen professor of analytical chemistry in the Massachusetts Institute of Technology, which post he filled for a period of four years.

In 1869, Eliot succeeded Thomas Hill as president of Harvard, and continued at its head until 1909. During his administration, many notable changes in the government of the university occurred; its scope was broadened, and there was a great increase in the number of its professors and students. By gifts and benefactions, its wealth was greatly increased. The elective system as now known to American education was devised and developed by him. He also became widely known as a speaker and writer on educational subjects, and, after 1909, devoted much attention to the cause of international peace.

Eliot, George (1819-1880), is the pen name of Mary Ann Evans, English novelist, who was born at Arbury, in Warwickshire. She received an ordinary school education but later became very proficient in Latin, German, and the higher mathematics. She began her literary career by a translation of Strauss's *Life of Jesus,* and became, in 1851, an assistant editor of the *Westminster Review.* During this time she formed the acquaintance of George Henry Lewes, with whom she subsequently lived as wife, though unmarried, and who, it would seem, discovered her latent faculty for fictional work.

Her first work in fiction was *Scenes of Clerical Life,* contributed to *Blackwood's* in 1857. The stories proved a signal success, and encouraged the production of a series of novels, beginning in 1859 with *Adam Bede,* which was followed in 1860 by *The Mill on the Floss,* and in 1861 by *Silas Marner,* a tale which is perhaps the most perfect of any of this series. In 1863, *Romola* appeared; *Felix Holt* was published in 1866 and *Middlemarch* in 1872. Eliot's novels reveal a highly intellectual rationalist who nevertheless deeply appreciates the strength of religious convictions. This fact, combined with her sympathetic delineation of character, especially when drawing on her experience, brought her into the front rank of novelists of the day. Lewes died in 1878. In 1880, George Eliot married an old friend, John Cross. She died in the same year.

Eliot, John (1604-1690), the "Indian apostle," was born probably at Widford, Herts, England. He was graduated from Jesus College, Cambridge, in 1622. After his ordination in the Church of England he left the country for conscience' sake, and, in 1631 landed at Boston. Next year he settled at Roxbury, and, in 1646, began to preach in the native dialect to the Indians at Nonantum. Shortly afterward, he established his converts in regular settlements, and in England a corporation was founded in 1649 for propagating the gospel among the Indians of New England.

In 1674, the number of "praying Indians" was estimated at 4000, but the decay of the "praying towns" was rapid after King Philip's War in 1675, in which the converts suffered equal cruelties at the hands of their countrymen and of the English. Eliot assisted in preparing an English metrical version of the psalms, *The Bay Psalm-Book,* the first book printed in New England. His greatest work was the translation of the Bible into the Indian tongue. He died at Roxbury.

Eliot, Thomas Stearns (1888-), critic, poet, and dramatist, was born at St. Louis, Mo., but became a British subject in 1927. He received his education at Harvard, University of Paris, and Oxford. He was employed for some years as a bank clerk, but he has been primarily a scholar and a writer. As poet, critic, editor of *The Criterion,* lecturer, and, more recently, successful dramatist, he has exerted a strong influence on the literature and thinking of his time. In recognition of his outstanding position in contemporary letters, he was awarded the Nobel prize for literature in 1948. His verse play, *The Cocktail Party,* was a 1950 success on Broadway. Other works written by him include: *The Sacred Wood, The Use of Poetry and the Use of Criticism, The Rock, The Waste Land, The Idea of a Christian Society,* and *What is a Classic?*

Elizabeth I (1533-1603), queen of England from 1558 to 1603,was born at Greenwich palace. She was the daughter of Henry VIII and Anne Boleyn; she was scarcely three years of age when her mother was beheaded, and only 13 at the death of her father. As Princess Elizabeth, she had the advantage of the best teachers and masters, especially under the supervision of Catherine Parr, the last of Henry's queens.

Elizabeth was in her 26th year when she obtained the crown. Her first act was to release the imprisoned Protestants and to re-establish Protestantism. Next she concluded a peace with France and Scotland, entering into an undertaking with the Reformers in the latter country to protect them from the Catholics. In her own country, while zealously maintaining Protestantism and severe toward those of her subjects who adhered to the formerly established religion, she was not less severe toward the Puritans, who were the most Protestant of all the sects.

Very early in her reign Elizabeth was troubled by the pretensions of the friends of Mary Queen of Scots, who was now the next heir to the throne. As Mary was a zealous Catholic, the counselors of Elizabeth were anxious that she should marry in order to secure the Protestant succession. She finally refused to marry, though it is believed that she would have accepted her favorite, the Earl of Leicester, for a husband, if she had not been prevented by her counselors. In 1586, the Babington conspiracy was formed, the object of which was to re-establish the papacy and to set Mary Queen of Scots on the throne of England. It led, however, only to the execution of Mary after she had been imprisoned in England for 19 years.

In 1588, Elizabeth had to contend with a more formidable enemy in Philip II of Spain, who avowed his resolution to annihilate Protestantism, but his threatened invasion of the country was prevented by the defeat and destruction of the armada. At the close of her reign, which lasted for 45 years, England was stronger and greater than it had ever been before. To this reign belong the dis-

coveries of Hawkins, Drake, and Sir Walter Raleigh. Spenser, Shakespeare, and Bacon belong also to the Elizabethan age.

Elizabeth II (**1926-**), English queen, was born in London and christened Elizabeth Alexandra Mary. She was proclaimed queen February 8, 1952, following the death of her father, King George VI. She had become heiress presumptive to the throne when her uncle, Edward VIII, abdicated in 1936. Trained from childhood for her royal career, she served during World War II in the Auxiliary Territorial Service. At the age of 21, Elizabeth married Philip Mountbatten (formerly Prince Philip of Greece) on November 20, 1947. They were created the Duke and Duchess of Edinburgh. They have two children—H.R.H. Prince Charles Philip Arthur George, born November 14, 1948, heir apparent to the throne, and H.R.H. Princess Anne Elizabeth Alice Louise, born August 19, 1950. Queen Elizabeth has traveled widely. She has visited both Canada and the United States. At the time of her father's death she was in Africa. Following her coronation, Elizabeth and Prince Philip made an extensive tour of British Commonwealth countries and paid an official visit to Norway. In January 1956 they visited Nigeria.

Ellis, Henry Havelock (**1859-1939**), English scientist and literary scholar, was born in Croydon, Surrey. He was educated for a medical career. After teaching in Australia, 1875–79, he practiced medicine in England for a brief period and then devoted himself exclusively to literary and scientific work. His researches were concerned chiefly with sex, to which he brought a psychological and sociological approach. The literary charm of his writings did much to spread his viewpoint. His scientific works include *The Criminal; Man and Woman;* and a monumental work on the psychology of sex, including the volumes entitled *Sexual Inversion, The Evolution of Modesty, Sexual Selection in Men, Erotic Symbolism,* and *Sex in Relation to Society.* Among his other works are *The New Spirit, A Study of British Genius, The World of Dreams, Kanga Creek,* and *The Dance of Life.*

Elman, Mischa (**1891-**), Russian violinist, was born at Talnoje. He displayed precocious musical talent, and, at the age of five, he was taken to Odessa, where he studied five years with Fidelmann. In 1902, Leopold Auer prevailed upon the czar to suspend, in his case, the rule barring Jewish pupils from the Imperial Conservatory at Leningrad. Here he continued studying for two years under Auer with great success. He made his first appearance in concerts in 1904, at the age of 13, and was immediately acclaimed a violinist of the first rank. He made his first visit to the United States in 1908 and thereafter made frequent concert tours with increasing popularity.

Elphinstone (*ĕl'fĭn-stŭn*), **Mountstuart** (**1779-1859**), British statesman and historian. He was educated at Edinburgh and Kensington, and entered the Bengal civil service in 1795. He served with distinction on Wellesley's staff, and was appointed resident at Nagpur in 1804. In 1808, he was sent as envoy to Sha Shuja at Kabul. As resident at Poona, 1811–19, he ended the Mahratta war of 1817 and organized the newly acquired territory. During his governorship of Bombay, 1819–27, he founded an improved system of administration and greatly advanced public education. He returned to England in 1829, and, declining the governor generalship of India, he lived in comparative retirement. His valuable *History of India* appeared in 1841.

Emanuel I (*ĕ-măn'ū-ĕl*) (**1469-1521**), king of Portugal, called "the Great" or "the Fortunate," became king in 1495. His reign is known as the golden age of Portugal. He prepared the code of laws which bears his name, and made his court a center of chivalry, of art, and of science. Vasco da Gama's voyage round the Cape of Good Hope, Cabral's discovery of Brazil, and the expedition of Albuquerque and others that so widened Portuguese possessions were all authorized and encouraged by Emanual. He died at Lisbon.

Emerson, Ralph Waldo (**1803-1882**), American essayist, philosopher, and poet, was born at Boston, Massachusetts, the descendant of a long line of ministers. After attending the Boston Latin School and receiving his degree in arts at Harvard University in 1821, he taught for a short time in Boston. In 1823, he began to study for the ministry.

In 1829, he married Ellen Louisa Tucker and became minister of the Second Church of Boston, a Unitarian congregation. From this ministry he resigned for conscientious reasons in 1832. In December of that year, after the death of his wife, he sailed for Europe. There he made the acquaintance of many English men of letters and began his lifelong friendship with Carlyle.

Emerson returned to America in 1833 and, in the following year, took up his permanent residence at Concord, Mass. In 1835, he married Lydia Jackson. He led a quiet, meditative life, preparing the lectures that he delivered subsequently in Boston and the vicinity, writing essays, and preaching occasionally.

The year 1836 was signalized in his life by the publication of his tractate *Nature,* perhaps the most important of his works, and by those meetings of a few like-minded thinkers who became known as the transcendental school of philosophy. This year, also, he wrote "Concord Hymn." In 1837, he delivered an oration *The American Scholar,* which advocated that American thought should cut loose from its moorings in European culture. He pleaded for making the individual consciousness and the soul of each man the supreme judge in spiritual matters.

His first series of *Essays* appeared in 1841; the second, in 1844. These were received with great interest on both sides of the Atlantic. He assisted in founding *The Dial,* the journal of the transcendentalists. In 1846, a collection of his poems was published. His second journey to England, the next year, resulted in the publication of *English Traits* in 1856.

In 1850, he issued *Representative Men.* A decade later appeared *The Conduct of Life,* which contains a statement of his moral and ethical principles. *Society and Solitude* appeared in 1870. The ripest fruit of his culture was the paper *Sovereignty of Ethics,* published in 1878. His last years were spent in revising his unpublished manuscripts and in preparing a complete edition of his works.

Though he was not, in the technical sense of the word, a reformer, his habits and tastes being rather those of a scholar and a man of letters, every earnest movement for the welfare of humanity had his sympathy. His thought may be described as Puritanism in the process of fermentation and transformation into a semi-scientific system. He was the prophet of intellectual individualism. He was elected to the American Hall of Fame in 1900. See *Representative Men.*

Emin Pasha (*ā'mĕn pä-shä*) (**1840-1892**), is the adopted name of Eduard Schnitzer, who was born at Oppeln, Silesia. He studied medicine and, in 1864, went to Turkey, where he became a well-known physician. He learned to speak Turkish and Arabic and adopted Turkish habits and customs. He also adopted the name Emin, which means "faithful one." In 1876, he joined the Egyptian service and proceeded as chief physician to the Equatorial Province, of which he was made governor in 1878 by "Chinese" Gordon. Here, on the sudden uprising of the Mahdi, he was cut off from the outside world. After great privations, a rescue party from the west coast, led by H. M. Stanley, reached him early in 1888. He refused, however, to return to Egypt and remained only to be deposed by a revolt in 1889, after which he reluctantly abandoned his province. In 1890, he entered the German service and at once made his way again to central Africa. In 1892, at Kinena, in the region of Stanley Falls, he was killed by Arabs.

Emmet, Robert (**1778-1803**), Irish revolutionist, was born at Dublin, the son of a doctor. He resigned from Dublin University in 1798 in protest against political domination, and was henceforth an ardent partisan of Irish independence. His impulsive patriotism led him in 1803 to make an unsuccessful attack on Dublin Castle, but he escaped into Wicklow. He was captured and executed the same year. His fate is the subject of a poem by Moore.

Empedocles (*ĕm-pĕd'ō-klēz*) (**c. 493 B.C.-435 B. C.**), Greek philosopher, was born at Agrigentum in Sicily. He was poet, priest, physician, and philosopher, and followed Pythagoras in his teaching. In philosophy he was an eclectic and endeavored to combine the teachings of the Eleatic School with the doctrine of Heraclitus. He assumed four indestructible elements—earth, air, fire, and water—and two primal causes of all change—"friendship" and "strife," or the uniting and the dividing principle. He was the first to teach that the mind can know only what is akin to it. He is credited with performing various miracles, including the restoration of a girl to life. The exact date and the manner of his death are unknown. According to a tradition, he threw himself into the crater of Etna.

Encke (*ĕng'kē*), **Johann Franz** (**c.1791-1865**), German astronomer, was born at Hamburg. Entering the University of Göttingen in 1811, he devoted himself to the study of astronomy under Gauss. In 1816, he became assistant in the Observatory of Seeberg, near Gotha. In 1817, the Cotta astronomical prize was awarded to Encke for his determination of the orbit of the comet of 1680. This led him to solve the problem of the sun's distance from the earth, and his value of the solar parallax, giving a distance of about 95 million miles, was for a long time accepted as the most accurate known. He showed that the comet discovered by Pons in 1818 revolves around the sun in the remarkably short time of 3.3 years, being identical with those observed in 1786, 1795, and 1805. This comet has ever since been known by Encke's name. In 1825, he was made director of the Berlin Observatory.

Endicott (*ĕn'dĭ-kŏt*), or **Endecott, John** (**c. 1588-1665**), early American governor, was born at Dorchester, England.

In 1628, he led the first settlers to the region now known as Salem, Mass. He commanded an expedition against the Pequot Indians in 1636 and was governor or deputy governor of the Massachusetts Bay Colony with short interruptions from 1641 until his death. Apart from his bigotry and harshness toward the Quakers, his administration was just.

Ennius (*ĕn'ĭ-ŭs*), **Quintus (239 B. C.-c. 169 B. C.),** Roman poet, the father of Roman literature, was born at Rudiæ, Calabria. Cato "the Elder" took him to Rome, where he taught Greek and Latin and gained the friendship of the leading Romans of his day. He was famous for his learning and his charming conversation. His writings were a poem on Roman history; plays for the theater, many of them adapted from the finest Greek plays; and short poems, a few of which remain. He died in Rome.

Enters, Angna (1907-), American dancer and painter, was born in New York. The special form of dance interpretation or "mime," for which she has become famous, is original with her. It is related both to her painting and to her dancing. Through the blending of costumes and poses in creative pantomime she achieves a characterization or tells a story. Her unique point of view as a contemporary artist is expressed in her book, *First Person Plural.*

Epaminondas (*ĕ-păm'ĭ-nŏn'dăs*) **(c. 418 B. C.-362 B. C.),** Theban general and statesman, led a retired life until his 40th year. After the stratagem by which his fellow citizens expelled the Spartans in 379, he was sent to Sparta in 371 to negotiate peace, but refused to meet the terms demanded. When war was resumed, he received the command, and with 6000 men defeated a much larger Spartan force at Leuctra through the use of a new organization of the phalanx. The victory over Sparta gave him extraordinary prestige. In 370, with Pelopidas, he marched into the Peloponnesus and incited several of the allied tribes to desert Sparta.

On his return to Thebes, Epaminodas was accused of having retained the supreme power beyond the lawful time, but was acquitted after an able defense. In 368, war was renewed. After indecisive campaigns he advanced into Arcadia and near Mantinea finally broke the power of Sparta, but was mortally wounded.

Epée (*ā'pā'*), **Charles Michel, Abbé de l' (1712-1789),** a French priest, one of the founders of the modern system of instruction for the deaf and dumb, was born at Versailles. In 1765, he began to occupy himself with the education of two deaf and dumb girls. Meeting with success with his system of manual signs, he founded at his own expense, in 1770, an institution for the deaf and dumb which through his labors attained international fame.

Epictetus (*ĕp'ĭk-tē'tŭs*), Greek Stoic philosopher, who flourished in the 1st century A. D., was born at Hierapolis, Phrygia, and was originally a slave to Epaphroditus, one of Nero's freedmen. Having obtained his freedom, he gave himself up wholly to the study of philosophy. Being banished from Rome with certain other philosophers by Domitian, 90 A. D., he settled at Nicopolis, in Epirus. His pupil Arrian collected the maxims of Epictetus in the work entitled *Encheiridion.*

The sayings of Epictetus exhibit a simple and noble earnestness. They emphasize the desirability of indifference to external advantages and the duty of endurance and forebearance. The date of his death is unknown.

Epicurus (*ĕp'ĭ-kū'rŭs*) **(c. 342 B. C.-270 B. C.),** Greek philosopher, was born probably in Samos. His youth was spent in that island, whence he removed to Athens when about 18 years of age. He afterward taught at Colophon, Mytilene, and Lampsacus, but returned to Athens about 306 B. C. He was founder of the Epicurean school, which held that the highest good consists in pleasure. Epicurus was a man of amiable character, to whom his friends and pupils were warmly attached. None of his exceedingly numerous works have been preserved, but the great poem *De Rerum Natura,* by Lucretius, contains the substance of the Epicurean philosophy.

Epinay (*ā'pē'nĕ'*), **Louise d' (1726-1783),** French writer. In 1745, she formed a close intimacy with Rousseau and presented him with a small house, the now famous Hermitage, which stood on one of her husband's estates in the woods of Montmorency. An unfortunate jealousy, however, which Rousseau conceived for Grimm, another friend of Madame d'Epinay, was followed by an open rupture with his benefactress. With the assistance of Diderot, she carried on Grimm's celebrated *Correspondence with European Courts.* She wrote *Les conversations d'Emilie, Mémoires et correspondence, Correspondence de l'abbé Galiani, Lettres a mon fils,* and *Mes moments heureux.* Died at La Briche.

Epstein, Sir Jacob (1880-), sculptor, was born in New York, N. Y., of Russian and Polish parentage. He studied under Rodin in Paris and then settled in London in 1905. His first commission consisted of 18 large figures for the building of the British Medical Association, London. This and later works met with storms of criticism because of Epstein's departure from the decorative to express the abstract, often by figures resembling products of primitive art but conveying an impression of power and universality. Other works of his in marble or bronze include "Venus," "Ecce Homo," "Day and Night," "Genesis," and "American Soldier," the last being in the Metropolitan Museum of Art, New York. He was knighted in 1953.

Erasistratus (*ĕr-ā-sĭs'trā-tŭs*), Greek physician and anatomist, who flourished in the 3d century B. C. and is said to have been born in the Island of Ceos. He was a pupil of Theophrastus and resided for some time at the court of Seleucus Nicator, king of Syria. He founded a school of medicine and wrote several works on anatomy and practical medicine, some fragments of which have been preserved by Galen. Erasistratus was the first anatomist to distinguish between motor and sensory nerves and to trace both sets back to the brain.

Erasmus (*ē-răz'mŭs*), **Desiderius (c. 1466-1536),** Dutch scholar, was born in Rotterdam. On his parents' death he entered a monastery, which he left to become a teacher at Paris. At the invitation of his pupil Lord Mountjoy, he went to England; settled at Oxford, where he became the friend of More; and studied divinity under Colet and Greek under Grocyn and Linacre. In 1506, he visited Italy, staying at Bologna and Rome, where he was warmly received, but returned to England and became a teacher of Greek at Cambridge. In 1513, he again visited the continent and, after a journey to the low countries, settled at Basel, where he published an edition of the New Testament. Erasmus was the man of culture par excellence. Although favoring moderate reform in the Church, he deprecated the religious strife of the day as the enemy of culture. His works include *Christian Soldier's Manual* and *Praise of Folly.*

Eratosthenes (*ĕr'ā-tŏs'thē-nēz*) **(c. 276 B. C.-c. 196 B. C.),** Greek geographer and astronomer, was born at Cyrene, Africa. He was called to Alexandria by Ptolemy Euergetes to superintend the great library. He measured the obliquity of the ecliptic, and the result at which he arrived, namely 23° 51′ 20″, must be reckoned a very fair observation, considering the age in which he lived. Eratosthenes' greatest claim to distinction is as a geographer, his work on geography being the first scientific treatise on the subject. He knew that the earth was round, and, in order to measure its circumference, he employed some of the means used at the present day. See *Geographical Discovery: Greeks.*

Erckmann-Chatrian (*ĕrk'măn-shă'trē-ăN'*) (Emile Erckmann and Alexandre Chatrian), two French men of letters, the first of whom was born at Pfalzburg, 1822, the second, in the village of Soldatenthal, 1826. The two friends employed their pens in the same works, which they signed with the two names united in one; it was not until about 1863 that the authors informed their readers that these numerous works of fiction were the fruits of their friendly collaboration.

The story "The Famous Doctor Matthew" was their first success and was followed by a widely popular series of which *Histoire d'un conscrit de 1813, L'Ami Fritz,* and *Waterloo* are the best-known. They dramatized *L'Ami Fritz* and wrote another play of merit, *Le juif polonais,* adapted in English as *The Bells,* long one of the most effective plays in Sir Henry Irving's repertoire. Their fiction shows humor, fine character drawing, local color, and patriotic spirit. Erckmann died in 1899; Chatrian, in 1890.

Ericsson (*ĕr'ĭk-sŭn*), **John (1803-1889),** Swedish-American engineer and inventor, was born in Vermland, Sweden. At the age of 12, he became cadet of engineers, and, at 17, he entered the Swedish army; in 1826, he was promoted captain. In 1828, he constructed a flame engine and went to London to introduce it. He also produced in succession an instrument for sea sounding, a hydrostatic weighing machine, a tubular steam boiler, a steam fire engine, a caloric engine, and a pyrometer.

In 1836, Ericsson invented and patented the screw propeller. In 1839, he came to the United States where, in 1841, he designed for the government the screw-propelled warship *Princeton,* the pioneer screw-propeller warship. In 1861, he built for the United States government, in 100 days, the ironclad *Monitor,* which, on March 9, 1862, in Hampton Roads, defeated the Confederate ironclad ram *Merrimac.* His scientific investigations included computations of the intensity of solar heat.

Erigena (*ē-rĭj'ē-nà*), **Johannes Scotus (?-c.897),** philosopher and scholar, was born probably of Scottish parents in Ireland during the 9th century. He appears to have resided principally in France at the court of Charles the Bald. He took part in the controversies of his time regarding predestination and transubstantiation. His philosophic opinions were those of a neo-Platonist rather than of a scholastic. He uttered his opinions with boldness, and

evinced great subtlety and strength of intellect in their defense. In logic he was a realist and insisted that "authority originates in reason, not reason in authority." His chief work was *De Divisione Naturae*, a system in which pantheism is everywhere apparent.

Erskine, John (1879-1951), American literary scholar and writer, was born in New York. After being graduated from Columbia University as doctor of philosophy in 1903, he taught at Amherst College until 1909 and thereafter at Columbia University. He wrote a number of works on American literature, then turned to popular philosophy with his *Moral Obligation to Be Intelligent, Democracy and Ideals*, and *Give Me Liberty*. With *The Private Life of Helen of Troy*, which became very popular, he began a series of novels in which he retold old stories made over with modern motivation as a vehicle for social satire.

Erskine (*ûr'skĭn*), **Thomas Erskine, Baron (1750-1823),** British jurist and orator, was born in Edinburgh. He entered the army but, seeing little chance of promotion, decided to study law and was admitted a student of Lincoln's Inn, 1775. His rise was immediate and brilliant. Without the advantage of a business training, he rose into practice with unprecedented rapidity. His eloquence and powers of cogent reasoning made him one of the greatest trial lawyers in English history. In 1786, he was made attorney general to the Prince of Wales.

Erskine was a strong Whig and acted for the defense in the political trials of the time, giving his aid to Horne Tooke, Thelwall, and Thomas Paine; his defense of the last named cost him the post of attorney general to the Prince of Wales. He was now regarded as the defender of popular liberties and constitutional rights. Beginning with 1790, he sat in Parliament as a supporter of Fox; in 1806, he became chancellor under Fox and was raised to the peerage.

Ervine, Saint John Greer (*sĭn' jŭn ĕr'vĭn*) **(1883-),** Irish dramatist and novelist, was born in Belfast. After service in World War I, he began writing novels, short stories, essays, and plays. The scenes of his principal dramas are located in and around Belfast. He excels in plays of character. He was dramatic critic for the New York *World* in 1928–29. His writings include *The Magnanimous Lover, Mixed Marriage, Mrs. Martin's Man, God's Soldier* (biography of William Booth), and *The Christian and the New Morality*.

Espy (*ĕs'pĭ*), **James Pollard (1785-1860),** American meteorologist, was born in Westmoreland County, Pa. His *Philosophy of Storms*, published in 1841, was commended by the French Academy of Sciences. Appointed in 1842 to the Washington Observatory, Espy laid the basis of the weather bureau and was the founder of modern physical, or theoretical, meteorology.

Estaing (*ĕs'tăN'*), **Charles Hector, Count d' (1729-1794),** French admiral, was born in Auvergne. After serving in the army in India, he entered the navy; was made lieutenant general in 1763 and vice admiral in 1777. In 1778, he was placed in command of a squadron sent to aid the United States against England; he captured the Island of Grenada, but, failing in his attack on Savannah, 1780, returned to France. In 1792, he was chosen admiral. Notwithstanding his work in behalf of the Revolution, he was condemned as a noble and guillotined.

Esterházy (*ĕs'tĕr-hä'zē*), **Prince Nicholas (1765-1833),** Hungarian patron of arts and sciences. He traveled over a great part of Europe and resided for a considerable time in England, France, and Italy. He founded a splendid collection of pictures, which is preserved at the Vienna Museum. When Napoleon, in 1809, entertained the notion of weakening Austria by the separation of Hungary, he made overtures to Prince Esterházy respecting the crown of Hungary, which, however, were declined. Haydn composed most of his works at the court of Prince Esterhazy.

Ethelbert (*ĕth'ĕl-bûrt*) **(c. 552-616),** first Christian king of Kent, England. He was converted in 597 by his wife, Bertha, of France, and by Saint Augustine. Ethelbert gave the English their first written code of laws. He reigned from 560 until his death.

Eucken (*oik'ĕn*), **Rudolph Christoph (1846-1926),** German philosopher, was born at Aurich, East Friesland. He was educated at the universities of Göttingen and Berlin. In 1871, he was made professor of philosophy at Basel and, in 1874, at the University of Jena. He became a prominent leader of philosophical protest against purely materialistic conceptions of man and life and the tendency to narrow the point exclusively to that of the physical and biological sciences. His emphasis of spiritual interests and the inspirational quality of his writings have given them wide popularity. In 1908, he received the Nobel prize for literature. He was exchange professor at Harvard in 1912–13 and at the University of Tokyo in 1914.

Eucken's writings include *The Fundamental Concepts Of Modern Philosophic Thought, The Life of the Spirit, The Problem of Human Life as Viewed by the Great Thinkers, Main Currents of Modern Thought, Religion and Life*, and *Can We Still be Christians?*

Euclid (*û'klĭd*), Greek geometrician, said to have been a native of Alexandria, in which city he taught mathematics during the reign of Ptolemy Soter about 300 B. C. Euclid wrote on music, optics, and other subjects; but the work which has immortalized his name in mathematical science is his *Elements*, the basis of all modern textbooks on geometry. Tradition attributes to Euclid the saying, "There is no royal road" to learning, said to have been made to Ptolemy, who complained of the difficulty in understanding geometry.

Eugène (*û'zhĕn'*; Eng., *û-jēn'*), **François (1663-1736),** usually called Prince Eugène of Savoy, Austrian general, was born in Paris. He was a son of Eugène Maurice, Count of Soissons. His application for a commission in the army of France having been refused, he offered his services to the Emperor of Austria, in whose court and army he spent the whole of his remaining life.

For 50 years, and under three emperors, Prince Eugène was one of the greatest generals of his day. He fought against the Turks and, with the English general Marlborough, won the victories of Blenheim, Fadenarde, and Malpaquet over the French in the War of the Spanish Succession. He was also eminent as a statesman, and inaugurated some important reforms in the constitution of the Austrian monarchy. In later life he took much interest in art and learning, and formed a valuable collection of paintings and books.

Eugénie-Marie de Montijo (*û'zhā'nē' mà'rē' dĕ môn-tē'hō*) **(1826-1920),** empress of the French, 1853–70, was born in Spain. She was the grandaughter of William Kirkpatrick, at one time American consul at Malaga. Her mother, the Comtesse Teba, took her to Paris where she attracted the attention of Louis Napoleon. The latter proposed to the charming young Spaniard, whom he married in 1853.

The empress became the leader of the fashions of Europe and maintained a brilliant court. She urged the disastrous war of 1870 with Germany, which she spoke of as "my war." She was appointed regent when Napoleon III went to fight the Germans, and was in Paris when the revolution broke out after Sedan. Escaping from the Tuileries, she sought refuge in England, where she established her permanent residence at Chislehurst.

Euler (*oi'lĕr*), **Leonhard (1707-1783),** Swiss mathematician, was born at Basel. At the age of 16, he received the master's degree from the University of Basel. In 1727, he went to Leningrad, where he became professor of physics and higher mathematics. In 1741, he was called to Berlin by Frederick II to take the chair of mathematics in the Academy of Sciences. Returning to Leningrad in 1766, he spent the remainder of his life there. His contributions to higher mathematics entitle him to be called a principal founder of the science. His later years were spent in total blindness.

Euripides (*û-rĭp'ĭ-dēz*) **(c. 480 B. C.-406 B. C.),** Greek tragedian, was born at Salamis. The first play of Euripides which was performed was the *Peliades*. In 441 B. C., he gained the first prize for tragedy and continued to write for the Athenian stage until about 409, when he went to reside at the court of Archelaus, king of Macedonia.

In marked contrast to his two great predecessors, Æschylus and Sophocles, Euripides represents the new movements in the Athenian life of the time. His characters, although drawn from the ancient mythology, are treated in a realistic fashion with much psychological subtlety. His sentimentalism, tenderness, romanticism, and skepticism, combined with his exquisite lyrical qualities, made him, in later ages, by far the most popular of the Greek tragic poets. In his own day, however, his merits were the subject of sharp controversy, and he succeeded in winning the first prize in tragedy only five times.

Of his 92 plays, 18 are extant. These include *Alcestis, Hecuba, Medea, Bacchæ, Electra, The Trojan Women, Hippolytus*, and *Iphigenia Taurica*. He is said to have been killed by dogs, which were set upon him by envious courtiers. See *Iphigenia*.

Eusebius (*û-sē'bĭ-ŭs*) **of Cæsarea (c. 264-c. 340),** ecclesiastical historian, was born in Palestine. He took the surname Pamphili. About 313 he became bishop of Cæsarea, and took a prominent part in the council of Nice. Eusebius was regarded as the most learned father of the Early Church, except Origen, and was one of the most voluminous writers of antiquity. His *Ecclesiastical History* relates the principal events in the Christian Church to the year 324.

Eustachio (*â-ōō-stä'kyō*), **Bartolommeo (c. 1510-1574),** Italian anatomist. Little is known regarding his life, but in 1562 he was professor of medicine in the Colle-

gio della Sapienza at Rome. His name is indelibly associated with anatomical science through his discovery of the Eustachian tube of the ear and the Eustachian valve of the heart. He was also the first to give an accurate description of the thoracic duct. Eustachio is regarded as one of the founders of modern anatomy.

Evans, Mary Ann or **Marian.** See *Eliot, George.*

Evans, Maurice (1901-), actor, was born in Dorset, England. After his first considerable stage success as Second Lieutenant Raleigh in *Journey's End*, he joined the "Old Vic" Company, as others had done, in order to study the classics. A tour of the United States as Romeo for Katherine Cornell's Juliet was followed by his memorable performance of *Richard II*. Other Shakespeare plays in which he appeared were *Henry IV* (Falstaff) and *Hamlet*, in which he played the title role. Among his more recent successes is his revival of Shaw's *Man and Superman* and *The Devil's Disciple*. He has been a U. S. citizen since 1941.

Evans, Oliver (1755-1819), American inventor, was born at Newport, Delaware. He was apprenticed to a wheelwright in early youth. At 22 he invented a machine for making the wire card-teeth used in carding cotton and wool. In 1779, he entered the milling business with his brothers and soon afterward invented machinery which revolutionized the flour milling industry, enabling the miller to make 20 pounds more to the barrel of finer flour at one-half the former labor cost.

In 1786, Evans asked for a patent on his invention of a steam engine adapted to mill machinery and to a steam carriage. In 1800, he built the first high pressure steam engine, and, in 1803–04, he constructed by order of the Philadelphia Board of Health the first steam dredge used in the United States. This steam dredge propelled itself on a carriage to the Schuylkill River, near which it was built. This is the first instance of land travel by steam in America. Evans built many steam engines and has been called the "Watt of America." He died in New York.

Evans, Robley Dunglison (1846-1912), American admiral, was born in Floyd County, Va. He was graduated from the United States Naval Academy in 1863. In the Civil War he participated in both attacks on Fort Fisher, 1865, and in land attacks received four severe rifle-shot wounds. When in command of the *Yorktown* at Valparaiso, Chile, 1891, his actions in connection with various incidents earned him his popular name of "Fighting Bob." As commander of the *Iowa* in Sampson's fleet off Santiago, he took an active part in battle with Cervera's fleet, July 3, 1898. He was made rear admiral, 1901, and commanded the Asiatic expedition, 1907–08.

Everett, Edward (1794-1865), American statesman, orator, and scholar, was born at Dorchester, Mass. He was graduated from Harvard, 1811, and was for some time a Unitarian clergyman. He became professor of Greek at Harvard in 1815; traveled in Europe from 1815 to 1818; was editor of the *North American Review*, 1820–24. From 1824 to 1834, he was a member of Congress; from 1836 to 1840, he was governor of Massachusetts; and, from 1841 to 1845, he was minister to England. He was president of Harvard University, 1846–49; became secretary of state in 1852, and was elected to the United States Senate in 1853. In 1860, he was the candidate of the Constitutional Union party for vice president.

Everett was one of the foremost orators of his time and with his oration on Washington earned nearly $100,000, which he gave to the purchase of Mt. Vernon. The last of his great orations was delivered at Gettysburg in 1863 at the same time with Lincoln's immortal speech.

Eyck (*īk*), **Hubert** and **Jan** or **John van,** two painters of the old Flemish School, were born at Maeseyck between 1350 and 1400. They resided chiefly at Bruges and Ghent, and became the founders of the Flemish School of Painting. Tradition credits them with the invention of the modern method of oil painting with a drying varnish, with which they were the first to achieve success. With the exception of his work on their greatest painting, the altarpiece at Ghent, nothing by Hubert has been preserved. Among the important works by Jan van Eyck are "St. Ursula," Antwerp Museum; "Salvator Mundi" and "Man with Pinks," Berlin Museum; "Triumph of the Church," Madrid; portrait of John Arnolfini and his wife, London; and a Madonna in the Louvre. Hubert died about 1426 and Jan, about 1441.

Faber (*fā'bĕr*), **Frederick William (1814-1863)**, English composer of hymns, was born at Calverley in Yorkshire; was graduated from Balliol College, Oxford; and, in 1837, became a fellow at University College. He came under the influence of Newman and, in 1845, after three years' tenure of the rectory of Elton in Huntingdonshire, he adopted Catholicism. He founded a community of converts at Birmingham—"the Wilfridians," with whom he joined, in 1848, the Oratory of Saint Philip Neri; the next year, a branch under his care was established in London; and, in 1854, he finally located at South Kensington. Faber wrote many theological works; but his fame rests chiefly upon his hymns, which include "O Paradise, O Paradise," "The Pilgrims of the Night," and "The Land Beyond the Sea."

Faber (*fā'bĕr*), **Johann Lothar von (1817-1896)**, German manufacturer of lead pencils, was born at Stein, Bavaria, where he became the proprietor of a small lead pencil factory. He enlarged the establishment to international proportions, opening branches in France, Great Britain, and the United States. To the manufacture of lead pencils he added that of other writing and drawing materials. He received a patent of nobility and was made a counsellor of state for his services to German industry.

Fabius (*fā'bĭ-ŭs*), **Maximus Quintus (c. 275 B. C.-203 B. C.)**, Roman general, was surnamed Cunctator, "Delayer," because, having in 217 been appointed dictator and intrusted with the defense of Italy against the victorious Hannibal, he pursued a course of cautious and patient generalship, now proverbially known as "Fabian policy." He never risked a general engagement with his opponent, but cut off his enemy's supplies and gradually wore him out, in the end meeting with signal success. Before his appointment to the dictatorship he was five times consul.

Fabre (*fä'br'*), **Jean Henri (1823-1915)**, French entomologist, was born at Saint Leons, Aveyron. He became a teacher in the Lycée of Avignon and later professor of physics at the College of Ajaccio. After retiring to Serignan, he produced, 1879–1907, his *Souvenirs entomologiques*, a monumental work on insects in 10 volumes, which was crowned by the French Institute. His books contain some of the most interesting discoveries yet made in the life history of insects and have been widely translated into other languages. The following works of Fabre are available in English: *Insect Life, The Life and Love of the Insect, Social Life in the Insect World, The Life of the Spider*, and *The Life of the Fly.*

Fabricius (*fä-brĭsh'ĭ-ŭs*), or **Fabrizio** (*fä-brēt'syō*), **Hieronymus (1537-1619)**, Italian anatomist and surgeon. He was graduated from the University of Padua, where, in addition to the usual instruction in the classics, he studied anatomy and surgery under Fallopius. On the death of the latter in 1562, Fabricius was appointed to fill the vacant professorship. Among his students was William Harvey, who derived from Fabricius' observations on the valves of the veins the first clue to his own discovery of the circulation of the blood. He was a most laborious investigator in comparative anatomy and made comparative studies of the eye, the larynx, the ear, the intestinal canal, the development of the fœtus, and many other subjects. His chief work was his *Opera Chirurgica.*

Fahrenheit (*fä'rĕn-hīt*), **Gabriel Daniel (1686-1736)**, German physicist, was born at Danzig. In 1720, he conceived the idea of using quicksilver instead of alcohol in the construction of thermometers, by means of which the accuracy of the instrument was greatly improved. His method of graduating thermometers, known as the Fahrenheit scale, is in general use in the United States, Great Britain, the Netherlands, and other countries.

Fairbairn (*fâr'bârn*), **Sir William (1789-1874)**, Scottish engineer, was born at Kelso, Scotland. He was the first to use iron instead of wood in the shafting of cotton mills. He was also among the earliest of iron shipbuilders, and made many improvements in ship construction. Fairbairn built the tubular bridge across the Menai Strait, after a plan of Robert Stephenson's; also the Britannia and Conway bridges, and numerous others. He also devised improvements for steam boilers and other steam machinery by means of the riveting machine. He was knighted in 1869.

Fairbanks, Douglas (1883-1939), American actor, was born at Denver, Colo. He was educated at the Denver High School and at the Colorado School of Mines. He made his first appearance on the regular stage at New York in 1901. Later, he played leading parts in *Frenzied Finance, All for a Girl, A Gentleman from Mississippi, He Comes Up Smiling*, and *Show Shop.* Entering the motion picture drama, he starred in various motion pictures. In 1916, he became the head of his own producing company. His productions include *His Majesty the American, The Three Musketeers, Robin Hood, The Thief of Bagdad*, and *The Taming of the Shrew.*

Fairchild, David Grandison (1869-), American botanist and agricultural explorer, was born at East Lansing, Mich. After being graduated from Kansas State Agricultural College, he studied in several European universities and was hired by the United States Department of Agriculture to search for plants which could be advantageously introduced into the United States from abroad. From 1903, he was in charge of foreign explorations, which took him and those under his direction to nearly all parts of the world. Among the most valuable of his importations are dates

and particularly soy beans. The latter, having been introduced from Manchuria, developed into one of the larger and most useful American crops. He wrote *The Book of Monsters, Exploring for Plants,* and *The World Was My Garden.*

Falconer (*fôk'n-ẽr*), **Sir Robert Alexander (1867-1943),** Canadian educator, was born at Charlottetown, Prince Edward Island. He was educated at Queen's Royal College, Trinidad, at the universities of London and Edinburgh, and also at Berlin, Leipzig, and Marburg. In 1892, he was ordained a Presbyterian minister. The same year, he began to teach in the Presbyterian College, Halifax, where he became professor of New Testament exegesis in 1895 and principal in 1904. In 1907, he was made president of Toronto University and served until 1932. In 1925, he was special lecturer on American history in British universities. He published *The Truth of the Apostolic Gospel, Idealism in National Character, Citizenship in an Enlarging World, The United States as a Neighbor.*

Fallières (*fál'yâr'*), **Clément Armand (1841-1931),** French statesman, was born near Agen, South France. He received his education at Angoulême and Paris; settled as a barrister at Nerac, of which he became mayor; and was elected to the Chamber of Deputies, 1876. He held many important posts in that body and was elected president of the Senate eight times. He became president of France in 1906, in which capacity he accorded recognition to the working classes by placing Poincaré, Savrien, Clemenceau, and Briand in the same ministry. In 1913, he was succeeded as president by Raymond Poincaré.

Fallopius (*fál-lō'pĭ-ŭs*), or **Fallopio, Gabriello (c. 1523-1562),** Italian anatomist, physician, and naturalist, was born at Modena, where he began his career as an ecclesiastic. He abandoned the priesthood for the pursuit of science, which he studied at Ferrara and Padua. At Pisa, he was for three years professor of anatomy, and afterward he went to Padua to accept the chair of anatomy and surgery and to take charge of the first botanical garden established there. He acquired great fame by being the first to describe the anatomical structure of the fœtus and by his discovery of the function of the oviducts, called after him the Fallopian tubes. *Observationes Anatomicæ* is his principal work. Cuvier characterizes him as one of the three *savants* who restored, rather than created, the science of anatomy in the 16th century, the other two being Vesalius and Eustachius.

Faneuil (*făn"l* or *făn'yĕl*), **Peter (1700-1743),** founder of Faneuil Hall, Boston, Mass., was born in New Rochelle, N. Y. He was a rich merchant in Boston and gave to the city a building for a market and town hall. The building was finished just before his death in 1743. It was burned in 1761, and the present hall was built two years later by the town. So many important patriotic meetings were held in Faneuil Hall during the Revolution that it has been called the "cradle of American liberty."

Faraday (*făr'ă-dā*), **Michael (1791-1867),** English chemist and physicist, was born near London. He was largely self-educated and, in 1833, became professor of chemistry in the Royal Institution, London, where his lectures attracted the admiring attention of both Europe and America. His manner, his happy illustrations, and his felicitous choice of expression, even in the most abstruse subjects, were such as to charm and attract all classes of hearers. The great work of his life is the series of *Experimental Researches in Electricity,* published in the *Philosophical Transactions.*

Faraday was one of the most brilliant experimentalists in the history of science, and his notable discoveries laid the foundations for many of the most important applications of electricity, as in magneto and dynamo machines and in electrolysis. He was the first to use the terms "anode" and "cathode." He also discovered benzol, the basis of aniline dyes, and was the first to detect the phenomenon known as polarization of light, which establishes a connection between light and electricity. It is related that when he showed Gladstone, prime minister of England, the effect which is basic to the dynamo and electric motor, Gladstone asked him of what value it was. Faraday replied that some day Gladstone might be able to tax it for revenue.

Fargo, William George (1818-1881), pioneer American expressman was born at Pompey, N. Y. After working as a grocery clerk, freight agent, express messenger, and resident agent at Buffalo, he organized, with Henry Wells, a carrying company to operate between Buffalo and Western points. The company was later reorganized as the American Express Company, of which Fargo was the first secretary and, from 1868 to 1881, the president. Wells, Fargo and Company was formed in 1851 to carry express between New York and San Francisco by way of the Panama Isthmus. An overland service was also instituted, operated by horses and popularly known as the "pony express." Fargo served as mayor of Buffalo, 1862–66, and was a director of several railroads.

Farley, James Aloysius (1888-), American politician and administrator, was born at Grassy Point, N. Y. Rising rapidly as salesman for building materials, he formed a corporation to engage in construction work, in which he was very successful. Franklin D. Roosevelt obtained his aid as campaign manager, which led to Roosevelt's nomination and election to the presidency in 1932. Farley was made postmaster general and continued to head the Democratic National Committee, in which capacity, in 1936, he succeeded in obtaining for his candidate the most sweeping electoral college victory in more than a century. When Roosevelt ran for a third term, Farley disapproved and resigned his post as campaign manager. He resigned later as postmaster general.

Farley, John Murphy (1842-1918), Catholic prelate, was born in Newton Hamilton, Ireland. He made his primary studies at Saint McCartan's College, Monaghan, and, after coming to New York, continued his education at Saint John's College, Fordham, and at the Provincial Seminary, Troy. He later studied at the American College, Rome, where he was ordained as priest, 1870. In 1872, he became secretary to Archbishop McCloskey, serving until 1884, when he was made pastor of Saint Gabriel's Church, New York. In 1891, he became vicar-general in the archdiocese of New York; in 1895, was made prothonotary apostolic; and, soon afterward, became assistant bishop. On the death of Archbishop Corrigan in 1902, he was unanimously chosen his successor, and, in 1911, was made cardinal. He did much to promote Catholic education in his diocese, increasing the number of primary and high schools and founding Cathedral College and a preparatory seminary.

Farmer, Fannie Merritt (1857-1915), American cookery expert, was born at Boston, Mass. She was graduated in 1889 from the Boston Cooking School, which she served as assistant director and director until she opened her own school, Miss Farmer's School of Cookery, in 1902. Plagued by ill-health much of her life, she lectured while seated in a wheel chair. Called "The Mother of Level Measurements" because of her insistence that recipes be strictly followed, she taught general cooking to housewives and special cooking for the sick and convalescent to nurses. Her famous work, *The Boston Cooking School Cook Book,* first appeared in 1896, and has since been reissued many times.

Farragut (*făr'ă-gŭt*), **David Glasgow (1801-1870),** American admiral, was born near Knoxville, Tenn. He entered the navy at nine years of age and first saw action in 1814, when the *Essex,* on which he served, engaged the English ships *Phœbe* and *Cherub.* In 1841, he was raised to the rank of commander and, with his ship, the *Saratoga,* helped to maintain a strict blockade of Tuxpan in the Mexican War.

When his native state seceded from the Union prior to the Civil War, he removed his residence to Hastings upon Hudson and placed his services at the disposal of the Federal government. In 1862, under orders from Porter, he brought a flotilla of ships past the Confederate batteries at New Orleans and destroyed a hostile fleet. In 1863, by controlling the Mississippi River from Vicksburg to Port Hudson, he aided materially in the capture of those strongholds. Finally, in 1864, he succeeded in annihilating a Confederate fleet in Mobile Bay. Congress appointed him vice admiral and later admiral, having created these grades expressly for him. Elected to the American Hall of Fame in 1900.

Farrar (*făr'ăr*), **Frederic William (1831-1903),** English clergyman and author, was born in Bombay, India; was educated at London and Cambridge; and was ordained in the Church of England in 1857. He became a master of Harrow and, from 1871 to 1876, was headmaster of Marlborough College. In 1876, he became canon of Westminster; in 1883, archdeacon; and, in 1895, dean of Canterbury. He was one of the most eloquent of English pulpit orators, and he published many works on educational, theological, and other subjects. His *Life of Christ* attained great popularity. Other works from his pen which were widely read include *Seekers After God, Witness of History to Christ, The Silence and the Voices of God, Eternal Hope,* and *Lives of the Fathers.*

Farrar (*făr-ăr'*), **Geraldine (1882-),** American dramatic soprano, was born at Melrose, Mass. She began her musical education in Boston and New York and studied further under Trabadello in Paris and Lilli Lehmann in Berlin, where she made her debut at the Royal Opera House as Marguerite in *Faust,* October 1901. She was offered a three years' contract and became one of the favorite singers in grand opera at Berlin. From 1906 to 1922 she was a member of the Metropolitan Opera Company, New York, where she was a leading soprano, creating principal roles in new productions and achieving marked distinction in standard repertoire. In accordance with a previously an-

nounced plan, she retired from opera at 40 and from concert singing at 50. She possesses a voice of unusual beauty, which she uses with great dramatic power.

Farrell, James Thomas (1904-), American novelist, was born in Chicago. He attended the University of Chicago for three years and then worked as a clerk, gas station attendant, and newspaper reporter, meanwhile writing in his spare time. His "Studs Lonigan," a series of related novels in part autobiographical, described life in Chicago among families in straitened circumstances. Its force and uncompromising realism brought immediate success. Farrell's later works include *A World I Never Made, Can All This Grandeur Perish, No Star Is Lost,* and *Father and Son.*

Faulkner, William (1897-), American novelist, was born at New Albany, Miss. After his high school days, he enlisted in the British Royal Air Force, in 1918. Returning to the United States, he attended the University of Mississippi and then was postmaster at University, Miss., 1922–24. From that time he wrote a number of novels, dealing chiefly with "poor whites" of the South, in which powerful use is made of suspense and bizarre incidents to create effects of pity and fear. His principal works include *The Marble Faun, Sanctuary, Light in August, Absalom Absalom!,* and *Wild Palms.* In 1950 he was awarded the Nobel prize in literature for 1949.

Faure (*fōr*), **Jean Baptiste (1830-1914)**, French baritone singer and composer, was born at Moulins. He entered the Paris Conservatory at the age of 13 and became a chorister at the Madeleine. He made his first professional appearance as a singer at the Opera Comique in 1852 and, in 1861, began a long series of triumphs in grand opera. His best-known compositions are sacred songs, some of which, such as "The Palms," have become widely popular.

Favre (*fȧ'vr'*), **Jules Claude Gabriel (1809-1880)**, French statesman and orator, was born at Lyons and studied for the bar. He took part in the July revolution of 1830 and thereafter played a prominent role in politics as an uncompromising Republican. The *coup d'état* of 1851 interrupted his political career, and he returned to his profession. His defense of Orsini, would-be assassin of Napoleon III, in 1858 procured his election to the legislature for Paris, and he became one of the leaders of the Republicans against Napoleon III. After the fall of the Empire in 1870, he was appointed minister of foreign affairs, and, in 1871, settled the terms for the capitulation of the capital. He resigned office in 1871 in protest at the harshness of the terms imposed by Germany and resumed practice at the bar.

Fawcett (*fô'sĕt*), **Henry (1833-1884)**, English statesman, was born at Salisbury. He was graduated with honors at Cambridge in 1856 and began to read for the bar. In 1858, by an accident, shots from his father's gun entered both of Fawcett's eyes, totally blinding him. His *Manual of Political Economy* led to his election to the chair of political economy at Cambridge in 1863. Other works from his pen are *The Economic Position of the British Labourer* and *Protection and Free Trade.* He was elected to Parliament in 1865. He opposed legislative restrictions upon the industry of women and was a warm supporter of their claims to representation. In 1880, he became postmaster general, in which capacity he introduced the parcel post, postal orders, sixpenny telegrams, and the banking of small savings by means of stamps.

Fawcett, Millicent Garrett (1847-1929), English reformer, was born at Aldeburgh, Suffolk. At 20 years of age, she married Henry Fawcett. She took a keen interest in the higher education of women and was one of the most prominent leaders of the Woman Suffrage Movement in England, heading the constitutional as opposed to the militant group. She wrote *Political Economy for Beginners, Janet Doncaster, Life of Queen Victoria, Five Famous French Women, Women's Suffrage,* and *Women's Victory.*

Fawkes (*fôks*), **Guy** or **Guido (1570-1606)**, English conspirator, was born of a Protestant family in Yorkshire. He became a zealous Roman Catholic at an early age and served in the Spanish army in the Netherlands. On his return to England, he entered into a plot to blow up the king, his ministers, and the members of both houses of Parliament, November 5, 1605. This conspiracy, known as the "gunpowder plot," was discovered when barrels of gunpowder had already been placed in the building and were prepared for ignition. Fawkes was tried, tortured, and publicly executed. Parliament set aside November 5 as a day of thanksgiving known as Guy Fawkes day, which continues to be celebrated in parts of England to the present day. The celebrations are often marked by the public burning of effigies representing Fawkes.

Fechner (*fĕK'nĕr*), **Gustav Theodor (1801-1887)**, German physicist and psychophysicist, was born at Gross-Sarchen, in lower Lusatia. He became professor of physics at Leipzig in 1834, but afterward devoted himself to psychology, formulating Fechner's law, according to which sensations increasing in arithmetical progression require stimuli whose intensities increase in geometric progression. Besides poems and essays, he wrote on æsthetics, on the theory of color, and on galvanism.

Fénelon (*fā'n'-lôN'*), **François de Salignac de la Mothe (1651-1715)**, French preacher and author, was born at the Château de Fenelon, in Perigord, France. As a preacher, he was remarkable for his persuasive eloquence; as a writer, he was distinguished for his tender and mystic devotion and for the purity of his style. He was, for some years, tutor to the grandson of Louis XIV, for whom he composed several works, among them a preliminary sketch of his best-known work, *Telemachus.* In 1695, he became archbishop of Cambrai. His *Maxims of the Saints* was strongly denounced by his great contemporary Bossuet and was condemned by Pope Innocent XII on account of its tendency to mysticism. As a man, Fenelon was distinguished for the simplicity of his character and for his Christian piety and charity.

Ferber, Edna (1887-), American writer, was born at Kalamazoo, Mich., of Jewish parentage. At 17, she began writing as reporter on the Appleton *Daily Crescent* and was later employed on the Milwaukee *Journal* and the Chicago *Tribune.* She then took up short story writing. She produced *Dawn O'Hara* in 1911, followed by *Buttered Side Down, Personality Plus, Half Portions,* and *The Girls.* Her first successful novel, *So Big,* won a Pulitzer prize award in 1925. *Show Boat* and *Cimmaron* followed, both being highly successful not only as novels but in dramatized form.

Ferdinand I (?-1065), the Great, king of Castile and Leon, was the first king of Castile, to which he added by seizure the principality of Leon. By victories over the Moors, he began the reconquest of Spain and extended the Christian frontiers to the Mondego. He also reduced to vassalage the rulers of Toledo, Saragossa, and Seville. He assumed the title of Emperor of Spain in 1056, thus challenging the claimed authority of the German emperor and the pope over the peninsula.

Ferdinand I (1503-1564), emperor of Germany, son of Philip I of Spain and younger brother of Charles V of Germany. On the death of his grandfather Maximilian, he received the archduchy of Austria and the other German possessions of the House of Habsburg. He succeeded his brother-in-law Louis II of Bohemia and Hungary, and waged a long and bloody war with Zapolya for the possession of Hungary, only partly succeeding. During this period, Ferdinand acted in Germany as agent of Charles V, who turned over to him the empire in 1556, although not abdicating until 1558. Ferdinand negotiated the Peace of Augsburg between Lutherans and Catholics, under which each ruler might determine the affiliation of his subjects.

Ferdinand II (1578-1637), emperor of Germany, was a grandson of Ferdinand I. Educated by the Jesuits, he was a devout Catholic and enforced a Catholic policy in Hungary and Bohemia, of which he became king in 1617 and 1618 respectively. Chosen emperor in 1619, he was faced by a revolt of the nobles in Bohemia because of his Catholic policy. This revolt began the Thirty Years' War, in which Ferdinand's generals Tilly and Wallenstein won signal victories. The successful leadership of the Protestant cause by Gustavus Adolphus of Sweden made the crushing of the Protestant cause in the North impossible, and Ferdinand made peace in 1635.

Ferdinand V of Castile (1452-1516), surnamed the Catholic, son of John II, succeeded his father on the throne of Aragon and Sicily in 1479. In 1469, he was married to Isabella, sister of Henry IV of Castile, and, in 1474, became, through her, king of Castile, Isabella sharing with him the royal dignity. The reign of Ferdinand and Isabella was signalized by the discovery of America by Columbus, the conquest of Granada from the Moors, and the expulsion of the Jews from Spain. Ferdinand died in 1516, Isabella having died 12 years before him.

Fergusson, James (1808-1886), Scottish historian of architecture, was born at Ayr. After ten years as an indigo planter in Bengal, he extensively explored India, studying the rock temples, which were illustrated in his earliest works. His *History of Architecture* appeared first as a handbook in 1855. Besides works on fortification, he also published *The Palaces of Nineveh and Persepolis Restored, Tree and Serpent Worship,* and *Rude Stone Monuments in All Countries.* He died at London.

Ferreira (*fĕr-rĕ'ē-rä*), **Antonio (1528-1569)**, Portuguese poet, was born at Lisbon. He was educated for the law, but devoted his attention mainly to literature. He was a professor at the University of Coimbra and won great celebrity by his *Castro,* the earliest Portuguese tragedy and the second regular tragedy produced after the revival of letters in Europe, being preceded only by Trissino's

Sophonisba. Writing in the vernacular, he exercised a great influence on the Portuguese as a literary language. In style he emulated the Roman poet Horace.

Ferrero (*fĕr-rō'rŭ*), **Guglielmo (1872-1942)**, Italian historian, was born near Naples. He lectured at Milan on militarism and in the College de France, Paris, on Roman history. While in Paris he received the cross of the Legion of Honor. He traveled extensively in Europe and America and was known in the latter for his acute observations on American manners and institutions. In 1930 he was made professor of modern history at Geneva University. His publications include *Symbols, The Greatness and Decline of Rome, Between Two Worlds, Ancient Rome and Modern America, The Women of the Cæsars, Four Years of Fascism*, and *The Principles of Power*. His Italian books were condemned and seized in 1935 by the Italian government.

Fessenden (*fĕs'ĕn-dĕn*), **William Pitt (1806-1869)**, American statesman, was born at Boscawen, N. H. He was graduated at Bowdoin College in 1823, was admitted to the bar in 1827, and settled in Portland, Me. He entered Congress in 1841, serving one term; was United States senator, 1854–64; was secretary of the treasury, 1864–65; and was again United States senator, 1865–69. He was one of the founders of the Republican party, distinguished himself as a debater in the Senate, and ranked among the leading lawyers of his time.

Feuchtwanger (*foixt'văng'ĕr*), **Lion (1884-)**, German novelist, was born at Munich. Educated at Berlin and Munich universities, he served in the German army during World War I, where his experiences and observations led to the writing of *Prisoners of War* in 1918. Ten years later appeared the first of a number of novels which dealt in forceful fashion with the social and national problems which were later to explode in revolutionary movements and general warfare in the late 1930's. They include *Success, Power, The Jew of Rome, The Pretender*, and *The Paris Gazette*. Anticipating the storm of criticism in Germany which later broke over his works, he removed to France where, however, he was interned as an enemy alien in 1939 but escaped to America in 1940 with the aid of American friends.

Fichte (*fĭĸ'tĕ*), **Johann Gottlieg (1762-1814)**, German philosopher, was born at Rammenau, in upper Lusatia. He studied at Jena and supported himself in a precarious way as tutor. In 1791, he went to Königsberg, where he became an ardent disciple of Kant. Here he wrote, in 1792, his *Tentative Critique of All Revelation*, whose favorable notice by Kant did much to make Fichte's reputation. In 1794, he was appointed to the chair of philosophy at Jena, where he expounded with extraordinary zeal a system of transcendental idealism.

In 1799, Fichte removed to Berlin. In 1800 appeared his *Vocation of Man*. In 1805, he obtained the chair of philosophy at Erlangen. The victories of Napoleon at Auerstadt and Jena drew forth the patriotic *Addresses to the German Nation*, which served as inspiration later not only to the revolutionists of 1848 but to the nationalists of 1871. The Prussian king requested him to draw up a constitution for the newly founded Berlin University. He was its first rector.

Fiedler, Arthur (1894-), American conductor. After studying violin, piano, chamber music, and conducting at the Royal Academy of Music, Berlin, he made his concert debut at the age of seventeen. On joining the Boston Symphony Orchestra in 1915 as a violinist, he became the youngest member of that organization. Since 1930 he has conducted the famous Boston Symphony "Pops" concerts. His recordings and broadcasts of these have won him wide popularity in America and Europe. As a guest conductor, he has appeared with the leading orchestras of the United States.

Field, Cyrus West (1819-1892), American merchant and promoter, was born at Stockbridge, Mass., brother of David Dudley Field. He began commercial life as a clerk in New York, but soon developed a prosperous merchandising business of his own. Being joined in 1854 by Peter Cooper, Moses Taylor, and other American capitalists, he organized companies to span the Atlantic Ocean with a telegraph cable. After five attempts, the first cable was laid, but it snapped after two weeks. In 1866, eight years after the first failure, a permanent cable was established. He was rewarded by a gold medal from Congress. See *Cable, Submarine*.

Field, David Dudley (1805-1894), American jurist, was born at Haddam, Conn., brother of Cyrus W. Field. He was graduated at Williams College, 1825, studied law, and was admitted to the bar in 1828. He settled in New York, and soon made his way into the front rank of his profession. In 1847, he was appointed by the legislature of New York one of a commission to reform the legal practice of the state. In this work he was engaged for nearly a quarter of a century, at the same time carrying on a large professional practice. In 1866, he brought before the British association for social science a proposition to frame an international code. This led to the preparation of his *Draft Outlines of an International Code*, one feature of which was the principle of arbitration to settle disputes between nations.

Field, Eugene (1850-1895), American poet and journalist, was born at Saint Louis, Mo. He removed to New England, but was educated later in Missouri. At 23, he entered journalism and 10 years later became editor of the "Sharps and Flats" column of the Chicago *Daily News*. His humorous sayings therein during the following decade established his reputation in newspaper work. He was an author and poet of rare sympathy. His poems of childhood, which exhibit unusual qualities of appreciation and power of expression, gained for him the title "the child's poet." They include "Little Boy Blue" and "Wynken, Blynken and Nod." Among his books are *Culture's Garland, Love Affairs of a Bibliomaniac, Echoes from the Sabine Farm* (with his brother R. M. Field), and *Poems of Childhood*.

Field, Marshall (1835-1906), American merchant, was born at Conway, Mass. He spent his boyhood on a farm; studied at an academy until 1852; and was a dry goods clerk at Pittsfield, Mass., 1852–56, and Chicago, 1856–60. He was junior partner, 1860–65, then senior partner in the firm which became, 1865, Field, Palmer, and Leiter. Potter Palmer retired in 1867 and Levi Z. Leiter in 1881, Field then becoming head of Marshall Field and Company, which under his management became the largest wholesale and retail dry goods business in the world. He founded with a gift of $1,000,000 the Field Museum of Chicago, to which he bequeathed the further sum of $8,000,000. He also gave to the University of Chicago money and land to the amount of $400,000. He left an immense fortune.

Field, Stephen Johnson (1816-1899), American jurist, was born at Haddam, Conn., brother of David Dudley Field and Cyrus W. Field. He was graduated at Williams College in 1837, studied law, and began practice in New York. In 1849, he went to California and took up legal practice at Marysville. In 1857, he was elected judge of the State Supreme Court, of which he was made chief justice in 1859. In 1863, he was appointed associate justice of the United States Supreme Court, and served with marked usefulness and distinction for 34 years, a period of service equaled only by that of John Marshall, Joseph Story, and John Marshall Harlan. He was a member of the electoral commission, 1877, which decided the presidency in favor of Rutherford B. Hayes. He died at Washington.

Fielding, Henry (1707-1754), English novelist, often called the father of the modern novel, was born near Glastonbury, England. He was educated at Eton and at the University of Leiden. On his return from Leiden he began writing for the stage and, for ten years, was a prolific play writer. In 1737, he entered as a student of the Middle Temple, and, in 1740, was called to the bar; but, his new profession not proving remunerative, he returned to literature. Fielding's literary reputation rests upon four noted novels: *Joseph Andrews, Jonathan Wild, Tom Jones*, and *Amelia*. His novels, embodying his theory that "the novel is a comic epic in prose," are instinct with satire. They depict common-life characters, abound in picaresque adventure, and afford an invaluable picture of society at that time.

Fields, Gracie (1898-), English singer and comedienne, was born at Rochdale, Lancashire, England, where as a young girl she began work in a cotton mill, but was fired for wasting time entertaining the other girls. At fifteen she got her first job in a music hall. She made a name for herself in a revue, *Mr. Tower of London*, in which she toured seven years (1918–25), and was then starred in *By Request* (1925–27). Since then she has enjoyed great popularity, repeating her stage success on radio, screen, and television in England and America. Among her best known comic songs are "The Biggest Aspidistra in the World," and "Turn Herbert's Face to the Wall, Mother." Her home is in Capri.

Fiesole (*fyĕ'zō-lā*), **Fra Giovannida.** See *Angelico, Fra*.

Fillmore, Millard (1800-1874), American statesman, 13th president of the United States, was born in Summerhill, N. Y. He was apprenticed to a wool carder, but became a clerk in a judge's office; removed to Buffalo, N. Y.; and, in 1823, was admitted to the bar. He entered Congress in 1832, was appointed chairman of the committee of ways and means in 1840, and was author of the Tariff Act of 1842. He became comptroller of the state of New York in 1847, was elected vice president of the United States in 1848, and succeeded to the presidency on the death of Zachary Taylor in 1850. Diplomatic relations with Japan were established for the first time during his administration. By signing the act for the surrender of fugitive slaves,

Fillmore brought about the utter defeat of the Whig party in 1852. In 1856, he was nominated for the presidency by the American, or Know-Nothing, party, but received only the electoral vote of Maryland. He died at Buffalo.

Finley, John Huston (1863-1940), American educator, was born at Grand Ridge, Ill. He was graduated at Knox College in 1887 and pursued postgraduate study at Johns Hopkins, 1887–89. He was secretary of the State Charities Aid Organization, New York, 1889–92; president of Knox College, 1892–99; editor of *Harper's Weekly* and *McClure's Magazine*, 1899–1900; professor of politics, Princeton, 1900–03; and president of the College of the City of New York, 1903–13. From 1913 to 1921, he was commissioner of education for New York State. In 1921, he became an editorial writer on the New York *Times*. With Richard T. Ely he wrote *Taxation in American States and Cities*. His writings include also *The French in the Heart of America*, *The Life of Grover Cleveland, French Schools in War Time*, and *A Pilgrim in Palestine*. He was elected to the American Academy of Arts and Letters in 1927.

Finsen (*fĭn'sĕn*), **Niels Ryberg (1860-1904),** Danish physician and inventor, was born in Thorshavn, Faroe Islands. He received his early education at Reykjavik, Iceland, studying later at the University of Copenhagen, from which he was graduated in medicine in 1890 and in which he subsequently became demonstrator in anatomy. After much research he demonstrated that the effects of light upon the body are due to the chemical, or violet and ultraviolet, rays. By filtering the light of the room through red glass, he shut off the chemical rays from smallpox patients with the result that the vesicles did not suppurate and scars and pitting were avoided.

Finsen found also that the chemical, or actinic, rays could be used to cure skin diseases, particularly lupus, or tuberculosis of the skin. The Light Institute established under his supervision in 1896 met with such success that Finsen institutes were soon established in other countries. He wrote *Chemical Rays and Variola* and *Phototherapy*. He was awarded, in 1903, the Nobel prize for medicine. He died in Copenhagen.

Firdousi (*fĕr-dōō'sē*), **(c.935-c.1020),** pseudonym of Abu'l Qasim Mansur, the greatest epic poet of Persia (Iran), was born near Tus, in Khorassan. He spent 30 years in writing the *Shah Namah*, or *Book of Kings*, a national epic, but, having received for his monumental literary labors only a meager reward from Sultan Mahmud, he gave vent to bitter satire against his royal master and fled from the court. For some time he led a wandering life until at length he returned to his birthplace, where he died.

Fischer, Ernst Kuno Berthold (1824-1907), German historian of philosophy, was born at Sandewalde, Silesia. After being graduated from Halle, he went to Heidelberg and established himself as a private lecturer. He was eminently successful, but, in 1853, he was deprived of his lectureship by the government, probably on account of the alleged pantheistic trend of his teaching. In 1856, however, he was elected to the chair of philosophy in Jena and, 16 years later, was called back to Heidelberg as Zeller's successor. His philosophical viewpoint is essentially Hegelian, and his chief work is a *History of Modern Philosophy*, which is one of the most authoritative works of its kind.

Fish, Hamilton (1808-1893), American statesman and diplomat, was born at New York. He was graduated at Columbia in 1827 and was admitted to the bar in 1830. He was elected congressman in 1842, lieutenant governor of the state in 1847, governor in 1848, and, in 1851, United States senator. As secretary of state under Grant from 1869 to 1877, he signed the Washington Treaty of 1871 and completed the settlement of the Alabama Question. See *Alabama Claims*.

Fisher, Dorothy Canfield (1879-), American author, was born at Lawrence, Kans. She was graduated from the Ohio State University, 1899, and received the degree of doctor of philosophy at Columbia, 1904. She studied and traveled extensively in Europe and, after serving three years as secretary of the Horace Mann School, devoted herself to writing. In 1907, she married John Redwood Fisher of New York. Beginning with *The Squirrel Cage* in 1912, she wrote more than a score of novels and books having an educational purpose. The novels *Hillsboro People* and *Raw Material* have a rural Vermont setting. *Home Fires In France* reflects three years of war work in France. *Why Stop Learning?* is one of the first books on adult education. Her other works include *Her Son's Wife*, *Fables for Parents*, and *Seasoned Timber*.

Fisher, Geoffrey Francis (1887-), English churchman, was born at Nuneaton, Warwickshire. Graduating with honors from Oxford, he taught at Marlborough College and Repton School from 1911 to 1932, when he was appointed bishop of Chester. He served as bishop of London from 1939 to 1945, when he was nominated archbishop of Canterbury. He favored social reforms and worked for interdenominational cooperation.

Fisher, Harrison (1877-1934), American illustrator, was born in Brooklyn, N. Y. He was educated in San Francisco, and at an early age evinced fine capabilities in drawing and illustration. He illustrated *The Market Place*, by Harold Frederic; *Three Men on Wheels*, by Jerome K. Jerome; *The Eagle's Heart*, by Hamlin Garland; and other books. Much of his work has appeared also in the *Saturday Evening Post*, *McClure's Magazine*, *Life*, *Puck*, *Ladies' Home Journal*, *Scribner's* and the *Cosmopolitan*. He became widely popular for his type of the "American girl." In 1907, he published *The Harrison Fisher Book*, a collection of drawings.

Fisher, Irving (1867-1947), American political economist, was born at Saugerties, N. Y. He was graduated at Yale, 1888; received the degree of doctor of philosophy, 1891; and studied at Berlin and Paris, 1893-94. He became an instructor in mathematics and later in political economy, Yale University, in which, in 1898, he was made professor of political economy. From 1896 to 1910, he was editor of the *Yale Review*. His published writings include *The Nature of Capital and Income*, *The Rate of Interest*, *Elementary Principles of Economics*. His *Stabilizing the Dollar* is an exposition of his proposal to vary the gold content of the dollar according to the fluctuations in a standard commodity price index, thereby keeping the purchasing power of money constant.

Fiske, Bradley Allen (1854-1942), American naval officer and inventor, was born at Lyons, N. Y. He entered the United States navy in 1870 and was made rear admiral in 1911. He distinguished himself at the battle of Manila, 1898. Of his naval inventions the most important is the naval telescope sight, which revolutionized naval gunnery. He obtained also the basic patent for the wireless controlled torpedo. His writings include *Electricity in Theory and Practice*, *War Times in Manila*, *The Navy as a Fighting Machine*, *From Midshipman to Rear Admiral*, and *The Art of Fighting*.

Fiske, Harrison Grey (1861-1942), American editor, dramatic manager, and playwright, was born at Harrison, N. Y. He was educated in private schools and spent two years in New York University. In 1890, he married Minnie Maddern, the actress. He was editorial writer and dramatic critic on the Jersey City *Argus*, and later on the New York *Star*. In 1879, he became contributor to the New York *Dramatic Mirror*, of which he later was proprietor and editor until 1911. He acted as manager for Mrs. Fiske, the Manhattan Company and others, producing over 140 plays. He wrote the plays *Hester Crewe*, *The Privateer*, and *A White Pink*.

Fiske, John (1842-1901), American philosopher and historian, whose original name was Edmund Fiske Green, was born at Hartford, Conn. He was graduated from Harvard in 1863 and from Harvard Law School in 1865. From 1869 to 1871, he was lecturer on philosophy at Harvard, and assistant librarian, 1872–79. In his earlier career, he lectured and wrote extensively to popularize Darwin's theory of evolution, which he held to be compatible with religion. His *Cosmic Philosophy* is an expansion of Herbert Spencer, and in *The Destiny of Man* he defended spiritual religion.

Fiske's later career was devoted to popularizing American history, to which end his lucid style and dramatic imagination contributed. His published works in this field include *Discovery of America*, *The Beginnings of New England*, *The War of Independence*, *Dutch and Quaker Colonies in America*, *New France and New England*, and *The Mississippi Valley in the Civil War*.

Fiske, Minnie Maddern (1865-1932), American actress, was born in New Orleans, La., of theatrical parents. She appeared in child's parts when 3 years old; at 12 was alternately playing leading roles and old women's parts, and at 15 became a star under the name of Minnie Maddern. In 1890 she retired for a period of study and married Harrison Grey Fiske, journalist and playwright, in whose *Hester Crewe* she returned to the stage in 1894.

She afterward appeared in *A Doll's House*, *Tess of the D' Urbervilles*, *A Bit of Old Chelsea*, *Little Italy*, *Frou Frou*, and other plays with increasing success. In 1899, she won distinction by her *Becky Sharp*, regarded as her greatest achievement. In 1901, she opened the Manhattan Theater as an independent playhouse. Here she produced *Leah Kleshna*, *Rosemersholm*, *The Pillars of Society*, *Hanneles Himmelfahrt*, and other plays, appearing in leading roles. She did much to popularize Ibsen's dramatic works in America.

Fitch, John (1743-1798), American inventor, was born at Windsor, Conn. He received a common school education, was a sailor for a brief period, and during the Revolution was a sutler with the American army, realizing extensive profits. In 1785, he completed a model steamboat with wheels at the sides. He built and operated three steam-driven ships on the Delaware River in 1787–90, having secured exclusive operating rights in several states. In 1793,

he went to France, to find hopes of financial assistance frustrated by the Revolution. Penniless, Fitch worked his passage back to America, and, disheartened by further reverses, poisoned himself.

Fitch, William Clyde (1865-1909), American dramatist, was born in New York, and was graduated from Amherst College, 1886. He immediately began writing poems, short stories, and sketches. In 1890, he commenced his dramatic career with *Beau Brummell*, written for Richard Mansfield, and soon arose to distinction. With Bronson Howard, Augustus Thomas, and William Vaughn Moody, he ranks among the foremost American dramatists of his time. He wrote about 40 plays, of which the best-known are *Nathan Hale*, *Barbara Frietchie*, *The Climbers*, *The Stubbornness of Geraldine*, *The Girl with the Green Eyes*, *Her Own Way*, *The Woman in the Case*, *The Truth*, *The Straight Road*, and *The City*. He died at Châlon sur Marne. See *Truth, The*.

Fitzgerald, Edward (1809-1883), English poet and translator, was born at Woodbridge, in Suffolk. In 1826, he entered Trinity College, Cambridge, where he took his degree in 1830. With the exception of periodical visits to London, he led a quiet country life, his chief amusements being gardening and yachting. In 1851, he published anonymously his *Euphranor*, which was followed in 1852 by *Polonius*. In 1853, the first of his noted translations, *Six Dramas of Calderón*, appeared. About this time he took up Persian and, in 1856, published an anonymous version of Jami's *Salaman and Absal*. In 1859 appeared his famous version of the *Rubaiyat*. The quatrains of Omar Khayyam were then little known, but Fitzgerald at once recognized their beauty, and his and Omar's names remain indissolubly linked together through his exquisite rendering of them.

Fitzgerald, F. Scott (1896-1940), American novelist, was born at St. Paul, Minn. He attended Princeton, where he was a close friend of the critic Edmund Wilson and the poet John Peale Bishop. He served as a staff officer in World War I. After an unsuccessful stint at writing advertising copy in New York City, Fitzgerald went to Minneapolis. He was despondent at being separated from his fiancee in Alabama, and he turned to writing. Though his novels, *This Side of Paradise* (1920) and *The Beautiful and Damned* (1922), reveal narrative power and a gift for irony, they are only spottily interesting today. But, in the early 1920's, they offered identity and a promise of romance to a young generation. Royalties poured in on Fitzgerald; he recaptured his fiancee, and began a peripatetic and often riotous life, divided between the United States and Europe. He wrote numerous short stories, most of which appeared in the *Saturday Evening Post*. In the early 1930's, Fitzgerald suffered a popular decline that coincided, paradoxically, with a great maturing of his powers as a novelist. *The Great Gatsby* (1925) is a masterpiece of swift, graceful narrative, and humor; *Tender Is the Night* (1934) is a powerful story of almost painful insight. Neither was successful until they were revived after World War II. Fitzgerald died of a heart attack in Hollywood in 1940. He was at work on *The Last Tycoon* (1941), a story of the motion picture industry. The unfinished chapters, together with the elaborate and interesting framework Fitzgerald had planned for the novel, were later published. Fitzgerald's essays, letters, and notebooks were edited by his friend Edmund Wilson and published as *The Crack Up* (1945).

Flagg, Ernest (1857-1947), American architect, was born at Brooklyn, N. Y. After preparing for his profession at the Ecole des Beaux-Arts, Paris, he began practice as an architect in New York City in 1891 and soon attained prominence. Notable buildings designed by him include Saint Luke's Hospital and the Singer Building, New York; Corcoran Gallery of Art, Washington; and the United States Naval Academy, Annapolis, Md. The tower of the Singer Building, 612 feet high, designed in modern French style of architecture, was the highest commercial structure in America at the time it was erected in 1908. His *Economic Design and Construction of Small Houses* contains important contributions to the problem of low-cost housing.

Flagg, James Montgomery (1877-), American illustrator, portrait painter, and writer, was born at Pelham Manor, N. Y. He studied at the Art Students' League, New York; also in England and in Paris. He published his first drawing in *Life* at the age of 14 and soon attained prominence as an illustrator for various magazines. His work is characterized by keen observation, marked technical ability, and never-failing humor, showing equal skill in charcoal, crayon, pen and ink, and oils. Among his best portraits is that of Mark Twain in the Lotos Club, New York. Among the volumes of prose and verse written and illustrated by him are *Tomfoolery*, *If: A Guide to Bad Manners, Why They Married, All in the Same Boat, City People, I Should Say So, The Mystery of the Hated Man*, and an autobiography, *Roses and Buckshot*.

Flagstad, Kirsten (1895-), Norwegian singer, was born at Hamar. She began voice training at the age of 16 and made her debut two years later as Nuri in *Tiefland* at the National Theater in Oslo. She appeared in various cities of northern Europe during the next 22 years and then, in 1935, made her debut at the Metropolitan Opera House as Sieglinde in Wagner's *Walküre*. Her success was immediate and led to concert tours through the principal cities of America, Europe, and Australia. Her rich soprano voice, used with great dramatic power, is at its best in the interpretation of Wagnerian operas. She married Sigurd Hall in 1919 and Henry Johansen in 1930.

Flammarion (*flä'mä'rē-ôN'*), **Camille (1842-1925),** French astronomer and writer, was born at Montigny le Roi. He was educated at Langres, the Paris Observatory, and the Sorbonne, Paris. Among his many contributions to astronomical science are *The Plurality of Inhabited Worlds*, *Celestial Marvels*, *The Atmosphere*, *The Lands of the Heavens*, *The Planet Mars*, *Popular Astronomy*, *The End of the World*, and *The Unknown*. He also wrote several astronomical and spiritualist romances. As an astronomer he did important work on double and multiple stars and on the physical constitution of Mars and of the moon.

Flamsteed (*flām'stēd*), **John (1646-1719),** English astronomer, was born at Denby, near Derby. His success in mathematics and astronomy procured for him the appointment of astronomer to the king in 1675. The following year, Greenwich Observatory was built, and Flamsteed began there the observations that mark the rise of modern practical astronomy. He formed the first trustworthy catalogue of the fixed stars and furnished those observations by which Newton verified his lunar theory. His great work is *Historia Cœlestis Britannica*, an account of astronomical observation.

Flanagan, John (1865-1952), American sculptor, was born at Newark, N. J. He was a pupil of Augustus Saint-Gaudens, New York, and of Henry Chapu and Alexandre Falguière, Ecole des Beaux-Arts, Paris. He executed the monumental clock in the Library of Congress, Washington; the statue of Joseph Henry at Albany, N. Y.; the decorative groups for the Saint Louis Exposition; the tinted marble relief "Aphrodite" in the Knickerbocker Hotel, New York; the design for the Verdun medal, presented by President Harding to the French city of Verdun; and various works now in the Metropolitan Museum, New York, and the Luxembourg, Paris.

Flaubert (*flō'bâr'*), **Gustave (1821-1880),** French novelist, was born at Rouen. After long hesitation between medicine and literature, he chose literature, beginning with poetry, which he soon gave up for prose. He possessed means which enabled him to write at leisure. Being highly neurotic and possessed by a hatred of "middle class smugness," he lived largely in seclusion near Rouen. Here he produced, by devoting several years to the writing of each, a series of novels which are masterpieces of literary style and artistic precision.

His work formed the connecting link between the romantic and the realistic school of fiction and profoundly influenced the writings of French novelists for a generation. As a literary exponent of art for art's sake, he imbued his famous godson and pupil, Guy de Maupassant, with his own spirit and ideals. His works include *Madame Bovary*, *Salammbô*, *L'Education sentimentale*, *La tentation de St.-Antoine*, and *Bouward et Pécuchet*.

Flaxman, John (1755-1826), English sculptor, was born at York. He worked in the pottery of Josiah Wedgwood and was associated with the poet William Blake. He studied at Rome from 1787 to 1794. In 1800 he was elected to the Royal Academy, in which he was made professor of sculpture in 1810. His best known sculptures are the monuments to the poet Collins at Chichester, to Lord Mansfield in Westminster Abbey, and to the Baring family at Micheldeaver Church, Hampshire. He produced outline illustrations of Homer, Æschylus, and Dante, and also of scriptural scenes.

Fleming, Sir Alexander (1883-1955), British physician and discoverer of penicillin. He served as professor of bacteriology in the University of London, St. Mary's Hospital Medical School. In 1929 an accidental observation of the effect of a certain mold, *penicillium notatum*, on cultures of bacteria, led him to develop a method by which an extract of this mold, penicillin, could be used to destroy malignant bacteria, leaving other bacteria unharmed. Later researches at Oxford showed that other molds had similar properties. Extracts of the penicillin group have been successfully used in the treatment of syphilis and of surface wounds. He was knighted in 1944. He received one-half the Nobel prize in medicine, 1945.

Fleming, Sir John Ambrose (1849-1945), English physicist and electrical engineer, was born at Lancaster. Educated at University College, London, and at Cambridge, he was professor of electrical engineering at University College, 1885 to 1926, and electrical engineer to the

Edison Electric Lighting Company. He was intimately associated with the application of electrical science to the telephone, electric lighting, and wireless telegraphy. He was knighted in 1929. His works include *Short Lectures to Electrical Artisans, Magnets and Electric Currents, Memories of a Scientific Life* and many scientific papers.

Fleming, Sir Sandford (1827-1915), Canadian civil engineer and scientist, was born in Scotland. He removed to Canada in 1845 and built up an extensive practice as chief engineer of railways and other public works; constructed the Intercolonial Railway through the provinces of Nova Scotia, New Brunswick, and Quebec; was engineer in chief of the Canadian Pacific Railway, 1871–80, exploring and locating the route across the continent; and, for many years, took an active interest in the movement for establishing the Pacific cable and a Pan-Britannic telegraph service encircling the globe.

In 1880, Fleming began advocating the adoption of a universal time system for railway schedules, and his system, which was approved by international action in Washington in 1884, has been widely adopted throughout the world. In 1880, he was made chancellor of Queen's University, Kingston, and he was knighted in 1897. See *Standard Time*.

Fletcher, John (1579-1625), English dramatist, whose name is inseparably associated with that of his friend and co-worker, Francis Beaumont, was born at Rye, in Sussex. He was educated with Beaumont at Cambridge, and there began the intimacy that led to their future collaborations. It is said that Beaumont supplied the judgment and Fletcher the fancy for the plays, nearly 50 in number, which they produced jointly. The chief piece largely of Fletcher's own unaided composition is a dramatic pastoral entitled *The Faithful Shepherdess*. Others of their joint authorship include *Philaster* and *The Maid's Tragedy*. Fletcher is now believed to have written portions of Shakespeare's *Henry VIII*, and Shakespeare is thought to have assisted Fletcher in writing *The Two Noble Kinsmen*.

Fletcher, John Gould (1886-1950), American poet, was born at Little Rock, Ark. After being graduated from Harvard College, he went to Europe in 1908 as a literary expatriate who believed that American materialism stifled culture. He actively participated in the imagist group of poets in England and France, publishing in England a number of volumes of verse, including *Fire and Wine, Goblins and Pagodas*, and *The Two Frontiers*.

Convinced by reading Spengler's *Decline of the West* that he had been mistaken in turning his back on America, he returned and, in 1936, published *The Epic of Arkansas*. On the basis of his *Selected Poems* and other works he was awarded the Pulitzer prize for poetry in 1939. He wrote also the autobiographical *Life is My Song*.

Fleury (*flü'rē'*), **Claude (1640-1723),** French Church historian, was born at Paris; was tutor to various princes, prior of Argenteuil, and confessor to young Louis XV. Among his numerous works were *Mœurs des Israelites, Mœurs des Chrétiens, Droit ecclésiastique*, and the great *Histoire ecclésiastique*,—the first complete church history,—on which he labored 30 years. Fleury's own work brought the history to the year 1414, but it was continued by other writers to the year 1768.

Flexner, Abraham (1866-), American educationist, was born at Louisville, Ky., and was educated at Johns Hopkins, Harvard, and the University of Berlin. He taught high school until 1886, then was employed by the Carnegie Foundation for the Advancement of Teaching; and, from 1912 until 1928, was associated with the General Education Board as adviser on distribution of funds for research. In 1930, he was made president of the newly organized Institute of Advanced Study, serving until 1939. He wrote, among other works, *The American College, Prostitution in Europe, A Modern College, Do Americans Really Value Education?, Universities—American, English, German*, and *I Remember*, an autobiography.

Flinders (*flĭn'dĕrz*), **Matthew (1774-1814),** English navigator and hydrographer, was born at Donington, Lincolnshire. His first knowledge of geometry and navigation was acquired without regular schooling, and, in 1789, he entered the navy as a midshipman. In 1795, he sailed with the *Reliance* to Australia, where he spent five years in geographical explorations and coast surveys.

Returning to England, he was placed in command of the *Investigator* with instructions to complete the coastal survey of Australia, where he devoted two years to mapping the coast line from Cape Leeuwin to the Gulf of Carpentaria. On his return to England, he unfortunately stopped at Mauritius, where he was detained as a prisoner by the French for nearly seven years. Reaching England broken in health, he lived but a short time after completing his account of his discoveries under the title *A Voyage to Terra Australia*. His monumental survey is still the foundation of modern Australian coast charts.

Flint, Austin (1836-1915), American physician and physiologist, was born in Northampton, Mass. He was brought to Buffalo in infancy and was educated at Harvard, the University of Louisville, and Jefferson Medical College. He practiced in Buffalo and lectured at the University of Buffalo prior to 1859, and was later connected successively with New York Medical College, New Orleans School of Medicine, Bellevue Hospital Medical College, and Cornell University Medical College. He assisted in establishing the glycogenic function of the liver and determined the nature of cholesterin and stercorin. His publications include *Physiology of Man, Physiological Effects of Severe and Prolonged Muscular Strain*, and *Source of Muscular Power*.

Flint, Charles Wesley (1878-), preacher and educator, was born at Stouffville, Ont. He was graduated at the University of Toronto, Drew theological seminary, and Columbia University. He entered the ministry of the Methodist Episcopal Church in 1900 and, for 15 years, occupied important pastorates. In 1915, he became president of Cornell College at Mount Vernon, Iowa, and, in 1922, was made chancellor of Syracuse University. He was made bishop of the Methodist Church in 1936.

Flotow (*flō'tō*), **Friedrich, Freiherr von (1812-1883),** German composer of light opera, was born at Teutendorf in Mecklenburg. He studied musical composition under Reicha in Paris and made his reputation by *Le Naufrage de la Méduse, Stradella*, and *Martha*, the last two conspicuously characterized by pleasing melodies. His introduction of "The Last Rose of Summer" in *Martha* made both the opera and the old Irish melody immensely popular. His later operas were *Indra* and *L'Ombre*. From 1856 to 1863, he was director of the theater at Schwerin.

Foch (*fŏsh*), **Ferdinand (1851-1929),** French general, was born at Tarbes, France of Basque-Alsatian parentage. He joined the French army in 1870 and fought in the war against Prussia. In 1898, he was appointed lieutenant colonel and professor of strategy and tactics in the War College at Paris. In 1905, he was made regimental commander of artillery and, in 1910, commandant of the war college.

In the early stages of the invasion of France in 1914, Foch stopped the great German drive toward Calais and later won the victories of Ypres and La Bassée. The plan whereby Joffre defeated the German armies in the great battle of the Marne was largely due to Foch, who came to be regarded as the master tactician among the Allied commanders.

On March 26, 1918, following the gigantic German attacks which drove back the Allied line in Picardy, jeopardizing Paris and Calais, Foch was placed in supreme command of the Allied armies. Holding the enemy's powerful thrusts to local gains, he organized for the counter offensive. On July 18, he inflicted a stunning defeat upon the Germans, blocking their fifth great drive of the year, and began a campaign of continuous attack against all the Teutonic allies. His consummate ability as a strategist was shown in an uninterrupted series of victories on all fronts. By well timed offensives, the military power of Bulgaria, Turkey, and Austria was crushed. Under relentless pressure, the great German army, beaten in every important battle, was practically driven out of France. To escape the impending annihilation of her forces, Germany, on Nov. 11, 1918, signed an armistice, surrendering enormous war supplies and yielding the military occupation of the Rhine. In recognition of his distinguished services, Foch was created Marshal of France. He was later made a marshal in the British army. See *World War I*.

Foix (*fwä*), **Gaston de (1489-1512),** French general. When 23 years old, he was made commander of the French army in Italy. He defeated the army of Venice near Brescia and took the city by storm on the same day. A few weeks afterward, he won a victory over the Spanish forces at Ravenna in one of the fiercest battles ever fought. The victory was so splendid that the hot-blooded young hero grew impatient when he saw some of the enemy's infantry leave the field slowly and in good order, and madly rushed after them in person, followed by Bayard and about 20 knights. He broke the enemy's line, but was killed in the encounter.

Fokine, Michel (1880-1942), Russian dancer, was born at Leningrad. Trained in the Imperial School of Ballet there, he first appeared publicly in 1898. The first ballet of his creation, *Acis and Galatea*, was performed in 1905. Its significance lay in the new freedom which he introduced into the movements based on the study of Greek dances. With the aid of the decorative art of Leon Bakst, he gave a new turn to the art of dancing, exemplifying his ideas in *The Carnival, Cleopatre, Sylphides*, and *Coq d'Or*. Driven from Russia by the revolution, he went to New York in 1919, where his production of *Aphrodite* created a sensation. It was followed in succeeding years

by *Mecca* and *Medusa*, which appeared less novel because his influence had already made itself felt in the theater arts generally.

Foley, John Henry (1818-1874), Irish sculptor, was born in Dublin, and studied art at Dublin and at the Royal Academy, London, of which he was elected member in 1858. While he produced some ideal works, he excelled in portrait statues which are noted for their strength of characterization. Among them are the statues of Hampden and Selden, in the Houses of Parliament at Westminster; of Prince Albert, which forms a part of the Albert Memorial in Hyde Park, London; and of Burke, J. S. Mill, and Goldsmith. He designed the seal of the Confederate States of America and executed a bronze statue of Stonewall Jackson for Richmond, Va. He died at Hampstead, England.

Folger, Henry Clay (1857-1930), American capitalist and collector of Shakespearean items, was born in New York City. He was graduated from Amherst College, where he acquired a keen interest in Shakespeare. He later studied law at Columbia University. In 1879 he became associated with the Standard Oil Company, of which he eventually became chairman of the board of directors, retiring in 1928. With the cooperation of his wife, Emily Jordan Folger (1859–1936), he acquired over many years one of the richest Shakespearean collections in the world. It was housed in the magnificent Folger Memorial Library Building, Washington, D. C., which was dedicated in 1932, two years after Folger's death.

Folsom, Marion Bayard (1893-), American government official, was born at McRae, Georgia. After he was graduated from the University of Georgia (1912) and the Harvard School of Business Administration (1914), he began his business career with the Eastman Kodak Company at Rochester, N. Y. He was made treasurer in 1935 and a director in 1947. Because of his pioneer work in the field of social security while with Eastman, he was called upon to help draft the Social Security Act of 1935. He left Eastman in 1953 when President Eisenhower appointed him Undersecretary of the Treasury. The revision of the tax laws as embodied in the Internal Revenue Code of 1954 was recognized as mainly Folsom's work. He became a member of the cabinet in 1955, when, following the resignation of Mrs. Oveta Culp Hobby, he was appointed Secretary of Health, Education, and Welfare.

Fontana (*fôn-tä'nä*), **Domenico (1543-1607),** Italian architect, was born on the borders of Lake Como. He obtained the favorable notice of Cardinal Montalto, who engaged him to erect a chapel in the Church of Santa Maria Maggiore and also the Villa Negroni. In 1585, after the cardinal had become Pope Sixtus V, he employed Fontana to plan the dome and lantern of Saint Peter's substantially in accordance with Michelangelo's design. He erected the obelisk near Saint Peter's, Rome, in 1586, and built the Lateran Palace and the Vatican Library.

Fontenelle (*fôNt'nĕl'*), **Bernard le Bovier de (1657-1757),** French writer, was born at Rouen. He was a nephew of Corneille, the tragic poet. In 1699, he was appointed perpetual secretary of the Academy of Sciences. His reputation rests chiefly upon *Dialogues of the Dead, Discourse on the Plurality of Worlds,* and an *Essay on the Geometry of the Infinite.* His long life, extending over nearly 100 years, was filled with literary activities, and, as a frequenter of the famous salons of Madame de Tencin and others, he was the literary arbitrator of his time.

Fonteyn, Margot (1919-), English prima ballerina of the Sadler's Wells Ballet, was educated in China and the United States. She has been a member of the Sadler's Wells company since she was fifteen. In 1937, she appeared as Giselle, and since then has had many leading roles in such ballets as *Les Sylphides, Coppelia, Le Lac des Cygnes, The Sleeping Beauty, Daphnis and Chloe,* and *Firebird.* She has been president of the Royal Academy of Dancing since 1954. In 1955 she married Roberto E. Arias, Panamanian ambassador to the Court of St. James's. In 1956, Queen Elizabeth II made her a Dame Commander of the Order of the British Empire, which is the female equivalent to a knighthood.

Foote, Andrew Hull (1806-1863), American naval officer, was born in New Haven, Conn. Entering the United States navy in 1822, he became a commander in 1852, saw service in China in 1856, and, after the outbreak of the Civil War, acted with signal credit in the reduction of Fort Henry and Fort Donelson, 1862. In the same year, he was promoted rear admiral. He died at New York.

Foote, Arthur (1853-1937), American composer, was was born at Salem, Mass. He was graduated from Harvard in 1874 and later studied music under S. A. Emery, J. K. Paine, and B. J. Lang. He settled in Boston as a teacher of music and was organist at the First Unitarian Church, 1878–1910. His compositions include an overture, *In the Mountains; Serenade in E;* a prologue, *Francesca da Rimini;* and the cantatas *The Skeleton in Armor, The Wreck of the Hesperus,* and *Farewell to Hiawatha.* Foote's music, classic rather than romantic in style, entitles him to high rank among American composers.

Forbes, Joan Rosita (c. 1895-), English traveler and writer. She drove an ambulance in France during World War I. She then began a series of travels which took her to many of the most inaccessible parts of the world, including a 1000 mile trip through the Libyan Desert into the secret capital of the Semissi sect, where she penetrated disguised as a Bedouin. She visited and wrote the biography of the outlaw chief Raisuli in Morocco, *The Sultan of the Mountains.* An 1100 mile trip through Ethiopia resulted in the film *Red Sea to Blue Nile.* Usually in disguise, she penetrated the hinterlands of China, Russia, Turkey, and other lands, experiencing many narrow escapes, but bringing back eye-witness accounts of events never before described including those of secret rites of jungle tribes in Africa and South America. Her interest was social and political rather than merely geographic, and she described her journeys in a number of colorful books, which include *The Secret of the Sahara-Kufara, Women Called Wild, A Unicorn in the Bahamas,* and an autobiography, *Gypsy in the Sun.*

Forbes-Robertson, Sir Johnston (1853-1937), English actor, was born in London. He was educated at Charterhouse, London, at Rouen, and at the Royal Academy of Arts. An actor from the age of 21, he became a member of prominent companies, including those of Sir Henry Irving and Sir Squire Bancroft. In 1895, he appeared in *The Notorious Mrs. Ebbsmith* and also in *Romeo and Juliet.* In 1898, he achieved the greatest successes of his career in *Othello* and *Hamlet.* He appeared in America also as Orlando in *As You Like It,* in Shaw's *Cæsar and Cleopatra,* and in *The Passing of the Third Floor Back.* He was knighted in 1913. He wrote *A Player under Three Reigns.*

Ford, Henry (1863-1947), American manufacturer, was born at Greenfield, Mich. He received his education in the district schools and learned the machinist's trade. In 1887 he removed to Detroit where he later became chief engineer of the Edison Illuminating Company. In 1903 he organized and became president of the Ford Motor Company, which under his management and control became one of the largest automobile manufacturing establishments in the world. Thirty years after the organization of the original company his establishment employed more than 100,000 persons and was capable of turning out over 7,500 automobiles a day. This result was secured by standardizing and quickly assembling parts, thereby securing economies that made possible the progressive reduction of prices and consequent widening of markets. About 15 million cars of the so-called model T type were produced before the design was changed in the interests of beauty in 1927. Beginning in 1914, Ford established a profit-sharing plan for the distribution of 10 to 30 million dollars annually among his employees.

Prior to America's entry into World War I, Ford was a pronounced pacifist and endeavored by a peace mission to bring the warring nations of Europe into conference. When war was declared against Germany, however, he placed his resources at the disposal of the government.

Ford took his son Edsel into the business, soon making him actual director of the enterprise, which was expanded to the manufacture of a high-priced car, tractors, and airplanes. Branches were established in many foreign countries. Ownership remained entirely in the hands of the Ford family. On Edsel's death in 1943, Henry Ford once more took active charge but retired again in 1945.

Henry Ford spent considerable money preserving or restoring objects and buildings typical of earlier generations in America. His Museum of American Life, near Dearborn, Mich., aims at assembling a complete series of every kind of article used or made in America from the first settlement to the present day.

The Ford factories demonstrated the value of mass production. This method soon spread to other industries and became a prime factor in a heightened standard of living while at the same time precipitating serious problems of employment.

Ford, Henry, II (1917-), American motor car manufacturer, was born at Detroit, Mich. A son of Edsel Ford and a grandson of Henry Ford, he was educated at Hotchkiss School, Lakeville, Conn., and Yale University. He joined the Ford Motor Company in 1941, and, except for two years' service as an officer in the Navy during World War II, he has been with the company ever since. He became president in 1945. It was his determination to help raise the level of salaries of the faculties of privately supported colleges, universities, and hospitals throughout the United States that resulted in the Ford Foundation announcing in December 1955 the allocation of $500,000,000 to 4157 American institutions—the largest philanthropic donation ever made.

Ford, John (1586-c. 1640), English dramatist, was born at Ilsington, Devonshire. He studied at Exeter College, Oxford, and entered the Middle Temple in 1602. His first literary work was an elegy on the earl of Devonshire entitled *Fame's Memorial.* The tragedies *'Tis Pity* and *The Broken Heart* are considered his masterpieces. His other dramas include *Honour Triumphant, The Lover's Melancholy,* and *The Lady's Trial.*

Ford, Paul Leicester (1865-1902), American historian and novelist, was born in Brooklyn, N. Y. He was educated privately, owing to physical deformity, and early devoted himself to literature. His works include *The Honorable Peter Sterling, The True George Washington, The Many Sided Franklin, Janice Meredith, Wanted: A Chaperon, Tattle Tales of Cupid, The Story of an Untold Love,* and *Wanted: A Matchmaker.* He also edited the works of Thomas Jefferson. See *Janice Meredith.*

Forester, C(ecil) S(cott) (1899-), English author, was born at Cairo, Egypt. He has written many novels, biographies, and books of travel, but is best known for his Horatio Hornblower stories, which include *Beat to Quarters* (1927), *Ship of the Line* (1938), and *Flying Colors* (1939), comprising the *Captain Horatio Hornblower* trilogy (1939). Other later Hornblower stories include *Commodore Hornblower* (1945), *Lord Hornblower* (1946), and *Lieutenant Hornblower* (1952).

Forrest, Edwin (1806-1872), American tragedian, was born in Philadelphia, Pa. He went on the stage at 14, and finally made his way to New York, where his rendering of Othello at the age of 20 raised him to the front rank among actors. He made three tours in England, but, during his last, in 1845, he lost popular favor through his conduct in an embittered quarrel with Macready. His greatest parts were those of Richard III, Macbeth, and Othello. He left the stage in 1871. At his death a part of his fortune was left to establish an asylum for aged and indigent actors. He left also a library rich in Shakespearean literature.

Forrestal, James (1892-1949), American businessman and politician, was born at Beacon, New York, educated at Dartmouth and Princeton, and served in the aviation force of the Navy in World War I. He engaged in banking in New York, becoming president of Dillon, Read and Company in 1938. He was Undersecretary of the Navy, 1940–44, and Secretary, 1944–47. While opposed to the merger of the armed forces, he cooperated with President Truman's plans, and, in 1947, was appointed Secretary of Defense.

Forster, John (1812-1876), English political and social writer, was born at Newcastle. He was educated for the bar, but turned to literature, editing successively the *Foreign Quarterly Review,* the *Daily News,* and, 1847–56, the London *Examiner.* His works include *A Life of Dickens,* biographies of Goldsmith, Swift, and Sir John Eliot, and historical essays on the *Debates on the Grand Remonstrance* and the *Arrest of the Five Members.*

Fortuny (*fôr-tōō'nē*), **Mariano (1838-1874),** Spanish painter, was born at Reus in Catalonia. Brought up in poverty, an allowance from his native town enabled him to study at Barcelona and Rome. His style, with its brilliance of color and dazzling effects, became, up to the rise of impressionism, a dominating influence in modern Spanish art. Among his celebrated pictures are "The Spanish Marriage," "Praying Arab," "Tribunal of a Cadi." "The Butterfly," and "Trial of the Model." Many of his works are found in American collections, including "An Ecclesiastic," "Don Quixote," "Mendicant," and "Rehearsal" in the Walters Gallery, Baltimore, and "Arab Fantasia at Tangiers," "A Court Fool," and "Lady in Black" in the Metropolitan Museum, New York. He died at Rome.

Fosdick, Harry Emerson (1878-), American clergyman and religious writer, was born at Buffalo, N. Y. He was graduated from Colgate University in 1900 and from Union Theological Seminary in 1904. Ordained to the Baptist ministry in 1903, he was pastor at Montclair, N. J., 1904–15. In 1908, he became instructor in homiletics, and, in 1915, was made professor of practical theology, Union Theological Seminary. He also occupied, at the same time, the pulpit of the First Presbyterian Church, New York City, which he left in 1924 as the result of a controversy growing out of his leadership in the so-called modernist school of religious thought. He accepted the pastorate of the Riverside Church, New York City. His writings include *The Second Mile, The Manhood of the Master, The Assurance of Immortality, The Meaning of Prayer, The Meaning of Faith, Spiritual Values and Eternal Life,* and *A Guide to Understanding the Bible.*

Fosdick, Raymond Blaine (1883-), American lawyer and publicist, was born at Buffalo, N. Y. He was graduated at Princeton University in 1905 and at New York Law School in 1908. In 1908–10, he was assistant corporation counsel, and in 1910–13 was commissioner of accounts, New York City. He spent 1913 in Europe in the study of police organization. In 1915–16, he was a member of the New York City Board of Education. He was chairman of the commission on training camp activities of the War and Navy departments, 1917–18, was civilian aid to General Pershing in France, 1919, and was undersecretary-general of the League of Nations, 1919–20. In 1935 he was made president of the Rockefeller Foundation and General Education Board. Among his writings are *European Police Systems, Keeping Our Fighters Fit, American Police Systems,* and *The Old Savage in the New Civilization.*

Foster, Stephen Collins (1826-1864), American song composer, was born at Lawrenceville, now a part of Pittsburgh, Pa. He first wrote Negro melodies, many of them composed primarily for the popular blackface minstrel shows of the 19th century. "Old Uncle Ned," "Campdown Races," and "Oh, Susanna," immediately gained a wide popularity. Of his song "Old Folks at Home" 300,000 copies were sold. "Nelly Bly," "My Old Kentucky Home," "O, Boys, Carry Me Long," "Come Where My Love Lies Dreaming," "Louisiana Belle," "Massa's in the Cold, Cold Ground," and "Ellen Boyne" were among the most popular. He published 175 songs, many of which achieved enduring popularity both in America and abroad. The naive pathos of his Negro songs has never been equaled. His life was marred by an unhappy marriage, addiction to drink, and poverty, which was due to his inability to profit substantially from his compositions. He was elected to American Hall of Fame, 1940.

The Stephen Collins Foster Memorial is on the grounds of the University of Pittsburgh. In it are housed a library devoted to Foster and his music, personal possessions, original manuscripts, letters, family records, and pictures.

Foucault (*fōō'kō'*), **Jean Bernard Leon (1819-1868),** French physicist, was born at Paris. He began the study of medicine but soon turned to physical science. In 1851, he demonstrated the rotation of the earth on its axis by means of a long pendulum and, in 1852, he invented the gyroscope. By means of a revolving mirror, he demonstrated that the velocity of light is greater in air than in water. In 1862, he determined that the velocity of light is about 185,000 miles per second. He also invented a polarizing prism and made applications of physics to the study of astronomy.

Fouché (*fōō'shā'*), **Joseph (1819-1868),** French Revolutionist and statesman, was born near Nantes. In 1792, he obtained a seat in the National Convention, and on the trial of Louis XVI voted for death without appeal. He became president of the Jacobins but was expelled by Robespierre and afterward imprisoned as a dangerous terrorist. At a later period, he became Napoleon Bonaparte's minister of police, long serving him as his ablest instrument. He was made Duke of Otranto in 1809, but was deprived of office after making the remark, "Let us prove that Napoleon's presence is not necessary to repel our enemies."

After Napoleon's return from Elba, Fouche again became minister of police. He advised Napoleon to abdicate after the battle of Waterloo, was placed at the head of the provisional government by the chambers, and negotiated with the allies. In 1816, Fouche was exiled from France by the edict against regicides, became an Austrian subject, and lived at Trieste until his death. It was Fouche who made the famous remark on the execution of the Duke of Enghieu: "It is worse than a crime; it is a blunder."

Fouqué (*fōō'kā'*), **(1777-1843), Friedrich Heinrich Karl, Baron de la Motte,** German novelist and poet, was born in Brandenburg. When young, he was a soldier and fought against Napoleon, but ill health obliged him to leave the army. He then gave himself up to study, and wrote many charming stories. *Undine, Sintram, Aslauga's Knight,* and *The Enchanted Ring* are the best of these. The fairy tale *Undine* ranks among the most exquisite in literature. He died in Berlin. See *Undine.*

Fourier (*fōō'rē-ā'*), **François Charles Marie (1772-1837),** French socialist, was born in Besançon. He served on the Rhine during the revolutionary period. Afterward he engaged in trade, at the same time earnestly studying the problems involved in the modern social system. In 1808 he disseminated the views which he had formulated on socialism by the publication of a work entitled *A Theory Of Four Movements and General Destinies.* He advocated the organization of society into communistic units, or phalanges, of 1620 people each, within which the individual would be put to work at the task best suited to his capabilities. The scheme was tried out later at various points in the United States, including Red Bank, N. J.

Fourier, Jean Baptiste Joseph, Baron (1768-1830), French geometrician, was born at Auxerre. He presented a mathematical memoir to the French Academy at the age of 19, and, in 1795, was made professor in the Ecole Polytechnique, Paris. He accompanied the French expedition to Egypt in 1798 and conducted explorations on the upper Nile.

In 1817, Fourier became a member of the Academy of Sciences and exercised with Cuvier the functions of perpetual secretary. His chief works are *Annales de physique*, *Theorie analytique de la chaleur*, and the *Analyse des equations determinees*. Fourier was one of the foremost mathematicians and physicists of his time and made valuable contributions to the theory of heat and to the solution of numerical equations.

Fox, Charles James (1749-1806), English statesman, was born in Westminster. He was educated at Eton and at Hertford College, Oxford. He entered Parliament at the age of 19 and immediately made his mark as a debater. In 1782, he became foreign secretary under Lord Rockingham. Fox brought the full effect of his brilliant oratory to bear in opposition to war with the American colonies and against the French revolutionaries, whom he favored. His policies, however, failed to prevail, the country following Pitt's leadership in the war against France.

On the death of Pitt, in 1806, Fox became foreign secretary in Grenville's ministry. But the term of his life had nearly run out, and he had no time to realize the high expectations of his followers. After carrying in Parliament his motion for the abolition of the slave trade, he died a few months before the measure became a law.

Fox, George (1624-1691), English religious leader, was born at Fenny Drayton. He became convinced of the futility of learning for the work of the ministry and held that the presence of Christ in the heart is sufficient as the "inner light" superseding all other lights, including the Scriptures. His views attracted followers, who were organized into "societies of friends" and became known as Quakers, a name expressing results of religious emotions excited among Fox's followers.

Fox was subject to persecution and numerous terms of imprisonment, but his following grew persistently. In 1671, he sailed for the West Indies and the American colonies to propagate the doctrines of the sect he had originated. On his return to England, in 1673, he was imprisoned at Worcester for 14 months because of his refusal to take the oath of supremacy. During the remaining years of his life, which he spent chiefly in London, the public worship of the Society of Friends became tolerated.

Fox, John William, Jr. (1863-1919), American novelist, was born in Kentucky. He was graduated from Harvard in 1883 and, after some experience in journalism traveled in the Southern States and in California. Subsequently, he engaged in business at Cumberland Gap and availed himself of the opportunity to study mountain life, which he described in novels that attained much popular success. Those most widely known are *The Little Shepherd of Kingdom Come* and *The Trail of the Lonesome Pine*.

Foxe, John (1516-1587), English martyrologist was born at Boston, in Lincolnshire. At 16 he entered Brasenose College, Oxford. He was a fellow of Magdalen College, 1539–45 and became tutor to the orphan children of the Earl of Surrey. During the reign of Mary, he retired to the continent, where he met Grindal and Aylmer. On Queen Elizabeth's accession he was made a prebendary of Salisbury Cathedral, 1563. He lived chiefly in London and often preached. He published numerous books, but the one upon which his fame rests is popularly known as *Foxe's Book of Martyrs*.

Fragonard (*frȧ'gô'nȧr'*), **Jean Honoré (1732-1806)**, French painter, was born at Grasse. In 1765, his "Callirhoe" secured his admission to the Academy and was commissioned for reproduction in Gobelin tapestry. He painted, with a loose touch and luscious coloring, genre pictures of contemporary life; he is also known for his landscapes. His art is the culmination of the rococo style of painting in France. In later years his pictures commanded high prices; his small "Billet Doux" sold for more than $90,000 after its exhibition in London in 1906.

In 1771, Fragonard was commissioned to decorate a pavilion for Madame du Barry with a series of subjects depicting the "Romance of Love and Youth." His work, rejected by Du Barry, was preserved by descendants of the artist's friend Maubert and sold in 1898 for $240,000. The series was purchased by J. P. Morgan, exhibited in the Metropolitan Museum, New York, in 1914, and in 1915, was bought by H. C. Frick of Pittsburgh.

France (*frȧns*), **Anatole (1844-1924)**, is the pen name of Jacques Anatole Thibault, French critic and author, who was born in Paris and educated at College Stanislaus. Through a long series of poems, dramas, stories, and critical essays, he attained an eminent position in French letters, being generally regarded as the most distinguished novelist, the keenest satirist, the most pleasing humorist, and the finest stylist of his time. In 1896, he was elected to the French Academy and, in 1921, he was awarded the Nobel prize for literature.

Of his numerous works, the following are among those that have been translated into English: *The Crime of Sylvestre Bonnard, At the Sign of the Reine Pedaque, The Red Lily, Mother of Pearl, Baltasar, The Wickerwork Woman, Joan of Arc, The Gods Are Athirst, The Revolt of the Angels, Thäis, The White Stone, Jocasta and the Famished Cat, On Life and Letters, Marguerite*, and *The Human Tragedy*.

Francis I (1494-1547), king of France, was born at Cognac, France, and became king in 1515. His first act was to reconquer Milan. Charles V, Henry VIII, and the pope were in alliance against him, driving his troops out of Italy and invading France on the north. Taken prisoner at the battle of Pavia, 1525, Francis was kept a year at Madrid, gaining his freedom only by renouncing Flanders, Artois, the Duchy of Burgundy, and all his Italian possessions. His struggles with Charles V continued unt l the Peace of Crespy, 1544. His reign is marked by the French Renaissance, the beginning of the Protestant Reformation, and the strengthening of the power of the monarchy. He fostered learning and art, invited painters and scholars to his kingdom, founded libraries, opened schools, and built several of the finest palaces in France.

Francis II (1768-1835), emperor of Germany, the last Holy Roman emperor, was born at Florence, Italy. He succeeded his father, Leopold II, in 1792. Joining the unsuccessful wars against Napoleon, he lost more and more of his scattered territories. In 1806, he formally abdicated the crown of the Holy Roman Empire, which was thereby dissolved after an existence of 1000 years. He continued, however, to rule Austria, which emerged from the wars in a strengthened condition and became the nucleus of the anti-revolutionary Holy Alliance.

Francis, Sir Philip (1740-1818), British politician and pamphleteer, was born in Dublin. Leaving Ireland at 12, he entered Saint Paul's School in London, and at 16 became a junior clerk in the Secretary of State's office. He held various minor positions in the government until 1773, when Lord North made him a member of the council of Bengal, which was equivalent to the government of India. There he vigorously opposed Warren Hastings, the governor general, with whom he fought a duel in 1780, and was seriously wounded. Francis entered Parliament in 1784 and pressed charges which led to the celebrated trial of Hastings.

Francis is remembered chiefly as the probable author of the "Letters of Junius," contributed to the *Public Advertiser* between 1769 and 1772. They attacked members of the government from the point of view of a liberal. In 1816, John Taylor wrote a book identifying Francis with "Junius" by remarkably strong circumstantial evidence. Francis, however, never acknowledged authorship. See *Junius, Letters of*.

Francis de Sales (*sālz*), **Saint (1567-1622)**, theologian, orator, and writer, bishop of Geneva, was born at Sales, Savoy. He studied law at the University of Padua, where he was graduated with distinction but soon gave up the law for the Church. He received holy orders in 1593, and, in 1602, was made Bishop of Geneva. Together with Saint Jane Frances de Chantal he founded the Institute of the Visitation in 1607. His *Introduction to the Devout Life* ranks with the *Imitation of Christ* among the most widely read books of devotion. He wrote also a *Treatise on the Love of God*. He was canonized in 1665.

Francis Ferdinand of Austria (1863-1914), archduke, was born at Graz. By the death of Crown Prince Rudolph and of his own father, he became the heir apparent to the Austrian throne. In 1900, he contracted a morganatic marriage with Countess Sophia Chotek, who was made Princess von Hohenburg after renouncing for her children the right of succession to the throne. As a result of a political plot, both were assassinated at Sarajevo, Bosnia, June 28, 1914. This tragic event was the precipitating cause of World War I.

Francis Joseph Charles (1830-1916), emperor of Austria. The revolution of 1848 having compelled his uncle Ferdinand to abdicate, Francis Joseph was called at the age of 18 to rule an empire shaken by civil war. Restored to the mastery of his dominions, he proceeded to undo the work of 1848. The Hungarian constitution was suspended and the absolute authority of the Habsburg monarchy in the Austrian dominions was proclaimed.

Under pressure of the liberal groups, the emperor granted partial return to constitutionalism. His Italian subjects won independence through their victory at Solferino, and other racial groups within the empire were frequently on the verge of revolt.

After suffering defeat by Prussia in 1866, the emperor restored national self-government to Hungary and, in 1867, was declared king of that country. In later years, the emperor's influence in foreign politics was directed chiefly to forming a closer alliance with Germany and

Italy. In 1878, the Treaty of Berlin allowed Austria to occupy Bosnia and Herzegovina.

Francis of Assisi (*ăs-sē'zē*), **Saint (1182-1226),** founder of the Franciscan order, was born at Assisi near Perugia, Italy. His father was a rich merchant, named Pietro Bernardone. His baptismal name was Giovanni, "John," but he was renamed Francesco, "Frenchman," by his father, who cherished a fondness for France. As a youth, Francis shared eagerly in the exercises of chivalry and arms. In one of the petty feuds of the time, he was taken prisoner and detained for a year in captivity at Perugia. An illness, which he had contracted during his confinement in prison, forced on him those first religious musings which led to his pilgrimage to Rome in 1206.

Thereafter, Francis renounced his inheritance, broke from his family, and consecrated himself to poverty and religion. No humiliation, no self-sacrifice was too extreme for him. Arrayed in a single brown tunic of coarse woolen cloth, girt with a cord of hemp, he begged at the gates of monasteries, discharged the most menial duties, and served the lepers at Gubbio. He worked with his own hands at the building of the churches of Saint Damian and Santa Maria degli Angeli. His biographers record the celebrated legend of his receiving upon his own person, while in an ecstasy of prayer at Monte Alverno, September 17, 1224, the stigmata of the wounds of his divine Redeemer.

Francis founded the Franciscan order in 1208. When his brotherhood had increased to eleven, he drew up for them a rule, which was approved at Rome by word of mouth in 1210 by Pope Innocent III. Francis himself returned to Assisi in 1212 and settled the simple constitution of his order, the Church of Santa Maria degli Angeli being assigned to him as their home.

In common with the older orders of monastic life, the Franciscan order was founded on the three vows of chastity, poverty, and obedience. Poverty, in the thought of Francis, was first in importance and in spiritual efficacy, and he repudiated all ideas of property, alike for his order and for its members. The passionate fervor and mystic tenderness of the Franciscans spread with irresistible contagion over Europe, and, in 1216, the order was solemnly approved by Pope Innocent. At its first general assembly, held in 1219, 5000 members were present. The order was confirmed in 1223 by Pope Honorius.

The extant writings of Saint Francis consist of letters, sermons, ascetic treatises, proverbs, moral apothegms, and hymns. He also established an order of nuns, generally called, from its first abbess, Clara of Assisi, the order of Poor Clares. Another branch consisted of the tertiarians, or penitents of the Third Order of Saint Francis. The influence of the Franciscans in the disorganized social condition of the time can scarcely be overestimated. As a literary order, they have been eminent chiefly in theology. They were also the earliest missionaries to America, having come over with Columbus on his second voyage in 1493. Saint Francis died near Assisi, and was canonized by Pope Gregory IX in 1228.

Francis of Paola (*pä'ô-lä*), **Saint (1416-1507),** founder of the order of Minims, was born at Paola in Calabria. At 13 he was a Franciscan; at 19 he retired to a cave and gave himself up to prayer and self-mortification. The fame of his piety having attracted emulators, he obtained permission to erect a convent, and the new order came to be known as the Minim-Hermits of Saint Francis of Paola. Communities were established throughout Europe, but the order did not become extensive and is now limited chiefly to Sicily, Italy, and southern France. Louis XI of France summoned Saint Francis to his deathbed, and Charles VIII built him a convent at Plessis les Tours. He was canonized in 1519.

Francis Xavier, Saint. See *Xavier, Saint Francis.*

Franck (*fränk*), **César Auguste (1822-1890),** French composer and organist, was born at Liege. He received his musical education at the conservatories of Liege and Paris. He became organist at Sainte Clotilde. His early compositions met with limited recognition, and, throughout his life, the circle of his admirers remained small though select. In 1872, he succeeded his former instructor Benoist at the Paris Conservatory, where his teaching influenced many of the later French composers. After 1900, his greatness as a composer received increasing appreciation, and, by many, he is accorded rank with Berlioz, whom he surpasses in originality. His greater works include a symphony in D minor; the oratorios *Ruth, The Redemption, The Beatitudes,* and *Rebecca;* and the operas *Hulda* and *Ghisèle.*

Franck (*fränk*), **James (1882-),** German physicist. In 1912, while at the University of Berlin, he, with a colleague, Dr. Gustav Hertz, devised the first experimental verification of Planck's theory that light and other forms of radiation travel, not in continuous waves, but in bundles, or "quanta." Franck later became professor of physics at the University of Göttingen but resigned in 1933 as a protest against the anti-Jewish activities of the Hitlerites. Coming to America, he was made professor of physics at Johns Hopkins University in 1935 and left to accept a chair at the University of Chicago in 1938. With Dr. Hertz, he received the Nobel prize in physics for 1925.

Franco, Francisco (1892-), Spanish general and dictator, was born in Galicia, Spain. He saw military service in Morocco, becoming colonel in 1926. Under the Spanish republic of 1931, he rose to the post of chief of staff in 1935. On the outbreak of civil war the next year, he sided with the insurgents, organizing and sending large numbers of Moroccan troops to assist them. Later the same year he was made commander and "Chief of the Spanish State." Assisted by German and Italian troops with mechanized equipment, he crushed the resistance of the republican regime and captured Madrid on March 27, 1939. Assuming the title of Prime Minister of Spain, Franco began the work of reconstruction by conscripting the labor of all able-bodied Spaniards for 15 days a year without pay. He declared neutrality in World War II but leaned strongly toward Germany.

Frankfurter, Felix (1882-), American jurist and educator, was born at Vienna, Austria, and was brought to America at six years of age. Educated at the College of the City of New York and Harvard University, he was an attorney for the Department of Justice and law officer for the War Department before being made professor of law at the Harvard Law School in 1914. Frankfurter was known as a liberal and his recommendations for appointments to legal positions under the Roosevelt administration were sought in numerous instances. President Roosevelt appointed him to the United States Supreme Court in 1939. His publications include *The Case of Sacco and Vanzetti, The Labor Injunction* (in collaboration), *The Public and Its Government,* and *Mr. Justice Holmes and the Supreme Court.*

Franklin, Benjamin (1706-1790), American statesman, diplomatist, author, and philosopher, was born in Boston, Massachusetts. After two years at school, he was obliged to leave his studies and assist his father, a dyer, tallow chandler, and soap boiler. In his twelfth year Franklin was apprenticed to his brother, a printer, in a business which promised to afford better opportunities to gratify his thirst for knowledge.

Original articles written by Franklin were accepted for publication in his brother's paper, the editor not knowing the source. His brother became jealous, and Franklin determined to leave him and begin in the world for himself. He consequently sold some of his books, ran away from Boston in October 1723, went to New York, and later to Philadelphia, where he soon found employment with a printer named Keimer.

Publishing Enterprises. In 1724, under the patronage of Sir William Keith, governor of the province, who proposed to set him up in business, Franklin embarked for London to buy type. He soon found that he had relied too confidently upon Sir William's promises, and he was compelled to find employment in London printing houses. He returned to Philadelphia in October 1726, and, shortly afterward, he joined with a fellow workman, Meredith, in establishing a newspaper, the Pennsylvania *Gazette.* Poverty and disappointments continued with him for a time, but ultimately his skill and industry prevailed.

His subsequent efforts in pursuit of fortune and independence were eminently successful. The first circulating library in America was established by him. In 1732, he first issued his celebrated almanac, commonly known as *Poor Richard's Almanac.* He continued this publication for 25 years, and its pithy sentences won him great popularity. In 1733, Franklin began to study languages, and became familiar with French, Italian, Spanish, and Latin.

Political Activities. In 1736, he was chosen clerk of the general assembly of Pennsylvania, and, in the following year, he became postmaster of Philadelphia. These preferments turned his attention to statecraft. He effected a reformation in the system of city police and promoted the establishment of a fire company, the first in America. He also organized a militia for the defense of the province. In 1743, he initiated the plans for an academy, which became the germ of the University of Pennsylvania.

Scientific Work. Notwithstanding the multiplicity of his public duties, Franklin found leisure to pursue scientific investigations on electricity. In 1752, he demonstrated the identity of electricity and lightning and announced a plan for defending houses from lightning by the use of pointed conductors. His renown spread over the whole civilized world.

Diplomatic Career. In 1753, Franklin was made deputy postmaster general for the British colonies in America, and, in the same year, he established the Academy of Sciences in Philadelphia. In 1757, he was sent to England as the agent for Pennsylvania and was employed in the same capacity by three other colonies. He returned to America in 1762 and took his seat in the Colonial Assembly.

But, two years later, he was again sent to England as an agent for Pennsylvania. He remained abroad until 1775. He was a member of the Continental Congress and signed the Declaration of Independence on July 4, 1776.

During the whole period of the Revolution, Franklin was active in a civil capacity at home or abroad. Congress sent him as a commissioner to the French Court in 1776. He was one of the most accomplished and adroit diplomats at Versailles, where he was received enthusiastically as a *savant* and patriot. In 1778, he induced the French government to form with the colonies the alliance that eventually compelled England to concede their independence.

In 1785, Franklin returned to Philadelphia. Two years later he was a delegate to the Federal Constitutional Convention, and, in 1788, he retired from active public life, using his pen, however, as vigorously as before.

Character and Genius. Franklin's genius was above all that of a practical man with a passion for human betterment, qualities seen alike in his scientific investigations, diplomatic activities, political views, and authorship. While prudent in the acquisition and management of property, he exhibited conspicuous generosity. His perseverance and energy defied discouragement. He wrote an *Autobiography* which has become classic. He died at Philadelphia and was elected to the American Hall of Fame in 1900.

Franklin, Sir John (1786-1847), English rear admiral, Arctic explorer, and colonial governor, was born at Spilsby, Lincolnshire. He was appointed to command the *Trent* in the expedition sent out in 1818 for the discovery of a Northwest Passage. He made a second expedition, during 1825–27, and for his achievements was knighted in 1829. In 1845, he commanded another expedition for the discovery of the northwest passage. He had with him two ships, the *Erebus* and the *Terror*, with 129 chosen officers and men. He sailed from Greenhithe, May 19, 1845, and was last seen July 26.

Many expeditions were sent out in search of the missing boats and their crews. The relics and skeletons found later proved that Sir John Franklin and his men perished by starvation and exposure. He is entitled to the honor of being the discoverer of the Northwest Passage from the Atlantic to the Pacific. A monument was erected to him, 1875, in Westminster Abbey.

Franz (*fränts*), **Robert (1815-1892),** German song composer, was born at Halle. He studied music for two years at Dessau and returned to Halle, where he devoted himself to the works of Bach, Handel, and Schubert. His first published songs, 1843, won warm praise from Schumann, Liszt, and Mendelssohn. He later became organist, conductor of singing, and musical director at the University. He published about 250 songs, a kyrie, chorales, and arrangements of the vocal masterpieces of Bach and Handel. Franz's best songs rank with those of Schubert and Schumann.

Franzén (*frän-sān'*), **Frans Michael (1772-1847),** Swedish poet, was born in Uleaborg, Finland. He was educated at Abo, became librarian of the university there, and, in 1801, was made professor of history and ethics. After the conquest of Finland by the Russians, he settled in Sweden as a clergyman, finally removing to Stockholm, where he was made bishop. He wrote *Emili, or an Evening in Lapland; Columbus; Gustav Adolf in Germany;* and many religious songs.

Frasch, Herman (1852-1914), chemist and inventor, was born at Gaildorf, Germany. He was educated as a pharmacist; came to America in early youth; and, in 1874, established a laboratory at Philadelphia. His earlier inventions were concerned chiefly with the production of oil, salt, wax, and white lead. In 1885, he engaged in petroleum refining in Canada. In connection with the processes which he developed for producing oils of great purity, he secured many important patents. These inventions were later purchased and extensively utilized by the Standard Oil Company. In 1890, Frasch patented an apparatus which largely revolutionized the sulphur industry. For his many achievements in chemical engineering, he was awarded the Perkin medal in 1912. See *Sulphur.*

Fraser, James Earle (1876-1953), American sculptor, was born at Winona, Minn. He was educated in the public schools of Minneapolis and studied sculpture at the Art Institute, Chicago, and under Falguiere in Paris. In 1906, he was made instructor at the Art Students' League, New York. Among his principal works are the bust of Theodore Roosevelt, Senate Chamber, Washington; a statue of Bishop Potter, Cathedral of Saint John the Divine, New York; "End of the Trail," a statue now in San Francisco; the John Hay Memorial, Cleveland; a statue of Alexander Hamilton, Washington; war memorials for the Bank of Montreal at Montreal and Winnipeg; and heroic figures at the entrances to the Supreme Court Building and the Archives Building, both in Washington, D. C. He designed in 1913, the nickel five-cent piece having an Indian head and a buffalo and also the medal of the American Academy of Arts and Letters. He was made a member of this academy in 1927.

Fraunhofer (*froun'hō-fĕr*), **Joseph von (1787-1826),** German optician and physicist, was born at Straubing in Bavaria. In 1807, he was employed to found an optical institute at Benediktbeuern, which, under his management, was removed in 1819 to Munich. He invented many optical instruments, but is most celebrated for his improvements in telescope prisms, in the mechanism for manipulating large telescopes, and especially for his discovery of the dark lines in the sun's spectrum, called Fraunhofer's lines.

Frazer, Sir James George (1854-1941), British anthropologist, was born at Glasgow. He was educated at Glasgow University and at Trinity College, Cambridge. In 1879, he was elected fellow of Trinity College and was later called to the bar. In 1907, he was made professor of social anthropology at Liverpool. His published works are of great importance in the study of anthropology, especially those concerned with the development of religion and myth, which he connects closely with magic. His principal work is *The Golden Bough.* This was first published in 1890 and was reissued with enlargements many times in the next half century. It contains an elaborate study of the Greek cults, their varied origins, and their place in the comparative history of religion. Among his other works are *Totemism, Pausanias's Description of Greece, The Scope of Social Anthropology, Folklore in the Old Testament, Sir Roger de Coverly, Apollodorus,* and *Anthologia Anthropologica.*

Frederick I (c. 1121-1190), called Barbarossa or "Redbeard," became emperor of Germany in 1152. His reign was a long struggle with powerful vassals at home and with Lombardy and the pope in Italy. He captured and razed Milan in 1162 and took Rome by storm five years later. His army was, however, smitten with the plague, and Lombardy again revolted, winning independence by defeating Frederick at Legnano in 1176. At home, he managed his vassals by conciliation and by keeping the balance of power among them equal. He asserted his power over Poland, Hungary, Denmark, and Burgundy. At the height of his fame and influence, he took the Cross to fight against Saladin. He defeated the Mohammedans in two battles, but was drowned in Cilicia.

Frederick VI (1768-1839), king of Denmark, son of Christian VII. In 1784, he was declared regent on account of his father's incapacity. With the help of his minister Count Bernstorff, he abolished serfdom, reformed the criminal code, removed the disabilities of the Jews, and prohibited the slave trade. By the advice of Bernstorff, he strove to maintain strict neutrality in the wars of the epoch. But, for refusing the demands of the English, the Danish fleet was almost destroyed in 1801, and, in 1807, Copenhagen was bombarded, and the remnants of the fleet were transferred to England. Denmark then became an ally of Napoleon and shared his fortune. Frederick ascended the throne on the death of his father in 1808. In 1814, Norway was taken from Denmark by the states allied against Napoleon and was given to Sweden. The country had become bankrupt in 1813, but, by Frederick's wise measures, financial order was finally restored.

Frederick the Great, or **Frederick II (1712-1786),** king of Prussia, was born in Berlin. In 1730, he endeavored by flight to escape from his father's control, but was arrested, tried as a deserter, and condemned to death. He was pardoned, however, through the intercession of Charles VI of Austria. In 1733, Frederick was compelled by his father to marry Elizabeth Christina of Brunswick. From 1732 to 1740, his time was devoted principally to literary amusements and society.

Conquest of Silesia. Frederick became King of Prussia on May 31, 1740, and his dormant energies at once awoke to action. In October, he marched an army into Silesia, most of which he obtained for Prussia by the Treaty of Breslau in 1742. This action was opposed by Austria, which proceeded to form, with England and Sardinia, the so-called Triple Alliance. Frederick executed a countermove by concluding a treaty with France and the Elector of Bavaria. In 1744, Frederick anticipated the designs of Austria upon Silesia by marching into Bohemia At the end of 1745, he found himself in possession of Dresden, the capital of Saxony, and in a position to dictate terms of peace to Austria and Saxony, thereby confirming himself in the possession of Silesia.

Patronage of Literature. During the next ten years, Frederick resided chiefly at Potsdam, exercising a minute superintendence over every branch of government, but without depriving himself of social pleasure or abandoning his literary pursuits. At this time, he began his *History of My Age* and wrote his *Memoirs of the House of Brandenburg.* He restored the Academy of Sciences of Berlin and was eager to enroll distinguished foreigners among its mem-

bers and to induce them to resort to his capital. Among the notable men attracted to his court were Euler and Voltaire. The latter, after a three-year sojourn, quarreled with the monarch and returned to France. Frederick ignored German writers and consistently fostered French culture at his court.

Later Activities. In 1756, Frederick learned that a new coalition, including Russia and his former ally, France, was forming against him. England was his only ally during the bitter struggles of the ensuing Seven Years' War, in which Frederick proved himself to be a brilliant military leader. Ultimately, by the Treaty of Hubertusburg, signed February 15, 1763, Frederick was again left in possession of Silesia. To cure the evils inflicted by warfare, Frederick set himself to restoring the strength of the exhausted population. He emancipated the peasants from hereditary servitude and then began a gradual alteration of the fiscal system. His *History of the Seven Years' War* was written at this period.

In 1772, Frederick joined in the project for the first partition of Poland. He gained a territory of no great extent, but of considerable value for strategic purposes. In 1778, he led an army into the field to prevent the partition of Bavaria, and, in 1785, he again found cause to oppose Austria, this time in defense of the integrity of the German constitution. To secure his purpose, he found it sufficient to negotiate a confederation among the chief powers of Germany, known as the Fürstenbund, which was bound to support the constitution of the empire and the rights of the several princes. Frederick died at Sans Souci, near Potsdam.

Frederick William (1620-1688), elector of Brandenburg, was born in Berlin. On his accession in 1640, he found the state disorganized and exhausted by the Thirty Years' War. He carefully regulated the finances, made a treaty of neutrality with Sweden, organized an army, and strove to repeople his deserted towns and villages.

By the Treaty of Westphalia, 1648, he recovered eastern Pomerania, Halberstadt, Minden, and the archbishopric of Magdeburg. Out of a quarrel between Sweden and Poland he contrived to secure the independence of the duchy of Prussia from Poland, 1657. Alarmed by the aggressions of Louis XIV on the Rhenish frontier, he organized a league against France and defeated the Swedes, the allies of Louis, at Fehrbellin, 1676. However, deserted by his friends, he was obliged to agree to the Treaty of Saint Germain, 1679, by which he restored all his conquests to the Swedes on the payment to him of 300,000 crowns.

The remainder of the elector's reign was devoted to the consolidation of his dominions and to the development of their resources. He encouraged the immigration of exiled French Protestants, Dutchmen, and other foreigners. He founded the Royal Library at Berlin, reorganized the universities, opened canals, established posts, greatly enlarged Berlin, and left a well filled exchequer and a highly organized army. He made Brandenburg virtually an absolute monarchy only less powerful than Austria. Died at Postdam.

Frederick William I (1688-1740), king of Prussia, son of Frederick I. On his accession in 1713, he became embroiled in the war waged by Sweden against Russia, Poland, and Denmark, at the end of which he acquired Pomerania with Stettin. The remainder of his reign was devoted to improving the internal condition of Prussia. He was sternly practical, blunt, and determined; he despised the arts and sciences, was rigidly economical, and strict in his ideas of justice. He fostered industry and agriculture, secured an adequate income for the state, and established an army of more than 80,000 men, the best disciplined force in Europe.

Freeman, Edward Augustus (1823-1892), English historian, was born at Harborne. He was educated at Trinity College, Oxford. His first work was a *History of Architecture*, 1849. After several minor works, his most important one, *The History of the Norman Conquest*, appeared between 1867 and 1879. It minimizes the effect of the conquest, exalting the Teutonic influences. This work was followed by *The Reign of William Rufus*. He also wrote histories of the Saracens and of the Ottoman power in Europe, *General Sketch of European History, Growth of the English Constitution, Comparative Politics, Historical Geography of Europe*, and various other works, all illustrating the two factors which, through him, influenced English historical writing—close dependence on sources and an appreciation of the unity of European history. In 1884, he was appointed regius professor of modern history at Oxford.

Freeman, Mary Eleanor Wilkins (1862-1930), American novelist, was born at Randolph, Mass. She was educated there and at Mt. Holyoke Seminary; for many years, was secretary to Oliver Wendell Holmes; and came into prominence as a writer for magazines, contributing poems, short stories, and novels. She married Dr. Charles M. Freeman, 1902. Her fiction, which is devoted chiefly to interesting portrayals of New England life, ranks among the best of its kind. Her writings include *Young Lucretia, Evelina's Garden, The Love of Parson Lord, The Portion of Labor, The Wind in the Rose Bush, By the Light of the Soul, Shoulders of Atlas*, and *A New England Nun and Other Stories*.

Frémiet (*frā'myĕ'*) **Emmanuel (1824-1910),** French sculptor, was born at Paris. He studied at La Petite Ecole and under Rude; made drawings at the Jardin des Plantes; and later drew plates for medical works. His first sculptural work was a gazelle. His masterpiece is an equestrian statute of Joan of Arc. His other pieces include "Gorilla Abducting a Woman," "Saint Michael," "Faun and Young Bear," "Dachshund," "The Man of the Stone Age," "Meissonier," and statues of De Lesseps, Du Guesclin, Napoleon, and Conde. At the Saint Louis Exhibition in 1904, his work was represented by bronze statues of Saint George, a "Gorilla of Gabun," and "Race Horses." Frémiet's work is marked by power, realism, and originality, and he ranks with Barye among the leading modern sculptors of animals.

Frémont (*frē'mŏnt*), **John Charles (1813-1890),** "the pathfinder," American explorer, was born at Savannah, Ga., and was educated at Charleston College, S. C. He taught mathematics on a warship for two years and, in 1838, began surveying. In 1842, he crossed the Rocky Mountains and demonstrated the feasibility of an overland route across the continent. In 1843, he explored Great Salt Lake advancing to the mouth of the Columbia River; in 1845, he examined the watershed between the Mississippi and the Pacific.

During the Mexican War, he cleared northern California of Mexican troops, but, quarreling with his superior officers, resigned his captaincy. In 1848, he started upon a fourth expedition, along the upper Rio Grande, but was compelled to return to Santa Fe after great sufferings. In 1849, he crossed over to California, where he settled and, in the following year, became United States senator from the new state. He discovered gold on his California estate, which made him very wealthy. In 1856, he was the Republican and Antislavery candidate for the presidency. In 1861-62, he served in the regular army as major general, but resigned rather than serve under General Pope. He was governor of Arizona, 1878-82.

Fremstad (*frĕm'stăd*), **Olive (c. 1870-1951),** dramatic soprano, was born at Stockholm, Sweden. She received her early musical education in Oslo and, at the age of 12, came with her parents to America, settling in Minneapolis. At 16, she sang in choirs, and, in 1890, she began musical study in New York. In 1895, she made her first appearance in opera as Azucena in *Il Trovatore* at Cologne, where she was a member of the opera, 1897-99, also appearing in Vienna, Antwerp, and Amsterdam. From 1900 to 1903, she was engaged by the Royal Opera in Munich, singing also at Covent Garden, London.

Late in 1903, with notable success, she made her first American appearance in opera as Sieglinde in *Die Walküre* at the Metropolitan Opera House, New York, where, for many seasons, she appeared in all the great Wagnerian roles, of which she ranked among the world's foremost interpreters. She also created the part of Salome in the opera by Strauss.

French, Daniel Chester (1850-1931), American sculptor, was born at Exeter, N. H. He was educated in Exeter, N. H., and at the Massachusetts Institute of Technology, Boston; studied art with William Rimmer in Boston, with J. Q. A. Ward in New York, and with Thomas Ball in Florence, Italy. After a short residence in Boston and in Concord, Mass., he became established in New York, 1887.

Among his best-known earlier works are "The Minute Man of Concord," at Concord Mass.; a statue of General Cass, in the Capitol at Washington; a statue of Rufus Choate, Boston Courthouse; one of John Harvard, at Cambridge, Mass.; "Dr. Gallaudet and His First Deaf-Mute Pupil"; "Death and the Sculptor"; and the colossal "Statue of the Republic," at the World's Columbian Exposition. Among his later works are the statue of Washington presented to the French nation; "Alma Mater," at Columbia University; the four groups of the "Continents," New York Customhouse; Alice Freeman Palmer Memorial, Wellesley College; the Melvin Memorial, "Mourning Victory," at Concord, Mass.; and the colossal seated figure of Lincoln in the Lincoln Memorial at Washington.

His style is distinctly American and combines beautiful technique and fine sculptural composition with high intellectual qualities. By his versatility and the sustained excellence of his numerous works, he ranks next to Saint-Gaudens among American sculptors. He was elected a member of the American Academy of Arts and Letters in 1905.

French, Lord John Denton Pinkstone (1852-1925), British soldier, was born at Ripple Vale, Kent. He served

first in the navy; entered the army in 1874; and was in the Sudan campaign, 1884-85. He became lieutenant general in the Boer War, having command of the British cavalry forces, and was made general in 1907 and field marshal in 1913. He resigned early in 1914 as a protest against an impending coercion of Ulster, but, on the outbreak of World War I in 1914, he immediately rejoined the army. He led the British expeditionary forces in France until December 1915, when he was made commander in chief of the armies in the United Kingdom and was created Earl of Ypres. At the end of the war, he published his personal narrative in *1914*. He was lord lieutenant of Ireland from 1918 to 1921.

Freneau (*frē-nō'*), **Philip (1752-1832),** American poet, was born in New York City of French Huguenot descent. He was graduated at Princeton in 1771. In 1776, he visited the West Indies and, in 1778, went to the Bermuda Islands. In 1780, during the Revolutionary War, he again sailed for the West Indies, but was captured by a British cruiser. After the return of peace, Freneau became in succession editor of a newspaper and captain of a ship that plied between New York, the West Indies, and the Southern states. When Jefferson was secretary of state, Freneau was made translator for the State Department. He also became editor of the *National Gazette* and the *Jersey Chronicle*.

Freneau was the earliest American poet of genuine ability. His finest poems are lyrics, among which are *The Indian Burying-Ground, The Wild Honeysuckle,* and *Eutaw Springs*. His effective satires include *The Prison Ship, The Midnight Consultation,* and *America Independent*.

Frère (*frâr*), **Pierre Edouard (1819-1886),** French painter, was born at Paris and studied under Delaroche and at the Ecole des Beaux-Arts. His paintings are mostly figures and scenes from domestic life, excellent in color and homely in sentiment. They are good subjects for engraving and are well known in art stores. Ruskin was enthusiastic in praise of several of his works. "The Seamstress," "Little Gourmand," "Preparing for Church," and the "Gleaner Boy" are among his best-known pictures. "Preparing for Church" is in the Corcoran Gallery at Washington.

Fresenius (*frâ-zā'nē-ōōs*), **Karl Remigius (1818-1897),** German chemist, was born at Frankfort on the Main. He studied at Bonn and Giessen under Liebig and, in 1845, became professor of chemistry at Wiesbaden. The laboratory founded by him in 1848 subsequently gained great celebrity in chemical science. His chief contributions were methods of chemical analysis. Many of his valuable and original papers were published in *Zeitschrift für analytische Chemie,* which he founded in 1862 and edited until his death.

Fresnel (*frā'nĕl'*), **Augustin Jean (1788-1827),** French physicist, was born at Broglie, Eure. He was educated at the Polytechnic School in Caen and, in 1816, received a permanent appointment as engineer in Paris, where he collaborated with the celebrated Arago. He distinguished himself by his experiments on the inflection and polarization of light and, in 1819, gained the prize offered for the best treatise explanatory of the phenomena of light.

Independently of Thomas Young, he disproved Newton's corpuscular theory of light by brilliant experiments which confirmed the undulatory theory. He advanced the theory that light is due to wave motion and that these waves are perpendicular, or transverse, to the direction of the propagation of the waves. He invented the compound lighthouse lens.

Freud (*froit*), **Sigmund (1856-1939),** Austrian physician, and the founder of psychoanalysis, was born at Freiberg, Germany, and was educated at the University of Vienna and in Paris. In 1892, he became assistant professor of neuropathology at the University of Vienna, in which capacity he attained wide celebrity for a method of treating hysteria and other nervous disorders by recalling to consciousness early sexual experiences which had been apparently forgotten but which continued to operate in unbalancing the personality. This treatment he called psychoanalysis. The influence of his viewpoint was widespread in literature, novelists finding the idea of the subconscious mind highly fruitful in developing springs of action for their characters. Freud's chief publications include *Studies on Hysteria, Interpretation of Dreams,* and *Psychoanalysis*. He died in England, where he had taken refuge after the German occupation of Austria, fearing persecution on account of his Jewish origin.

Freund (*froint*), **Wilhelm (1806-1894),** German philologist, was born of Jewish parents at Kempen in Posen. He studied at Berlin, Breslau, and Halle; taught at Breslau, Hirschberg, and Gleiwitz; and finally settled down to a literary life at Breslau. On his monumental *Wörterbuch der lateinischen Sprache* most Latin-English dictionaries are based.

Freytag (*frī'tăk*), **Gustav (1816-1895),** German novelist and dramatic writer, was born in Silesia. He studied at Breslau and Berlin; lectured on German literature in the University of Breslau; and edited a newspaper at Leipzig, 1848-70. He wrote poems, successful plays, novels, and dramatic criticism. His best-known novel is *Soll und Haben,* "Debit and Credit." *The Lost Manuscript* and the historical series called *Our Ancestors* were almost as popular. His other important works include *Die Journalisten*—one of the finest of German comedies—and *Die Technik des Dramas*.

Frick, Henry Clay (1849-1919), American manufacturer and capitalist, was born in West Overton, Pa. He began business life as a clerk for his grandfather, a flour merchant and distiller, and later embarked in a small way in the coke business. He was president and, in 1897, was made chairman of the board of directors of the H. C. Frick Coke Company, which became the largest coke producer in the world, operating nearly 40,000 acres of coal and 12,000 coke ovens, with a daily capacity of 25,000 tons. He came into public notice by his vigorous management during the strike at Homestead, 1892, when he was shot and stabbed by Alexander Berkman, an anarchist. He was elected chairman of the board of managers of the Carnegie Steel Company in 1892; he was also director or officer in numerous other business enterprises. On his death he bequeathed his New York mansion with its art collection to the city. This bequest had an estimated value of 50 million dollars, and to it Frick added an endowment fund of 15 million dollars. He bequeathed also a handsome park to the city of Pittsburgh.

Friml, Carl Rudolf (1881-), Czech-American composer, was born at Prague, and studied at the Conservatoire there under Dvořák and others. He came to the United States as accompanist for Kubelik the violinist, in 1901, and at that time appeared also as a concert pianist. He returned briefly to Czechoslovakia, and then settled permanently in the United States before World War I. Although the writer of numerous compositions for the piano, violin, and cello, his fame rests on his work as a composer of operettas. Among his twenty-seven musical comedies were *The Firefly* (1912), which included "The Donkey Serenade" and the waltz "Sympathy;" *The Vagabond King* (1925), with the "March of the Vagabonds" and "Only a Rose;" and *Rose Marie* (1927), with its "Indian Love Call" and "O, Rose Marie, I Love You, I'm Always Dreaming of You." Friml also wrote the popular song *L'Amour, toujours*.

Frobisher (*frŏb'ĭsh-ĕr; frō'bĭsh-ĕr*), **Sir Martin (c. 1535-1594),** English navigator, was brought up to the sea. Persuaded that there was a northwest passage to the Indies, he obtained three vessels from the government of Queen Elizabeth in 1576, explored portions of the arctic coast, and, passing through the strait which has since borne his name, returned to England.

He was enabled by the queen to make two more voyages of exploration, in 1577 and 1578. In 1585, he went with Sir Francis Drake to the West Indies. He contributed by his gallantry toward the defeat of the Spanish Armada in 1588 and received the honor of knighthood. In 1590 and 1592, he successfully commanded squadrons against the Spaniards, winning recognition as one of England's great naval heroes in addition to being one of the ablest navigators of his time. Having been sent to the aid of Henry IV of France, he was wounded and died on his homeward voyage.

Froebel (*frû'bĕl*), **Friedrich Wilhelm August (1782-1852),** German educator, founder of the kindergarten system, was born at Oberweissbach, Thuringia. He studied at Jena, Göttingen, and Berlin; served in the German army against the French, 1813–14; and, in 1816, founded a school at Griesheim, which he removed in 1817 to Keilhau, near Rudolstadt. He also founded a kindergarten at Blankenburg in 1837.

His system was based on the principles advocated by Pestalozzi,—under whom he worked from 1807 to 1809,—which combined physical, moral, and intellectual training, beginning with the early years of childhood. Froebel's influence upon modern education, by emphasizing the value of motor-expression and social participation, has been notably effective, particularly in the United States, where it has led to the kindergarten system, the manual training movement, and other radical changes in elementary school methods. His chief works are *The Education of Man* and *Mother's Songs, Games, and Stories*. He died at Marienthal. See *Educational Reformers*.

Frohman, Charles (1860-1915), American theatrical manager, brother of Daniel Frohman, was born at Sandusky, Ohio. He was educated in the public schools of New York; in 1877, took charge of a company playing *Our Boys;* was with Wm. Haverly's minstrels in United States and Europe, 1879–80. In 1888, he saw *Shenandoah* at Boston Museum; organized a company and bought rights to that play, outside of Boston; enjoyed great success with that and succeeding ventures; and, in 1890, organized the

Charles Frohman Stock Company. He became proprietor and manager of the Empire, Criterion, Lyceum, Garrick, Savoy, and Knickerbocker theaters, New York, and the Duke of York's, Comedy, Globe, and Adelphi theaters, London. As manager, he brought out Maude Adams, Julia Marlowe, John Drew, and other prominent actors. In 1905-06, he managed the Shakespearean productions of E. H. Sothern and Julia Marlowe. He was drowned on the *Lusitania*.

Frohman, Daniel (1853-1940), American theatrical manager, brother of Charles Frohman, was born at Sandusky, Ohio. He received a common school education and became office boy of the New York *Tribune*, 1866. He remained in the newspaper business for five years; then appeared as manager of theatrical companies traveling through the United States and later as manager of Fifth Avenue, Madison Square, Lyceum, Daly's theaters, New York. He was also manager of English and American stars and theatrical companies. He wrote *Memories of a Manager*.

Froissart (*frwä'sär'*), **Jean (1338-1410),** French poet and chronicler, was born at Valenciennes. He was educated for the Church, but early devoted himself to poetry, to tales of chivalry, and to travel. In 1361, he went to England to present a poem to Queen Philippa and became secretary to King John. In 1365, he visited the Scottish court and, in 1368, traveled in Italy. About 1370, he entered the service of Duke Wenceslas of Luxemburg. For 10 years, he was devoted to the writing of his famous *Chronicles*. He again traveled for 15 years, after which he revised the *Chronicles*.

The most valuable part of this work is that describing events and wars from 1325 to 1400. While often inaccurate in details, it presents a remarkably faithful picture of the general character and manners of the age. He wrote many verses and a long poem of chivalry, *Meliador*. He is said to have died at Chimay.

Fromentin (*frō'măN'tăN'*), **Eugène (1820-1876),** French painter and author, was born at La Rochelle, France. He was a pupil of Rémond and Cabat; traveled in Algeria, Egypt, and the East in 1846 and 1848; and was made an officer of the Legion of Honor, 1859. He wrote the successful romances *Dominique* and *Les Maîtres d'autrefois*. He became distinguished for his paintings of the Sahara and his portrayals of Arab life. Some of his best pictures are "Crossing the Ford," "Arabs Watering Horses," "Encampment in Atlas Mountains," "The Falcon Hunt," and "An Arab Camp." Many fine examples of his work are in American collections, particularly in the Walters Gallery, Baltimore, and the Metropolitan Museum, New York.

Frontenac (*frŏn'tē-năk; Fr. frôN'tē-näk'*), **Louis de Buade, Comte de (1620-1698),** French Colonial officer, governor of Canada. He served in the French army and, in 1672, was appointed governor of the French possessions in North America. He was recalled after ten years of controversy with the Jesuits, but he had gained the confidence of the settlers and the respect of the Indians; in 1689, when to constant attacks from the Iroquois a war with England was added, he was again made governor. He carried his punitive expeditions to the New England villages, repulsed a British attack on Quebec, and completely broke the power of the Iroquois. He died at Quebec.

Frost, Arthur Burdett (1851-1928), American illustrator and author, was born at Philadelphia, Pa. He worked as an engraver and lithographer, but was mainly self-taught in art. In 1876, he entered the employ of Harper and Brothers, New York, where he was associated with Abbey, Alexander, and Reinhart. Naturalness, fine draftsmanship, and good humor characterize his extensive illustrative work, which included the illustrations for Joel Chandler Harris's *Uncle Remus*. He published *Bull Calf and Other Tales, Golfer's Alphabet, Stuff and Nonsense, Sports and Games in the Open, Book of Drawings*, and *Carlo*.

Frost, Robert Lee (1875-), American poet, was born in San Francisco, and studied at Dartmouth and at Harvard. He engaged in farming at Derry, N. H., 1900–05; taught English at Pinkerton Academy there, 1905–11; and was instructor in psychology at the State Normal School, Plymouth, N. H., 1911–12. He then spent three years in England, during which time he published two volumes of poems,—*A Boy's Will* and *North of Boston*,—which display much poetic ability and won wide recognition. He served as professor of English at Amherst College from 1916 to 1938 with intervals of association with the University of Michigan in 1921–23 and 1925–26 and held positions at Harvard and Yale. He won Pulitzer prizes for poetry several times and was elected to the American Academy of Arts and Letters in 1930. His other publications include *The Lovely Shall Be Choosers, The Lone Striker*, and *From Snow to Snow*.

Froude (*frōōd*), **James Anthony (1818-1894),** English historian was born at Dartington. He was educated at Oriel College, Oxford, and was intended for the Church, but he abandoned this career and a fellowship on account of a change of views explained in his *Nemesis of Faith*. In 1892, he became professor of history at Oxford University.

His chief historical work is *The History of England from the Fall of Wolsey to the Defeat of the Spanish Armada;* he wrote also *The English in Ireland*. In literature, his best-known works are those on the Carlyle family and *Erasmus*. He wrote also a novel—*The Two Chiefs of Dunboy*—and many miscellaneous works, including *Cæsar, Life of Lord Beaconsfield, Life of Carlyle*, and *Oceana*. His accuracy in detail has been greatly criticized, but his brilliant yet lucid style and his power of presenting broad effects secured for his histories great influence and popularity.

Fry, Christopher (1907-), English dramatist, has been a schoolmaster, actor, and director. He has served as director of the Tunbridge Wells Players, the Oxford Repertory Players, and as staff dramatist of the Arts Theater. He is known chiefly for his verse plays, among them *The Lady's Not for Burning* (1948), *Venus Observed* (1950), *A Sleep of Prisoners* (1951), and *The Dark Is Light Enough* (1954). His work has been produced in London, and New York.

Fry, Elizabeth (1780-1845), English philanthropist was born in Norfolk, of Quaker parentage. When she was 18 years old, she heard a sermon in a Friends' meetinghouse that turned her thoughts toward philanthropy. She began working among the poor and founded a school for poor children. She married and later became a preacher among the Friends. In 1813, she first saw the miserable condition of the women in the Newgate Prison, and her attention was turned to prison reform. By her efforts, a school and a manufactory were begun in the prison; an association was formed to improve the prisoners and provide them with religious instruction; and a matron was appointed. Mrs. Fry visited prisons in Great Britain and on the continent, everywhere effecting improved conditions.

Frye, William Pierce (1831-1911), American legislator, was born in Lewiston, Me. He was graduated from Bowdoin College, 1850, and studied and practiced law. He entered the Maine legislature in 1861 and later became attorney general of the state. He was a Republican representative in Congress, 1871-1881, when he was elected United States senator to succeed James G. Blaine, and served with distinction for 30 years. A debater of great power, he urged an expansionist policy and a subsidized merchant marine. At the end of the Spanish-American War, he was a member of the peace commission at Paris and was in large measure responsible for the acquisition of the Philippines by the United States.

Fuertes (*fwär'tās*), **Louis Agassiz (1874-1927),** American painter was born at Ithaca, N. Y. He was graduated at Cornell University in 1897. His most pronounced success was in the painting of birds. Besides illustrating numerous books, he constructed the habitat groups in the American Museum of Natural History, New York, and executed many mural paintings in various public buildings. He was killed in a railroad crossing accident.

Fulbright, James William (1905-), American legislator, was born at Sumner, Mo. After he was graduated from the University of Arkansas in 1925, he went to Oxford University as a Rhodes Scholar, receiving his master's degree there in 1931. Returning to the United States, he studied law at George Washington University, where, after serving as a special attorney with the antitrust division of the Department of Justice, he became an instructor in law. He was a professor of law at the University of Arkansas, 1936-39, and president there 1939-41. In 1942 he was elected to Congress, and in 1944 to the Senate. He was re-elected in 1950 and 1956. He was sponsor of the Fulbright Act of 1946 which made possible the use of funds acquired from the sale of surplus property overseas for scholarships for United States students abroad and for foreign students in the United States. Under the program thus far about 2000 awards have been made to American students.

Fuller, Melville Weston (1833-1910), American jurist, was born in Augusta, Me. He was graduated from Bowdoin College in 1853, and studied at Harvard Law School. Admitted to the bar in 1855, he formed a law partnership at Augusta and became associate editor of *The Age*, a Democratic paper. He went to Chicago in 1856 and practiced law there until 1888, when he was appointed chief justice of the United States Supreme Court, which office he held until his death. He was chancellor of the Smithsonian Institution, was one of the arbitrators to settle the boundary line between Venezuela and British Guiana, Paris, 1899, and was appointed member of the Permanent Court of Arbitration at The Hague.

Fuller, Sarah Margaret (1810-1850), Marchioness Ossoli, American critic and essayist, was born at Cambridgeport, Mass. At 25 she assisted her family by school and private teaching. In Boston she edited *The Dial*, the organ

of the "transcendentalists," with some members of which group she participated in the communist community of Brook Farm colony. Her *Woman in the Nineteenth Century* is the outgrowth of classes in conversation for young women which she conducted as a step in the intellectual emancipation of women. She wrote also *Summer on the Lakes in 1843* and *Papers on Literature and Art*.

In 1847, she married the Marquis Ossoli at Rome. In 1849, during the siege of Rome, she took charge of a hospital. After the capture of the city by the French, she and her husband sailed with their infant for America and all were drowned in the wreck of the vessel off Fire Island, near New York.

Fulton (*fo͝ol'tŭn*), **Robert (1765-1815)**, American inventor and engineer, was born at Little Britain, Pa. He was apprenticed to a jeweler in Philadelphia at an early age, and, in addition to his labors at this trade, he applied himself to painting. The sale of his portraits and landscapes enabled him, in the space of four years, to purchase a small farm, in which he placed his widowed mother. At the age of 22, he went to London, where he studied painting under Benjamin West; but after several years thus spent he abandoned painting and applied himself wholly to mechanics.

In 1794, Fulton obtained from the British government a patent for an inclined plane, the object of which was to set aside the use of canal locks; in the same year, he invented also a mill for sawing and polishing marble. His next invention was a machine for spinning flax, followed by one for making ropes. He became qualified as a civil engineer in 1795, and wrote a work on canals. Accepting an invitation from the United States minister at Paris, he proceeded to that city in 1796 and remained there for seven years, devoting himself to new projects and inventions.

In 1803, Fulton constructed a small steamboat, and his experiments with it on the Seine were attended with great success. He returned in 1806 to New York and pursued his experiments there. In 1807, he launched on the Hudson his steam vessel, the *Clermont*, which made a successful start in the presence of thousands of astonished spectators. From this period, steamers came into general use upon the rivers of the United States. In 1815, he launched the war steamer *Fulton*. He was elected to the American Hall of Fame, 1900.

Funk, Isaac Kaufman (1839-1912), author, publisher, and clergyman, was born at Clifton, Ohio. He was graduated at Wittenberg College, 1861, and from 1867 to 1872 filled various pastorates, the last of which was Saint Matthew's English Lutheran Church, Brooklyn. In 1878, he entered into a partnership with A. W. Wagnalls, and became editor in chief of various periodicals of the Funk and Wagnalls Company. He was editor in chief of the *Standard Dictionary*, chairman of the editorial board that produced the *Jewish Encyclopædia*, and founder-editor of *The Metropolitan Pulpit*, later the *Homiletic Review*. In connection with his house, he founded *The Voice*, 1880, *The Missionary Review*, 1888, and *The Literary Digest*, 1889. He also published numerous works of reference. He wrote *The Next Step in Evolution*, *The Widow's Mite and Other Psychic Phenomena*, and *The Psychic Riddle*.

Funston (*fŭn'stŭn*), **Fred (1865-1917)**, American soldier, was born at New Carlisle, Ohio. He studied in the University of Kansas for two years and in 1890 became a newspaper reporter in Kansas City. In 1891, he was botanist in the United States Death Valley Expedition. In 1893, he was appointed commissioner for the Department of Agriculture to explore Alaska and to report on its flora. In carrying out this work, he crossed Alaska to the Arctic Ocean, traveled from the Mackenzie River to Bering Sea, 3500 miles, camped on the Klondike in winter of 1893-94, and floated down the Yukon, alone, in a canoe. In 1896-97, he was an officer in the insurgent army in Cuba.

At the beginning of the Spanish-American War, in 1898, he went as colonel to the Philippines, took part in several battles, and, for signal bravery at Calumpit, was promoted to brigadier general of United States volunteers and awarded a medal by Congress, 1899. He organized and commanded the expedition which resulted in the capture of Aguinaldo, head of the Filipino insurrection, and was appointed brigadier general of United States army, 1901. During 1905-07, he commanded the department of California, with headquarters at San Francisco, and performed valuable services for the city at the time of the earthquake-fire, 1906. In 1914, he commanded the military occupation of Vera Cruz, Mexico, and was promoted major general. In 1916, he was placed in chief command of the United States forces mobilized on the Mexican border. He died at San Antonio, Texas.

Furness (*fûr'nĕs*), **Horace Howard (1833-1912)**, American Shakespearean scholar, was born in Philadelphia, Pa. He was graduated from Harvard, 1854, and from the University of Halle, Germany, 1856. He studied law in Philadelphia and was admitted to the bar in 1859. He began publishing in 1871 the so-called Variorum edition of Shakespeare's plays, which brought together and summarized the results of the best Shakespearean scholarship in all languages. He completed 15 plays, and his son and namesake continued the work. Five universities honored him with degrees and, in 1905, he was elected member of the American Academy of Arts and Letters.

Furnivall (*fûr'nĭ-văl*), **Frederick James (1825-1910)**, English philologist, was born at Egham, Surrey. He was educated at University College, London, and at Trinity Hall, Cambridge. He also prepared for the law and was called to the bar. In early life he associated himself with the Christian Socialist movement and was one of the founders of the Workingmen's College, in which he taught every term for ten years. He devoted himself to English philology and founded the Early English Text Society in 1864, the Chaucer Society in 1868, the Ballad Society in 1868, and the New Shakespeare Society in 1874. He was active in starting the Browning Society, 1881, the Wycliffe Society, 1882, and the Shelley Society, 1885. He personally edited many works, chiefly in connection with the foregoing societies. He was one of the original promoters of the Oxford *New English Dictionary* and was for a time its chief editor. His best works are his "six-text" edition of Chaucer's *Canterbury Tales*, and the *Century Shakespeare*.

Furtwängler, Wilhelm (1886-1955), German conductor, son of archaeology professor Adolf Furtwängler, received his education at Munich. Except for two years as guest conductor of the New York Philharmonic Orchestra he was occupied with musical activities in Germany and Austria. He was well known for his work as conductor of operas at Breslau, Munich, Strassburg, Bayreuth, and Berlin, and of symphony orchestras at Frankfort, Leipzig, Vienna, and Berlin. After World War II his musical leadership was somewhat hampered by discussion of the extent of his sympathy and collaboration with the Nazi regime.

Fust (*fo͝ost*) or **Faust** (*foust*), **Johann (?-c. 1466)**, German printer, a citizen of Mainz, Germany, who was associated with Gutenberg in the introduction of printing. He probably had nothing to do with the invention of printing, but furnished the capital to introduce the new art. In 1455, he sued Gutenberg for money he had advanced. Upon nonpayment, it is claimed by some that Fust seized enough of the apparatus to satisfy the mortgage and continued the business of printing with his son-in-law, Peter Schöffer. There is, however, no direct evidence of such seizure. A Latin Bible in the Mazarin Library is the best-known book printed by Gutenberg and Fust. The best-known publication of Fust and Schöffer is a *Psalter*, 1457, the first book published with a complete date. Fust died at Paris.

Gade (*gä'dĕ*), **Niels Wilhelm (1817-1890)**, Danish composer, was born at Copenhagen. He was court organist at Copenhagen and wrote several symphonies, overtures, and cantatas, as well as many choral and solo productions. His overture *Ossian* has received high praise, as have also his musical sketches *Aquarellen* and *Volkstänze*. His cantatas *The Crusaders*, *Comala*, *Psyche*, and *The Message of Spring* gave him a wide reputation. While greatly influenced by Mendelssohn, with whom he spent five years at Leipzig, his works show much originality and he is regarded as one of the founders of the Scandinavian school of music.

Gadsden (*găd'dĕn*), **Christopher (1724-1805)**, American patriot, was born in Charleston, S. C. He was a member of the first Continental Congress, 1774; became brigadier general during the Revolution; and was lieutenant governor of South Carolina at the time of the surrender of Charleston to Sir Henry Clinton in 1780.

Gage, Thomas (1721-1787), English general and the last royal governor of Massachusetts. In 1763, he was made commander in chief of the British forces in America. His inflexible character led the British government to regard him as well fitted to end the disturbances in the American colonies. In 1774, he was nominated governor of Massachusetts, a post of peculiar difficulties.

In April 1775, he dispatched an expedition to seize a quantity of arms which had been stored at Concord. On the way thither, the detachment came upon a number of militia drilling and attacked them because of their refusal to lay down arms. This encounter, known as the battle of Lexington, was the signal for a general uprising throughout the colonies. On June 17, the battle of Bunker Hill was fought, which resulted in a dearly bought victory for the English; but, numerous complaints being lodged against Gage, he was recalled by the British government in October 1775.

Gaillard, David Du Bose (1859-1913), American engineer, was born in Sumter County, S. C. He was graduated from West Point in 1884; served on the boundary commission of the United States and Mexico, 1891-94; and became colonel of volunteer engineers during the Spanish-American War. In 1907, he was made member of the Isthmian

Canal Commission and engaged in dredging harbors and constructing breakwaters. In 1908, he was appointed engineer of the Gatun-Pedro Miguel division of the Panama Canal, where he demonstrated notable efficiency. After his death, the celebrated Culebra Cut was renamed Gaillard Cut by order of President Wilson in recognition of Gaillard's eminent services.

Gainsborough (*gānz'b'rō*), **Thomas (1727-1788),** English portrait and landscape painter, was born at Sudbury, Suffolk. He early displayed a decided talent for painting and began life as a portrait painter, producing during his successful career more than 200 portraits. These are distinguished by great nobility and refinement, and several rank among the greatest masterpieces of English portrait painting. His later genius found adequate expression in the delineation of the rich and quiet scenery of his native country, and to this he mainly devoted himself after settling in London in 1774. Among his finest productions are "The Shepherd's Boy," "The Fight Between Little Boys and Dogs," "The Sea-Shore," "The Woodman in a Storm," and "Duchess of Devonshire." The most celebrated of his pictures is "The Blue Boy," which is now in the Huntington Art Collection at San Marino, California.

Gaitskell, Hugh (1906-), English Labor party statesman, was born to a family long associated with the Indian Civil Service. He was educated at Winchester and at New College, Oxford, where he gave evidence of his proletarian sympathies by working for labor in the General Strike of 1926. Gaitskell went on to become head of the department of political economy in University College, London. There he helped evolve a moderate form of socialism that shunned revolution. Gaitskell entered the Labor government in 1940. He was successively Minister of Fuel and Power, Minister of State for Economic Affairs, and finally Chancellor of the Exchequer (1950-1951).

Since the ouster of the Labor government, Gaitskell has played a leading part in the tempestuous battle that has been waged within the Labor party between a radical wing led by Aneurin Bevan and the moderates led by Gaitskell, who seems to have prevailed. He has been a member of Parliament from Leeds since 1945.

Gaius (*gā'yŭs*), or **Caius,** Roman jurist, flourished in the 2d century of the Christian era. He is the author of numerous legal works, of which the *Institutes* is the most important. This is supposed to have been the first instance of a popular manual of Roman law in the sense of modern elementary textbooks. It was incorporated almost bodily into the the celebrated *Institutes* of Justinian. The work was long lost, but a large part of it was recovered in 1816-17 from a much defaced palimpsest found by Niebuhr in the Cathedral Library at Verona.

Galdós, Benito Pérez. See *Pérez Galdós, Benito.*

Galen (*gā'lĕn*), or **Claudius Galenus (130 A. D.-c. 201),** Greek physician, was born at Pergamum, in Mysia. He studied medicine first at Pergamum and afterward at Smyrna, Corinth, and Alexandria. He returned to his native city in his 29th year and was at once appointed physician to the School of Gladiators. In his 34th year, he went to Rome, where, in four years, he gained such a reputation that he was offered, but declined, the post of physician to the emperor. After a brief sojourn in his native country, he returned to Italy, where the sons of Marcus Aurelius were intrusted to his care.

His voluminous writings, believed to comprise nearly 500 treatises, covered the entire field of ancient medicine. Of these over 80 are still extant. His anatomical and physiological writings are the most important and indicate some knowledge of dissection. In diagnosis, he was the first to place great stress on the pulse, on which subject he was long considered an authority. In materia medica, he was inferior to Dioscorides, but his works dominated Greek, Roman, and Arabic medical practice for many centuries.

Galileo (*găl'ĭ-lē'ō;* It. *gä'lē-lā'ō*) **Galilei (1564-1642),** Italian physicist and astronomer, was born at Pisa, Italy. When a young boy he exhibited a genius in mechanical construction and a fondness for the classics, music, and painting. In 1581, he was sent to the University of Pisa. He first directed his attention to medical studies and to the prevailing Aristotelian philosophy, the dogmas of which he soon ventured to challenge.

At the age of 18, Galileo made one of his most important discoveries, the law of the vibration of the pendulum, which he subsequently utilized in constructing a clock for astronomical purposes. From 1586, he appears to have abandoned medicine and to have concentrated his attention upon mathematical sciences. He studied Euclid and Archimedes, and the first fruit of his geometrical investigations was the invention of a hydrostatic balance.

Life at Pisa and Padua. The years 1589-92 Galileo spent as lecturer and professor of mathematics at the University of Pisa. About this period, he turned his attention to the then very imperfectly comprehended laws of bodies in motion. In opposition to all received systems, he propounded the novel theorem that all falling bodies, great or small, descend with equal velocities. This soon led him to the discovery of "the three laws of motion" and the law regulating the motion of falling bodies. Enmity arising from disputes with his colleagues made him gladly accept, in 1592, the professorship of mathematics at Padua. There, under the shelter of the Venetian Republic, he spent the following 18 years and did most of his constructive work.

Galileo dwelt upon the importance of measuring all natural forces so as to bring them within the range of geometry and thus adapt them to the service of man. Among his notable discoveries were a thermometer, a proportional compass or sector, and a refracting telescope. He completed the last-named instrument in 1609 and soon discovered Jupiter's four moons, the irregular surface of our own satellite, the phases of Saturn, and the solar spots. These discoveries were made known in 1610 through his work entitled *Sidereal Messenger.*

Persecution. Galileo left Padua for Florence in 1610. The next year, he visited Rome, where he freely advocated the Copernican conception of the universe. Early in 1616, the propositions of the sun's fixity and the earth's diurnal motion were condemned by the Church authorities; the work of Copernicus, published 70 years before, was placed in the list of prohibited books; and a promise was extorted from Galileo not to defend the Copernican theory. Galileo remained silent for seven years, but he went to Rome in 1624 and strove though unsuccessfully, to get the edicts reversed. He still persisted in writing his celebrated *Dialogue on the Two Chief Systems,* which was printed in 1632. The author was summoned to Rome, and, on June 22, 1633, he was forced to read and sign a formal abjuration of his belief in the Copernican Doctrine. A tradition arose later to the effect that, on this occasion, after publicly declaring that the earth was stationary, he whispered to one of his friends, as he rose from his knees, *E pur si muove,* "It does move, though."

Galileo was sentenced to an indefinite imprisonment, but he finally obtained permission to return under surveillance to his villa at Arcetri near Florence. His strenuous activity continued, and his greatest book, the *Dialogues on the Two New Sciences,* was completed at this time and was published in 1638 in the Netherlands. In the course of 1636-37, he became blind. The strictness of his confinement was then relaxed, and he was allowed to receive his friends. He was visited by many distinguished foreigners, among them Milton. During this period, he co-operated with Torricelli in the investigation of the nature of percussion.

Greatest Achievements. The inventions due to his acute industry, his use of the telescope, the brilliant discoveries to which it led, and his patient investigation of the laws of weight and motion must all be looked upon as forming but a part of Galileo's real merits. He claimed, and helped to establish, the right of exercising one's faculties in examining the universe which surrounds us. See *Pendulum, Telescope.*

Gall (*gôl;* Ger., *găl*), **Franz Joseph (1758-1828),** German physician, founder of phrenology, was born at Tiefenbronn, Baden. He studied medicine at Strasbourg and established himself as a physician in Vienna, where, for many years, he carried on a series of elaborate investigations on the nature of the brain and its relation to the outer cranium. He held that each faculty of the mind has a definite seat in the brain and that the contour of the skull affords an index of the relative developments of the faculties. In 1796, he gave publicity to his views in a series of lectures in Vienna, which were, however, condemned as subversive of morality and religion. Being joined by Spurzheim, who adopted his theories, he undertook, in 1805, a lecturing tour through a large part of Europe and, in 1807, settled at Paris, where he published his phrenological work, *Fonctions du cerveau.* His chief work, however, is his *Anatomy and Physiology of the Nervous System.*

Gallait (*gà'lā'*), **Louis (1810-1887),** Belgian historical painter, was born at Tournai. He became famous for pictures on subjects from the history of the Netherlands, such as "The Abdication of Charles V," "Last Honors to Egmont and Horn," "The Plague at Tournai," and "Last Moments of Egmont." Other works of his include "Tasso in Prison" and "The Temptation of Saint Anthony." Gallait represented the new art tendencies of his time in Belgium and exercised a great influence on painting in his native country.

Galland (*gà'läN'*), **Antoine (1646-1715),** French Orientalist, was born at Rollot in Picardy. Attached to the French embassy at Istanbul in 1670, he traveled in Syria and the Levant, and made two subsequent journeys. In 1709, he became professor of Arabic in the Collège de France. He wrote on archeology, Eastern proverbs, and Indian fables, but is best known for his translation of the *Arabian Nights,* the first ever made into a European lan-

guage, which was published in 12 volumes, 1704–17. He died at Paris.

Gallatin (*găl'ə-tĭn*), **Albert (1761-1849)**, American financier and statesman, was born at Geneva, Switzerland. He was graduated from Geneva in 1779; came to the United States in 1780; taught French at Harvard; bought land in Virginia and Pennsylvania; and entered political life in 1789. In 1793, he was elected to the United States Senate, but was not permitted to retain his seat on the ground of ineligibility under the Constitution. In 1795, he entered Congress from Pennsylvania and, in 1801–13, was secretary of the treasury. He took an important part in the peace negotiations with England in 1814 and signed the Treaty of Ghent. In 1816–23, he was United States minister at Paris and in 1826 at London. From 1827, he devoted his time to historical and ethnological researches, writing on finance, politics, and the Indian tribes. He was one of the founders and the first president of the Ethnological Society of America. He died at Astoria, N. Y.

Gallaudet (*găl'ô-dĕt'*), **Edward Miner (1837-1917)**, American educator, was born at Hartford, Conn., a son of T. H. Gallaudet; was graduated from Trinity College, 1856; taught in his father's institution for deaf mutes, Hartford, 1856-57; and organized, 1857, the Columbia Institution for the Deaf, Dumb, and Blind, at Washington. He developed from it the Gallaudet College for the deaf, of which he became the first president, serving from 1864 to 1911. His writings include *Popular Manual of International Law* and *Life of Thomas Hopkins Gallaudet*.

Gallaudet, Thomas Hopkins (1787-1851), American educator of the deaf and dumb, was born in Philadelphia, Pa. He was educated at Yale College and Andover Theological Seminary, and, in 1814, was licensed to preach. He then studied the systems of deaf-mute instruction in London, Edinburgh, and Paris and, on his return to America in 1817, founded and became superintendent of the American Asylum for Deaf Mutes at Hartford. He held the office of president of the institution, 1817–30. In 1832–33, he was professor of education in New York University—the first American professorship of education.

Galle (*găl'ə*), **Johann Gottfried (1812-1910)**, German astronomer, was born in Prussian Saxony. He studied at Berlin, 1830–33; became director of the Berlin Observatory; and shares with Leverrier the honor of discovering the planet Neptune, 1846. He afterward became professor of astronomy at Breslau. He published several works on astronomy and climatology.

Galli-Curci (*gäl'lē-kōōr'chē*), **Amelita (1889-)**, coloratura soprano of Italian-Spanish parentage, was born at Milan, Italy. She was educated at the Liceo Alessandro Manzoni and the International Institute of Languages, from which she was graduated with first honors as a linguist. She studied music at the Milan Conservatory, graduating as a pianist. As Gilda in *Rigoletto* she made her operatic debut in Rome, 1910, and thereafter sang in leading theaters in Europe, and also in South America with Caruso and Titta Ruffo. Her first appearance in the United States, at Chicago in 1916, was a sensational success, and her subsequent engagements with the Metropolitan Opera Company sustained her fame. Her voice, cultivated largely without instruction, is of surpassing quality and remarkably even register. Her repertoire includes such operatic roles as Lucia, Rosina, Violetta, and Juliette, and an immense range of concert music.

Gallieni (*gä'lyä'nē'*), **Joseph Simon (1849-1916)**, French soldier and military writer, was born at Saint Beat, Haute Garonne. He was graduated from the Military School, Saint Cyr, in 1870; served in the Franco-Prussian War, 1870-71; and, in 1878, went to Senegambia as captain. He was a colonial administrator from 1883 until 1905, when he returned to France and became military governor of Lyons.

As military governor of Paris in September 1914, he rushed 80,000 reserve troops in motor cars to the relief of General Manoury, thereby enabling him to drive von Kluck's attacking army back upon the Marne. Gallieni was gratefully acclaimed the "savior of Paris." In 1915, he became minister of war and, in 1916, assumed direction of the department of aviation.

Gallup, George Horace (1901-), American statistician of public opinion, was born at Jefferson, Iowa. Educated at the University of Iowa, he taught journalism and advertising at Drake University, 1929–31, and Northwestern University, 1931–32. He then joined an advertising agency in New York as director of research. He specialized in measuring the effect of advertising by interviews with persons selected by a scientific sampling method. In 1935, he organized the American Institute of Public Opinion to apply this method for discovering the state of opinion on public questions, the results being syndicated to newspapers. When applied to the presidential election of 1936, the method predicted results in the states with an average error of 6 per cent of the vote for major candidates. In the 1940 elections, this error was reduced to a little over 2 per cent, but in 1948 was wide of the mark. The method was applied also in Great Britain.

Galsworthy (*gôlz'wûr-thĭ*), **John (1867-1933)**, English dramatist and novelist, was born at Coombe, Surrey. He attended Harrow and then went to Oxford, where he was graduated in 1889. He planned at first to practice law, but disliked the profession and gave it up for travel in various parts of the world. Later he became interested in writing. He published the novel *Jocelyn* in 1898. It was followed by *The Country House*, *The Man of Property*, *The Dark Flower*, *Beyond*, *The Freelands*, *The Forsyte Saga*, and other novels, which stand in the front rank of recent literary achievements. In 1906, he produced his first play, *The Silver Box*, which was followed by essays, stories, novels, plays, and poems.

Galsworthy is one of the most sincere and straightforward of modern writers—clear, simple, direct, and unerring in conveying the meaning he desires to impress. The list of his plays includes *Joy*, *Strife*, *Justice*, *The Pigeon*, *The Eldest Son*, *The Mob*, *A Family Man*, *Loyalties*, and *Exiled*. He received the Nobel prize for literature in 1932. See *Strife*.

Galton (*gôl'tŭn*), **Sir Francis (1822-1911)**, English scientist and traveler, cousin of Charles Darwin, was born near Birmingham. He studied medicine and was graduated at Trinity College, Cambridge, 1844. In 1846, he traveled through North Africa and on the White Nile; in 1850–52, assisted in exploring Damaraland in South West Africa; and afterward entered the British civil service in the Board of Trade. He turned his attention to meteorology and in his *Meteorographica*, 1863, laid the basis of the now widely known weather maps.

Galton's most important contributions to knowledge were in the field of anthropology and heredity, in which he established the foundation for the science of eugenics. His works include *Narrative of an Explorer in Tropical South Africa*, *Art of Travel*, *Hereditary Genius*, *Human Faculty*, *Natural Inheritance*, *Finger Prints*, *Essays on Eugenics*, and numerous memoirs. He was knighted in 1909.

Galvani (*găl-vä'nē*), **Luigi (1737-1798)**, Italian physician and physicist from whom "galvanism" derived its name, was born in Bologna. He was educated for the profession of medicine and, in 1762, was appointed lecturer on anatomy in the University of Bologna, in which city he practiced. While holding this lectureship, he made the discoveries, partly by means of experiments on the muscles of frogs, 1786, which he published in 1791 in his treatise entitled *De Viribus Electricitatis in Motu Musculari Commentarius*. The now fully established doctrine of animal electricity owes its origin to his patient and laborious investigations.

Gama (*gä'mä*), **Vasco da (c. 1460-1524)**, Portuguese navigator, was born at Sines in Alemtejo. He early distinguished himself as an intrepid mariner and was selected by King Emanuel to discover the route to India around southern Africa. His expedition of four vessels with 168 men left Lisbon in July 1497, but was four months in reaching Saint Helena. After rounding the Cape of Good Hope, despite hurricanes and mutinies, he made Melinde early in the following year. Here he found a skillful Indian pilot, crossed the Indian Ocean, and arrived at Calicut in May 1498. The ruler of Calicut soon became actively hostile, and Da Gama had to fight his way out of the harbor. In September 1499, he arrived at Lisbon and was ennobled.

Emanuel immediately dispatched a fresh squadron of 13 ships under Cabral, who founded a factory at Calicut. But the Portuguese who had been left there were murdered, and, to avenge them, the king fitted out a squadron of 20 ships under Da Gama, 1502. The latter founded the colonies of Mozambique and Sofala, bombarded Calicut, and, late in 1503, reached the Tagus with 13 richly laden vessels. Twenty years later, Da Gama was again sent to India, but died soon after his arrival.

Gambetta (*găm-bĕt'ä*), **Léon (1838-1882)**, French statesman, was born at Cahors, France. He studied law and rose to prominence through his able defense of political offenders prosecuted by supporters of the Second Empire.

In the Franco-Prussian War, after the investment of Paris, Gambetta escaped from the city by balloon and, as minister of war, exerted himself to the utmost to effect the relief of the capital. He showed himself a violent partisan of Republicanism in the civil strife following the war and later as a political leader in the Assembly. He became premier in 1881, but his radical anticlerical program occasioned his defeat a few months later.

Gandhi, Mohandas Karamchand (1869-1948), Indian political leader, was born at Porbandar, Western India, the son of a statesman. He went to England in 1881 and was called to the bar there. After practicing in India for 18 months, he went to South Africa in 1893, where he led a campaign of "passive resistance" against various

government enactments aimed at Asiatics. He returned to India in 1914.

Partly under the influence of Tolstóy's writings, Gandhi devoted himself, in 1918, to uniting the Mohammedan and Hindu elements of India in a "non-co-operation" movement directed against British rule. He acquired enormous influence as a saint with the masses of India, and was alternately imprisoned and negotiated with by the British government. Under the home-rule constitution of 1937, he abandoned non-co-operation.

He favored at first a return to a primitive form of economy, with the spinning wheel replacing the textile factory. Later he took up the cause of the "untouchables." He opposed the war measures of the British government in World War II. When the British withdrew from India he made earnest efforts, even endangering his life by fasting, to end the communal rioting between Hindus and Moslems. On January 30, 1948, he was murdered by a Hindu fanatic.

Gannett (*găn'ĕt*), **Henry (1846-1914)**, American geographer, was born at Bath, Maine. He was graduated from Harvard, 1869, and from Hooper Mining School, 1870. After serving as an assistant in Harvard Observatory, 1870-71, he was made topographer for the Hayden Survey. In 1882, he was appointed chief geographer and statistician of the United States Geological Survey, where he served with distinction for 30 years. Among his valuable published works are *Gazetteer of Cuba*, *Building of a Nation*, and *Contour Map of United States*.

Gannon, Robert Ignatius (1893-), American educator, was born in New York City. He was educated at Georgetown University and Woodstock College, with graduate study at Gregorian and Cambridge universities. He taught at Fordham University. In 1930 he founded St. Peter's College in Jersey City, and was its dean until 1936. He organized also, in 1932, the Hudson College of Commerce and Finance. From 1935 to 1949 he was president of Fordham University. He wrote *The Technique of The One-Act Play* and *After Black Coffee*.

Garbo, Greta (1906-), Swedish film actress, was born at Stockholm. After training at the Royal Dramatic Academy in Stockholm, she played in *Goesta Boerling*. Her acting attracted the attention of American producers, partly by reason of her beauty and partly for the range and depth of her expression. Coming to America, she took the leading role in many highly successful film dramas. Outside of her professional life, she sedulously avoided publicity. The more successful plays in which she starred include *The Temptress*, *The Flesh and the Devil*, *Mata Hari*, *Grand Hotel*, *Queen Christina*, and *The Painted Veil*.

García (*gär-thē'ä*), **Manuel (1805-1906)**, singing teacher, son of Manuel del Pópolo García, was born in Madrid, Spain. He studied singing under his father and successfully appeared on the stage, but his voice was not remarkable. In 1829, he settled in Paris to devote himself to teaching and to the scientific investigation of the voice. In 1840, he presented to the French Academy a *Treatise on the Human Voice*, and in 1847, he wrote his valuable *Traité complet de chant*. In 1855, he won wide recognition by his invention of the laryngoscope. In 1850, he became professor of singing at the Royal Academy of Music in London, where he continued to teach until 1895, after which he gave private instruction until his death.

García, Manuel del Pópolo Vicente (1775-1832), Spanish tenor and singing master, was born at Seville. He manifested great talent at an early age, winning distinction at 17 years of age as a singer, composer, and conductor. After establishing his reputation in Cadiz and Madrid, he went to Paris in 1808, where he won marked success in Italian opera. A tour of Italy in 1811 increased his reputation. Subsequently he studied five years in Spain, returning to Paris in 1816 and proceeding to London in 1817, where he was enthusiastically received. He then toured England, South America, Mexico, and the United States, with unqualified success.

He published numerous compositions, including many operas, but his enduring fame rests upon his sterling work as a teacher of singing, his well tested theories forming the basis of the best present-day teaching.

Garcilaso de la Vega (*gär'thē-lä'sō dā lä vä'gä*). See *Vega, Garcilaso de la*.

Garden, Mary (1877-), American operatic soprano, was born at Aberdeen, Scotland. At the age of six, she came to America with her parents, who located in Chicago in 1888. In 1893, she began instruction for the voice and, in 1896, went to Paris, where she studied under Trabadello, Chevallier, and Fugère. She made her debut at the Paris Opéra Comique in 1900 in Charpentier's *Louise*. Her success was immediate, and, in 1902, she was selected for the title role of *Mélisande* in Debussy's opera.

From her first appearance in the United States in *Thaïs* at the Manhattan Opera House in 1907, she was extremely popular and won success for impersonations of Marguerite, Grisélidis, Mélisande, Salome, Thaïs, Sappho, and Louise. While her repertoire was confined almost exclusively to modern French opera, she showed herself a dramatic singer of power and distinction, excelling in spontaneity, artistic detail, and striking delineation. She was general director of the Chicago Opera Association, 1921-22.

Gardner, Erle Stanley (1889-), American detective-story writer and lawyer, was born at Malden, Mass., but has lived most of his life in California, where he has been a member of the bar since 1911. His legal background has supplied him with material for many stories. One of his leading characters is Perry Mason, lawyer and detective. Following the publication of *The Case of the Velvet Claws* in 1932 and *The Case of the Sulky Girl* in 1933, Gardner has devoted all his time to writing, producing over eighty mystery stories under his own name or under one of his pseudonyms. His better-known works include *The Case of the Stuttering Bishop*, *The Case of the Dangerous Dowager*, *The D. A. Calls It Murder*, and *The Case of the Borrowed Brunette*. He also has been a contributor to many popular magazines.

Garfield, Harry Augustus (1863-1942), American educator, was born at Hiram, Ohio, the son of James Abram Garfield. He was graduated at Williams College, 1885, and studied law at Columbia; at Oxford, England; and at Inns of Court, London. He practiced law in Cleveland, 1888-1903, in which period he organized and became president of the Cleveland Municipal Association. He was professor of politics at Princeton University, 1903-08, and became president of Williams College in the latter year, serving until 1934. He was fuel administrator for the United States during World War I, 1917-19.

Garfield, James Abram (1831-1881), 20th president of the United States, was born in Orange, Ohio. He was left fatherless when two years of age and his early schooling was frequently interrupted by periods of labor necessary for earning the means of support and of education. He finally succeeded in being graduated with high honors from Williams College in 1856. He taught for a period, studying law in the meantime, and was admitted to the bar in 1861.

His political career began in 1859, when he was elected as a Republican to the state senate. During the Civil War, he rose from the rank of colonel of volunteers in 1861 to be major general in 1863, resigning at the end of that year to occupy the seat in Congress to which he had been elected. There he supported the draft law and, in the years following the war, he took a strong stand against inflation of the currency and in favor of severe measures toward the Confederacy. In 1880, he became a member of the United States Senate and, later the same year, was elected president of the United States. After holding office a few months, he was shot in Washington by the assassin Guiteau, whose vanity had been offended by the refusal of an office. Garfield died three months later, Sept. 19, 1881, and was buried at Cleveland, where his tomb is marked by a memorial erected in 1890 at a cost of about $225,000.

Garibaldi (*gä'rē-bäl'dē*), **Giuseppe (1807-1882)**, Italian patriot, was born at Nice, France, and began life as a sailor. He associated himself enthusiastically with Mazzini for the liberation of his country, but, being convicted of conspiracy, fled to South America, where, both as a privateer and as a soldier, he gave his services to the young republics there struggling for life.

Returning to Europe, he took part in the defense of Rome against France, but, being defeated, fled to New York, to return to the Isle of Caprera, biding his time. He joined the Piedmontese against Austria and, in 1860, set himself to assist in the overthrow of the kingdom of Naples and in the union of Italy under Victor Emmanuel. Landing in Calabria, he entered Naples and drove the royal forces before him without striking a blow. In 1870-71, he commanded a French force in the Franco-Prussian War. He died at Caprera.

Garland, Hamlin (1860-1940), American novelist and poet, was born at West Salem, Wis. After attending the common schools, he went to Cedar Valley Seminary, Osage, Iowa, and later worked on farms and taught school until 1884, when he settled in Boston and devoted himself to literary work for nine years. He then returned to the Middle West. In 1890, his first volume of fiction, *Main-Traveled Roads*, written in frankly realistic style, attracted wide notice. Besides a collection of verse entitled *Prairie Songs*, his books include *Wayside Courtships*, *The Trail of the Gold Seekers*, *The Eagle's Heart*, *Her Mountain Lover*, and *Forty Years of Psychic Research*. His *Son of the Middle Border*, autobiographical in character, is also an important document of the social and political life of the Middle West. He was elected to the American Academy of Arts and Letters in 1918. See *Yarpe*.

Garner, John Nance (1869-), American politician, was born in Red River County, Tex. He had limited school advantages, but studied law and was admitted to the bar in 1890. Entering politics as a Democrat, he served in the Texas House of Representatives from 1898 to 1902 and as

United States Congressman from 1903 until 1933. He was elected Speaker of the House in 1931. In 1932 he was elected vice president of the United States and was reelected in 1936. An able parliamentarian, he was an effective helmsman of most New Deal legislation, but a coolness developed between him and President Roosevelt in 1937, and he was not nominated with Roosevelt for a third term in 1940.

Garnier (*gär'nyā'*), **Jean Louis Charles (1825-1898)**, French architect, was born at Paris. He studied at the School of Fine Arts; in 1848, won the *prix de Rome;* and, after considerable travel in Italy and Greece, set up as an architect in Paris. In 1861, he competed for the design of the new Grand Opera House in Paris. His design was accepted, and in 1875, he completed the building, now world-famous for its ornamental facade, magnificent staircase, and foyer. He also built the conservatory at Nice and the casino at Monte Carlo, and designed the tombs of Bizet, Offenbach, and Victor Masse. Garnier's work has exercised a great influence upon monumental architecture in France and in other countries.

Garrick, David (1717-1779), English actor and theatrical manager was born in Hereford. He went to London with Dr. Samuel Johnson in 1736 to study law, but his instincts urged him to the stage. He made his first appearance under the name of Lyddal, at Ipswich, in 1741, and afterward played *Richard III*, his success in which enabled him to get an engagement at Drury Lane. In 1742, he went to Dublin; in 1747, he became joint manager of Drury Lane; and two years later, married Mademoiselle Violette. He acted at Drury Lane until 1776, when he retired and sold his share in the concern.

Garrick ranks as the greatest of English actors, his versatile genius enabling him to impersonate with great naturalness and power the whole range of characters from high tragedy to farce. He was buried beneath the Shakespeare monument in Westminster Abbey.

Garrison, William Lloyd (1805-1879), American abolitionist, was born at Newburyport, Mass. As a young man, he was engaged chiefly in newspaper work and soon made himself obnoxious to the then ruling powers by the boldness of his denunciation of slavery. In 1829, while editing *The Genius of Universal Emancipation*, which was published at Baltimore, his articles on this subject led to his being convicted and imprisoned for libel. He was released from prison on the payment of his fine by a friend, and thereupon commenced his career as an antislavery lecturer, which he continued until such agitation was no longer necessary.

In 1831, Garrison founded the *Liberator*, which he published at Boston for 35 years. His whole course met with the most malignant opposition. His life was frequently threatened, and more than once he was assaulted and roughly treated; but he lived to see slavery abolished. He made several visits to England on antislavery missions. On the abolition of slavery in 1865, he was presented by his friends in the United States with the sum of $30,000. He spent his last years in journalistic and reform work. See *Abolitionists*.

Gary, Elbert Henry (1846-1927), lawyer and financier, was born at Wheaton, Ill. He was educated at Wheaton College and Chicago University, and was admitted to the bar, 1867. He was chosen first mayor of Wheaton, and was elected county judge. After practicing law in Chicago 25 years, chiefly as counsel for railroad and manufacturing corporations, he retired to become president of the Federal Steel Company, 1898. He was actively identified with the organization of the United States Steel Corporation and, as a responsible official, was prominent before the public during the government prosecution of the Steel Corporation. He later became chairman of its board of directors and of its finance committee. The city of Gary, Ind., which contains one of the largest steel producing plants in the world, was named for him.

Gaskell, Elizabeth Cleghorn Stevenson (1810-1865), English novelist, was born at Chelsea. She married, in 1832, William Gaskell, a Unitarian minister in Manchester. Here she studied the lives of working men and women. In 1848, she published anonymously *Mary Barton*. It was followed by *Moorland Cottage; Cranford*, the most popular of her works; *Ruth; North and South; Sylvia's Lovers; Wives and Daughters;* and other stories. Besides her novels she wrote *The Life of Charlotte Brontë*, a masterpiece of English biography.

Gassendi (*gȧ'sȧN'dē'*), or **Gassend, Pierre (1592-1655)**, French philosopher and mathematician, was born at Champtercier in Provence. He studied and taught at Aix, but revolted from the scholastic philosophy and applied himself to physics and astronomy. In 1623, he was appointed provost of Digne Cathedral and, in 1645, became professor of mathematics in the Collège Royale at Paris.

He attacked Aristotelian philosophy, revived the doctrines of Epicurus, and controverted the new philosophy of Descartes with such vigor that French savants became divided into two groups, Cartesians and Gassendists. Kepler and Galileo were among his friends, and he was the personal instructor of Molière. He wrote extensively on Epicurus; gave, in his *Institutio Astronomica*, a clear view of the science in his day; and published lives of Tycho Brahe, Copernicus, and Regiomontanus. His chief philosophical work is *Syntagma Philosophicum*, dealing with logic, physics, and ethics.

Gasser, Herbert Spencer (1888-), was born at Platteville, Wis. He studied at Wisconsin and Johns Hopkins universities and taught at Washington University and Cornell Medical College. In 1935 he became director of the Rockefeller Institute for Medical Reasearch. In 1944, he was awarded one-half the Nobel prize in physiology and medicine for researches on the differentiated functions of single nerve fibers.

Gaston de Foix. See *Foix, Gaston de*.

Gates, Horatio (1728-1806), American general, was born in England. Sent to America in 1755 as a captain of infantry, he served under General Braddock. On the peace of 1763, he purchased an estate in Virginia, where he resided until the Revolutionary War.

In 1775, he was made adjutant general in the Colonial army. In 1777, he superseded Schuyler in the command of the army of the North and soon compelled the entire British army to surrender at Saratoga. This brilliant success gained for him a great military reputation, and his considerate conduct toward his compatriots won for him the esteem of even his enemies. In 1780, he was called by Congress to the command of the army of the South, but in the unfortunate defeat at Camden he lost the laurels he had already won. He then retired to Virginia until 1790, when he emancipated all his slaves and settled in New York,

Gatling, Richard Jordan (1818-1903), American inventor, was born in Hertford County, N. C. While a boy, he assisted his father in the invention of a machine for sowing cottonseed. Subsequently he invented a machine for sowing rice, which he later adapted to sowing wheat in drills. He was graduated in medicine at Cincinnati in 1850.

Stimulated by the outbreak of the Civil War, he built, in 1861, the first types of the revolving battery gun, later known throughout the world as the Gatling gun. This was greatly improved in 1865 and was immediately adopted by the United States government. In 1886, he invented a new gun metal of steel and aluminum.

Gatti-Casazza (*gät'tē-kä-zät'sä*), **Giulio (1869-1940)**, operatic manager, was born at Udine, Italy. He was educated in the universities of Ferrara and Bologna and the Naval School of Engineering at Genoa. In 1893, he gave up his career as an engineer and became director of the municipal theater at Ferrara. In 1895, he was appointed director of La Scala, in Milan, which in ten years he raised to the foremost opera house in Italy. From 1908 to 1935, he was general manager of the Metropolitan Opera House of New York, which achieved notable financial and artistic success under his administration. He inaugurated the policy of encouraging many American singers and of producing every year one new opera by an American composer. After 1935 he took up his residence in Italy.

Gauguin (*gō'gȧN'*), **Paul (1848-1903)**, French painter, was born in Paris, of French and Peruvian lineage. He entered banking in 1871 in Paris. Four years later he began spending his spare time painting and acquired the impresspresionist technique. In 1881, he gave up his business connection, separated from his wife and children, and devoted himself solely to painting.

He became the leading spirit of a group of painters at Port Aven in Brittany, known as the "synthesists," who painted in pure, unmixed colors, and with exaggerated effects, each picture being intended as "the passionate equivalent of a sensation experienced." The decorative and pictorial qualities were by-products. In this period he produced "Le Christe Jaune" and "La Lutte de l'Ange avec Jacob."

In 1891, oppressed by poverty, Gauguin sold all his paintings by auction and went to Tahiti, where he lived as a native. His autobiographical *Noa Noa* describes this chapter of his life. Here he executed most of his paintings, depicting tropical landscapes, Tahitian nudes, and similar subjects, into which he imported a robust symbolism. The decorative beauty and originality of these pictures are attested by the great prices which they were to bring in later years and by the profound influence which their style had upon the subsequent design of posters and in arts and craft work. Among the more celebrated of the paintings of this period are "L'esprit Vielle," "La Fuite," "Jours Delicieux," and "Two Maori Women." His wood carving "Aviri," a Maori Diana, comes from this period.

In 1901, he removed to one of the Marquesas Islands, where he built himself a house, which he decorated with paintings and carvings. A huge canvas, "Whence, What, Whither," was painted as his last before an attempted

suicide. He lived on, however, suffering from a fatal disease and painting until within a few days of his death.

Gauss (*gous*), **Karl Friedrich** (**1777-1855**), German mathematician, was born in Brunswick. He was graduated at the Collegium Carolinum in his native city in 1795 and at the University of Göttingen in 1798. At the age of 19, he demonstrated that a circle can be divided into 17 equal arcs by elementary geometry, the first discovery of the kind since the ancient Greeks. In 1801, he completed his celebrated *Disquisitiones Arithmeticæ*, which at once stamped its author as a most profound and original mathematician. In 1809 appeared his *Theoria Motus Corporum Cælestium*, in which was contained the exposition of his newly discovered method of least squares. In 1807, he was called to the chair of mathematics in the University of Göttingen.

His investigations at Göttingen took a wide range, and much of his time was occupied with work in the field of terrestrial magnetism. Laplace regarded him as the foremost mathematician in Europe, and he is considered the founder of the mathematical theory of electricity.

Gautier (*gō'tyā'*), **Théophile** (**1811-1872**), French poet and novelist, was born at Tarbes. From painting he turned to literature, and became a "romanticist" of an extreme type. In 1830, he published his first long poem, *Albertus;* in 1832, the striking *Comédie de la mort;* and, in 1856, *Emaux et camées*, the best example of his poetic work, which is marked by a worship of beauty and blindness to all other interests. In 1835 appeared his celebrated novel *Mademoiselle de Maupin*, the unconventional theme of which narrowed the circle of readers. He wrote many other novels and shorter stories, among which are *Les Jeunes-France, Fortunio, Une larme du diable, Militona, Le peau de tigre, Jettatura, Le capitaine Fracasse, La Belle Jenny*, and *Spirite*.

Gautier's theatrical criticisms were in part collected as *L'Histoire de l'art dramatique en France*. He devoted his leisure to travel, of which he published characteristic accounts in his delightful *Caprices et zigzags, Constantinople, Voyage en Russie*, and *Voyage en Espagne*.

Gay, John (**1685-1732**), English poet, was born at Barnstable. He wrote a large number of poems and ballads besides several operas; but little of his poetry is now read. His greatest success was *The Beggar's Opera*, which ran 62 nights, made the actors celebrated, and in the popular phrase "made Rich (the manager) gay and Gay (the author) rich." Under cover of depicting activities of thieves and highwaymen, the opera obviously satirized the lives of the governing class in England. Swift and Pope collaborated in several of his plays. Gay's *Fables* and his ballad of *Black-eyed Susan* also deserve mention.

Gayley, Charles Mills (**1858-1932**), American author and educator, was born at Shanghai, China, of missionary parents. He was graduated at the University of Michigan, 1878, and was a student at Giessen and Halle, Germany, 1886–87. After teaching Latin and English at the University of Michigan for nine years, he was made professor of English in the University of California in 1889. He held this chair for more than 30 years, and, in 1918–20, served as dean of the faculties of the university.

Gayley's *Classic Myths in English Literature* became a standard and definitive work on the subject. He wrote also *Representative English Comedies, Plays of Our Forefathers, Beaumont the Dramatist*, and *Shakespeare and the Founders of American Liberty*. He also edited *Songs of California*.

Gay-Lussac (*gā'lü'sák'*), **Joseph Louis** (**1778-1850**), French chemist and physicist, was born at Saint-Leonard le Noblat. He was educated in Paris, studied chemistry under Berthollet, and became his assistant. Later, in conjunction with Biot, he made important researches on the composition of the atmosphere. These resulted in his important discovery that the proportions by volumes in which gases combine are simply related, both to each other and to the volume of the product. This is now known as the law of volumes, and is one of the most important in the domain of chemistry.

In collaboration with Humboldt, Gay-Lussac investigated the composition of water. He made important discoveries regarding the expansion of gases, the expansion of fluids, and the process of evaporation. With Thénard he discovered a method of obtaining metallic potassium, and was the first to obtain hydriodic and iodic acids and cyanogen. He devoted many years to practical applications of chemistry in connection with fermentation, bleaching, and the manufacture of sulphuric acid and gunpowder.

Ged (*ged*), **William** (**1690-1749**), British inventor, was born in Edinburgh. He developed the earliest method of stereotyping by soldering together loose types, securing a patent in 1725. Notwithstanding his success in obtaining casts of type pages in similar metal, Ged was unable to induce the printers of Edinburgh to make use of his invention. Finally he formed a partnership in London to promote it but this resulted disastrously. While Ged failed to see the process adopted in Great Britain during his lifetime, he steadfastly refused, from patriotic motives, repeated offers from Dutch printers to establish it in the Netherlands. His sons endeavored to carry out the patent, which was ultimately perfected by Andrew Wilson.

Geddes (*ged'ĭs*), **Auckland Campbell Geddes, Baron** (**1879-**), British scientist, administrator, and diplomatist, was born in Scotland. He studied medicine at Edinburgh, at London, and at Freiburg, Germany. He held professorships successively at Edinburgh University, at Trinity College, Dublin, and at McGill University, Montreal. At the outbreak of World War I, he returned to Great Britain, where he served as director of recruiting in 1916, minister of national service from 1917 to 1919, and, in 1919, as minister of reconstruction and president of the British Board of Trade. He was British ambassador to the United States from 1920 to 1924. He then entered business, engaging in mining enterprises. He was raised to the peerage in 1942.

Geddes, Norman Bel (**1893-**), American scenic artist, was born in Adrian, Mich. He studied at the Cleveland School of Art and the Art Institute in Chicago, thereafter engaging in commercial art at Detroit. Removing to Los Angeles, he presented there his first dramatic production, *Nyu*, in 1916. In 1918, he presented *Shanewis* at the Metropolitan Opera House in New York and, in 1925, *Jeanne d'Arc* at Paris. *The Miracle* was his most popular success. He designed the first streamlined ocean liner and the General Motors exhibit in the New York World's Fair. His scenic work is characterized by grandeur and simplicity, all superfluous detail being suppressed to heighten the dominant impression.

Geddes, Patrick (**1854-1932**), Scottish biologist and educator, was born at Perth. He was educated at University College, London, at Edinburgh, and at the Sorbonne in Paris. After teaching and lecturing at London, Aberdeen, and Edinburgh, he was successively professor of botany at Saint Andrews University and professor of sociology at Bombay University, later retiring to devote his energies to city planning. While making valuable contributions to biological science, he also sought to embody fundamental principles of biology in sociological work and devoted much attention to art, social economy, and civics. He reconstructed the slum district of Edinburgh, designed the Hebrew University at Jerusalem, and laid out Visva-Bharati University in Bengal. His writings include *The Evolution of Sex* and *A Study in City Development*.

Gegenbaur (*gā'gĕn-bour*), **Karl** (**1826-1903**), German comparative anatomist, was born at Würzburg. He studied medicine at the university in his native city and was a pupil of Kölliker and Virchow. He received a chair at the University of Jena in 1855 and at the University of Heidelberg in 1873. By his masterly and comprehensive researches he took rank with Huxley and Owen among the great comparative anatomists of his time. He was the first to place the study of anatomy upon an evolutionary basis, and thereby became the founder of modern anatomy. His chief works are *Elements of Comparative Anatomy, Textbook of Human Anatomy*, and *Comparative Anatomy of the Vertebrates in Relation to the Invertebrates*.

Geikie (*gē'kĭ*), **Sir Archibald** (**1835-1924**), British geologist, was born at Edinburgh. He was educated at the University of Edinburgh. In 1855, he was appointed assistant on the Geological Survey, and, in 1867, he became director of the survey in Scotland. From 1871 to 1882, he was professor of geology and mineralogy at Edinburgh. He was director general of the Geological Survey of the United Kingdom and head of the Geological Museum, London, 1882–1901. From 1908 to 1913, he was president of the Royal Society. His studies of rock erosion are among the most valuable in the recent history of geology. Among his works are *Story of a Boulder, Phenomena of the Glacial Drift of Scotland, Ancient Volcanoes of Britain, Textbook of Geology, The Founders of Geology, Types of Scenery and Their Influence on Literature*, and *Love of Nature Among the Romans*.

Geissler (*gīs'lĕr*), **Heinrich** (**1814-1879**), German scientific-instrument maker, was born at Igelshieb. After becoming an expert glass blower, he established at Bonn, in 1854, a factory for making chemical and other scientific apparatus, which were widely known throughout the scientific world for their excellence. He invented the mercurial high vacuum air pump known as the Geissler pump. He also constructed the well-known Geissler's tubes, which enable investigators to examine incandescent gases with the spectroscope.

Gelée (*zhĕ-lā'*), **Claude.** See *Claude Lorraine*.

Gellius (*jĕl'ĭ-ŭs*), **Aulus** (**c. 130 A. D.-c. 180**), Latin author, was born at Rome. After studying philosophy at Athens, he practiced law at Rome. He wrote the *Noctes Atticæ*, or "Attic Nights," a medley on language, antiq-

uities, history, and literature, in 20 books, of which the 8th has not survived. The work contains many extracts from lost Greek and Latin authors and is a rich source of curious knowledge.

Gelon (*jĕ'lŏn*) **(?-478 B.C.),** tyrant of Gela and Syracuse, was the son of Dinomenes and a native of Gela. He figures in history first as one of the bodyguards in the service of Hippocrates, tyrant of Gela. On the death of the latter, he obtained the supreme power, 491 B. C., and, about 485 made himself master of Syracuse. His influence soon extended over the half of Sicily. Gelon refused to aid the Greeks against Xerxes, as they declined to comply with his demand that he should be appointed commander in chief.

In alliance with Theron, Gelon resisted the Carthaginians, and, on the same day on which the Greeks won the battle of Salamis, in 480, he gained a complete victory over the invaders at Himera. His clemency and the wisdom of his measures rendered him so generally beloved that, when he appeared unarmed in an assembly of the people and declared himself ready to resign his power, he was unanimously hailed as the deliverer and sovereign of Syracuse.

Genest, or **Genêt** (*zhĕ-nĕ'*), **Edmond Charles Edouard (1765-1834),** called "Citizen Genêt," French diplomat, was born in Versailles. He entered the French diplomatic service as *chargé d'affaires* at Leningrad in 1789, but was sent home in 1791, and, in December 1792, was accredited to the United States. He transgressed the laws of neutrality by issuing commissions to privateers to prey upon English commerce, France being then at war with England. He complained of the lack of sympathy displayed by the young republic to its old ally, and did his best to embroil the United States with Great Britain. Washington demanded and obtained his recall, but Genêt decided to become a naturalized citizen. He settled in New York and married a daughter of Governor George Clinton.

Geneviève (*zhĕn'vyĕv'*), **Saint (c. 422-512),** patroness of Paris, was born at Nanterre, near Paris. She took the veil, and acquired an extraordinary reputation for sanctity. This was increased by her assurance that Attila and his Huns would not touch Paris and by an expedition for the relief of the starving city during Childeric's Frankish invasion. In 460, she built a church over the tomb of Saint Denis, where she herself was buried. The Pantheon in Paris is built on the supposed site of her tomb and adjoining it is the noted library of Saint Geneviève. The Pantheon contains mural paintings of the saint by Puvis de Chavannes.

Genghis Khan (*jĕn'gĭz кän'*), **(1162-1227),** Mongol conqueror, was born in the region of Lake Baikal, the son of a Mongol chief. His career as a soldier began at the age of 13, when he boldly assumed the reins of government in succession to his father. By his military skill and daring example, he gradually raised his people to a position of supremacy in Asia and established a kingdom which, at his death, stretched from the Volga to the Pacific and from Siberia to the Persian Gulf. While his vast empire dissolved soon after his death, leaving no permanent institutions or remains, one direct result of his rule is the presence of the Turks in Europe. Driven out of their Asiatic homes by his armies, they fled westward and invaded Europe.

Genseric (*jĕn'sĕr-ĭk*), or **Gaiseric (c. 400 A. D.-477),** king of the Vandals. He was the son of Godigisdus and natural brother of Goderic, whom he succeeded in 428. From Spain he crossed to Africa, and in conjunction with the Moors added to his kingdom the land lying west of Carthage, ultimately gaining possession of Carthage itself, which he made his capital in 439. He next set himself to organize a naval force, with which he systematically from year to year pillaged Spain, Italy, Greece, and the opposite lands of Asia Minor, sacking Rome in 455. He continued master of the seas until his death, despite strenuous efforts of the Roman emperors to crush his power.

Geoffroy Saint-Hilaire (*zhô'frwä' săn'tē'lâr'*), **Etienne (1772-1844),** French zoologist, was born at Etampes. He studied at the College of Navarre, Paris, and, in 1793, became professor of zoology in the Museum of Natural History. He accompanied Napoleon's expedition to Egypt, for the collection of specimens. After his return, he laid the basis of scientific anatomy by enunciating his theory of the unity of organic structure. He was appointed to the chair of zoology at the Faculty of Sciences, 1809.

George, Saint, the patron saint of England, Portugal, and Aragon. His true history is not clearly known. Some say the real Saint George was a soldier in the army of Diocletian, 300 A. D., and that he suffered death in Palestine for the Christian faith. English crusaders brought home his fame from the East, and Edward III made him patron of his new order of the garter. His name became the English battle cry. There is a story that he slew a dragon, which had been sent by a magician to devour an Egyptian princess. In pictures he is generally shown in the act of killing the monster.

George I (1660-1727), king of Great Britain from 1714 to 1727. He was the son of Ernest Augustus, elector of Hanover, and of Sophia, the granddaughter of James I of England. On the death of Queen Anne, he ascended the throne, being the first monarch of the house of Hanover. The early part of his reign was troubled by the conspiracies and rebellions of the Jacobites, which were aggravated by foreign wars. In 1720, the collapse of the famous South Sea scheme occurred, and thousands of families were ruined. He had one son, George Augustus, who succeeded him.

George II (1683-1760), king of Great Britain from 1727 to 1760. He succeeded his father George I, ascending the throne when 44 years of age. He had the advantage over his father of being able to speak English, which George I could never do. But he had to cope with Jacobite conspiracies and also to contend with Charles Edward Stuart, the young pretender who was not entirely defeated until the battle of Culloden, 1746. In this reign occurred the war of the Austrian succession. King George espoused the cause of Maria Theresa. In 1756, the Seven Years' War broke out, in which England sided with Prussia. The last years of the king's reign saw the British victors in India, Canada, and on the seas.

George III (1738-1820), king of Great Britain from 1760 to 1820, was born in London. In 1761, he married Princess Charlotte Sophia of Mecklenburg Strelitz, by whom he had fifteen children. More English in sentiment and education than his two predecessors, George's main interest was centered in his English kingdom, and never during his long life did he set foot in his Hanoverian possessions, He attempted to rule as well as reign, and one fruit of his policies was the loss of the American colonies. His reign spanned the period from the Seven Years' War to the Napoleonic wars. In 1801, the legislative union of Great Britain and Ireland was effected. He became insane in 1811.

George V (1865-1936), king of Great Britain and Northern Ireland and emperor of India, was born at Marlborough house, London. The death of his elder brother, Albert, in 1892 made him heir apparent to the British throne, and he took his seat in the House of Lords as Duke of York. Upon the accession of Edward VII in 1901, he received the title of Duke of Cornwall. At this time he made a tour of all the chief British dominions and gained great popularity. On his return he was created Prince of Wales. In 1893, he married Princess Victoria Mary of Teck, and six children were born to them. On the death of Edward VII, the new king ascended the throne under the title of George V, May 7, 1910. The coronation took place, June 22, 1911. He was crowned emperor of India at the durbar at Delhi, December 12, 1911. The chief events of the early part of his reign were in connection with World War I, 1914–1918. In 1935, he celebrated his Silver Jubilee.

George VI (1895-1952), king of Great Britain, was born at Sandringham, England. His given name was Albert Frederick Arthur George. While Duke of York, he married Elizabeth Bowes-Lyon, a Commoner, in 1923. When his elder brother, Edward VIII, abdicated on December 10, 1936, George was made king.

George, Henry (1839-1897), American economist and sociologist, was born in Philadelphia. After being successively at sea, in a countinghouse, and in a printer's office, he settled in California and, in 1866, joined the staff of a San Francisco paper. During periods of unemployment he suffered extreme poverty, which drew his attention to the problem of the existence of poverty. He concluded that it was due to the private appropriation of increased values of land, which he called unearned increment, and that it could be cured by taxation of land only, all improvements being tax free. Such an impost he called the "single tax."

In 1871, George, having by then become managing editor of the San Francisco *Times*, published his conclusions in *Our Land and Land Policy*. He removed to New York in 1880 and nine years later expanded his earlier publication into *Progress and Poverty*, of which millions of copies were sold in America and abroad. He twice ran for the mayoralty of New York City. Other books from his pen include *The Irish Land Question*, *Social Problems*, *Protection and Free Trade*, and *The Science of Political Economy*.

George, Walter Franklin (1878-), American statesman, was born at Preston, Ga., and was educated at Mercer University in that state. He received his law degree in 1901, and began practice at Vienna, Ga. From 1912 to 1917, he was a superior court judge. In the latter year he became an associate justice of the Georgia Supreme Court. Resigning in 1922 to run for the United States Senate, he was elected for the first of six successive terms (1922–1957). In the spring of 1956, while chairman of the Senate Foreign Relations Committee and president

pro tem of the Senate, he announced that he would not seek re-election. Although a Democrat, Senator George, because of his influence for bipartisanship in foreign policy, was asked by President Eisenhower to be his personal representative and special ambassador for North Atlantic Treaty Organization.

Gérard (*zhā'rär'*), **François Pascal, Baron (1770-1837),** French painter, was born in Rome. Nearly the whole of his life was spent in Paris, where he was a pupil of and later an assistant to David, but he speedily acquired a reputation of his own. Most of the leading men and women of the French empire were painted by Gérard, and he became known as the "painter of kings." Among his famous portraits are those of Napoleon, Talleyrand, Moreau, and Mme. Récamier. Among his most noted paintings are the "Battle of Austerlitz" and the "Entry of Henry IV into Paris." He was appointed court painter to Louis XVIII, from whom he received the rank of baron. All his historical paintings were executed in the then dominant classical style.

Gerard (*jē-rärd'*), **James Watson (1867-1951),** American jurist and diplomat, was born in Geneseo, N. Y. From 1908 to 1911, he was Associate Justice of the Supreme Court of New York. In 1913, he was appointed ambassador to Germany by President Wilson, and he served with marked distinction and ability during the difficult period following the outbreak of the European conflict in 1914. When the United States declared war against Germany in 1917, Gerard was recalled. After his return to America, he published *My Four Years in Germany* and *Face to Face with Kaiserism.*

Gerhardt (*zhā'rär'*), **Charles Frederic (1816-1856),** French chemist, was born at Strasbourg. He was one of the most famous of the pupils of Liebig. In 1838, he went to Paris, where he made researches with Cahours at the Jardin des Plantes, and, in 1844, he became professor of chemistry at Montpellier. He accepted a chair at Strasbourg in 1855.

With his contemporary, Laurent, Gerhardt was author of the system of chemical notation now in use. Their views regarding the formation and the constitution of salts are now generally accepted. Gerhardt invented the theory of types, a most valuable method of classifying chemical compounds and of showing their mutual relationships. His theories and discoveries are embodied in his *Treatise on Organic Chemistry.*

German, Edward (1862-1936), English orchestral composer, was born at Whitchurch, Shropshire. He is best known by his incidental music to various Shakespearean plays, including *Richard III, The Tempest, Romeo and Juliet, As You Like It,* and *Henry VIII.* He composed also the operas *Merrie England, The Princess of Kensington,* and *Tom Jones;* the operetta *The Rival Poets;* two symphonies; and chamber music. He finished Sullivan's *Emerald Isle,* and employed the folk-song style with marked success. With Rudyard Kipling, he produced the *Just So Song Book.*

Gérôme (*zhā'rōm'*), **Jean Léon (1824-1904),** French painter and sculptor, was born at Vesoul, Haute Saône. After studying at Paris with Delaroche and traveling in the East, he was appointed professor of painting in the School of the Fine Arts at Paris. His reputation was established by his picture "Gladiators Before Cæsar." Among the best known of his works are "Phryne before Her Judges," "Cleopatra and Cæsar," "Thumbs Down" (a companion to his "Gladiators Before Cæsar"), and his Oriental pictures "Turkish Prisoner," "Prayer," "The Slave Market," and "The Promenade of the Harem."

Gérôme was an artist of great versatility and his work stands midway between the work of the classicists and that of the romanticists. After 1878, he attained eminence as a sculptor, producing, among other notable works, "Napoleon Entering Cairo," "Frederick the Great," "Tamerlane," "Tanagra," and "The Dying Eagle," a monument for Waterloo. Important examples of his works are found in American museums.

Gerry, Elbridge (1744-1814), American statesman, 5th vice president of the United States, was born in Marblehead, Mass. He was graduated at Harvard College, 1762. In 1776, he was elected a delegate to the Continental Congress, signed the Declaration of Independence, and was placed on the most important committees. He retired from Congress in 1780, but resumed his seat in 1783. As delegate to the convention in 1787 to revise the Articles of Confederation, he refused to sign the Constitution as proposed, but afterward supported it.

Gerry was member of Congress, 1789–93, and, in 1797–98, was special envoy to France, with Pinckney and Marshall. He was governor of Massachusetts in 1810 and 1811. In the latter term, he signed the famous act redistricting the state so as to destroy the Federalist representation in the legislature. From this act the term "gerrymander" has its origin. In 1812, he was elected vice president of the United States.

Gershwin, George (1898-1937), American composer, was born in New York City. Largely self-taught, he obtained work as a pianist to a firm of music publishers. He developed skill in adapting themes in jazz form for the orchestra. Some of his compositions became extremely popular, more particularly his "Rhapsody in Blue," one of the best known of all jazz compositions. His other compositions include "The King of Jazz" and "An American in Paris." His "Concerto in F," first performed in 1925, is a distinctive and original contribution to American music.

Gervinus (*gĕr-vē'nōōs*), **Georg Gottfried (1805-1871),** German critic and publicist, was born at Darmstadt. In 1836, he became professor of history at Göttingen. In 1837, he was one of the seven Göttingen professors who protested against the abolition of the Hanoverian constitution, and was ordered to leave the country. In 1844, he was appointed honorary professor in Heidelberg, and, from this period forward, wrote in behalf of constitutional liberty. In 1847, he helped to establish the *Deutsche Zeitung;* in 1848, was elected to the National Assembly. His commentaries on Shakespeare were translated into English in 1862. Besides these, he published a *History of German Poetry* and a *History of the 19th Century.* He died at Heidelberg.

Gesell, Arnold (1880-), American psychologist and physician, was born at Alma, Wisconsin. Because of his special training in education, he was chosen to conduct the child development clinic at the Yale School of Medicine. Beginning with a study of backward children and their pre-school history, Dr. Gesell later turned his attention to normal children. He came gradually to the conclusion that "the first five years of life are the most consequential in the history of the human individual." Besides numerous studies in collaboration with others, he is author of *Exceptional Children and Public School Policy, Handicapped Children in School and Court, Infancy and Human Growth, How a Baby Grows,* and *The Embryology of Human Behavior.*

Ghiberti (*gê-bĕr'tē*), **Lorenzo (c. 1378-1455),** Italian sculptor, was born in Florence. He was engaged in painting in fresco at Rimini, in the palace of Prince Pandolfo Malatesta, when the Merchants' Guild of Florence invited artists to propose models for one of the bronze doors of the baptistery of San Giovanni. The offering up of Isaac was to be executed in gilt bronze, as a specimen of the work. The judges selected the works of Brunelleschi and Ghiberti as the best, but the former voluntarily withdrew his claims giving the preference to Ghiberti.

After 21 years' labor, Ghiberti completed the door, and, at the request of the Merchants' Guild, executed a second after almost as long a period. Michelangelo said of these that they were worthy of adorning the entrance to paradise. During these 40 years, Ghiberti completed also a statue of John the Baptist for the church Or San Michele, two bas-reliefs for the baptistery of the Cathedral of Siena, and other works.

Ghirlandajo (*gêr'län-dä'yō*), **Domenico (1449-1494),** Florentine painter. He assisted in the decoration of the Sistine Chapel in Rome, and executed a series of frescoes in the Sassetti Chapel in Santa Trinità, Florence, which are considered his most important work. He painted also many easel pictures in oil and distemper, but his frescoes are incomparably his finest works. In artistic ability he ranks with Giotto, Masaccio, Lippo Lippi, and Botticelli among early Florentine painters. He was the instructor of Michelangelo.

Ghirlandajo, Ridolfo (1483-1561), Italian painter, son of Domenico Ghirlandajo. He was educated in art in his father's studio. About 1503, he began to study the works of Leonardo da Vinci and produced many fine paintings that are hardly distinguishable from those of that great master. The "Annunciation" in the Uffizi Gallery, Florence, the "Goldsmith" in the Pitti Palace, and other paintings attributed to Da Vinci were painted by Ghirlandajo. His best works in this style are the "Coronation of the Virgin," in the Louvre, and the "Betrothal of St. Catherine." Later, he came under Raphael's influence. This is reflected in his noted portrait of an "Old Woman" in the Pitti Palace. According to Vasari, he assisted Raphael in painting the draperies of "La Belle Jardinière."

Giannini (*jän-nē'nē*), **Amadeo Peter (1870-1949),** American banker, was born of Italian parentage at San Jose, Cal. After a childhood on a farm and a common school education, he worked for a commission firm, becoming a partner at 19. At 24, he was director of a savings bank; at 26, manager of a million dollar estate. He founded the Bank of Italy (now Bank of America) in 1904 in San Francisco. At the time of the earthquake in 1906, Giannini salvaged the bank's assets, and his was the first financial institution to reopen and extend loans for reconstruction. In the panic of 1907, it was the only bank in the state that could meet every demand in gold. In the same year, Giannini began a policy of establishing branch banks, which eventually numbered over 300 and spanned the nation. At first an institution for Italian Americans, the

Bank of Italy became national in scope through its liberal policy and friendly atmosphere.

Gibbon, Edward (1737-1794), English historian, was born at Putney, in Surrey, England. On account of his delicate health, his early education was carried on with difficulty at Kingston on Thames and later at Westminster School. Having been fully restored to health at Bath, he entered Oxford and matriculated at Magdalen College in 1752. His erudition at this time was enormous; his readings took a serious, religious turn.

His father sent him to Lausanne, Switzerland, for further training. When he returned to England in 1758, he brought with him the first pages of his *Essay on the Study of Literature,* a work which served as his card of admission to the society of notable literary men when he made his trip to France and Italy in 1764. While in Rome, in October of that year, he conceived the idea of writing a book on the decline of that empire.

When once again in England, Gibbon devoted a portion of each year to the army, where he had risen to the rank of lieutenant colonel, and the remainder to literary activities in London. His father died in 1770, leaving him in comparatively easy circumstances. In 1774, he was elected to Parliament, but he entered a public career without ambition and proved an indifferent politician.

Meanwhile, the first volume of his projected *Decline and Fall of the Roman Empire* appeared in 1776 and was received with unbounded admiration. Gibbon's reputation was firmly established. Two more volumes of this work were ready in 1781. He then settled in Lausanne and there completed his great history, of which the last two volumes were published in May 1788. It is virtually a history of the world for 13 centuries,—from the reign of Trajan to the capture of Istanbul by the Turks,—during all which time Christianity was superseding paganism.

Gibbon's brain was vigorous, and he had a vast capacity for both work and enjoyment. His style is polished and elegant. His unique merit is his supreme power of unifying a bewildering multitude of details and giving life and sequence to the whole.

Gibbons, Grinling (1648-1721), English sculptor and wood carver, was born probably at Rotterdam. He had for some time practiced his art in England when he was made wood carver to the crown, serving for Charles II and succeeding monarchs to George I. Sir Christopher Wren engaged him for architectural decorations and many public buildings and private houses of the period display his tasteful and delicately finished carvings.

Gibbons, James (1834-1921), American Roman Catholic cardinal, was born in Baltimore, Md. At an early age, he was taken by his parents to their former home in Ireland, where he began his education. He returned to the United States in 1848 and resided with his family in New Orleans. Ordained priest in 1861, he served the Church in various capacities and, in 1868, he was made vicar apostolic of North Carolina, with rank and title of bishop. He became archbishop of Baltimore in 1877, and, in 1886, was created cardinal. Gibbons was the Church's most persuasive spokesman to non-Catholic Americans. He championed democracy and praised the separation of Church and state. His *Faith of Our Fathers* is a plea for Catholicism addressed to conservative Protestants.

Gibbs, Josiah Willard (1839-1902), American physicist, was born at New Haven, Conn. He was graduated at Yale in 1858, was an instructor there for three years, and then studied in Berlin, Heidelberg, and Paris. In 1871, he became professor of mathematical physics at Yale, continuing until his death 32 years later. In 1878, he completed the publication of a paper *On the Equilibrium of Heterogeneous Substances,* which laid the basis of the science of physical chemistry. This publication contained the important formula called the "Gibbs phase rule," the use of which has greatly increased scientific knowledge of solutions, alloys, and crystallizations.

For his original researches, Gibbs was awarded the Copley medal of the Royal Society, the Rumford medal of the American Academy, and numerous honorary degrees in America and Europe. Ostwald called him the founder of chemical energetics. Between 1881 and 1884 he developed a system of vector analysis. He published numerous papers on mathematical physics. His final work was on the *Elementary Principles of Statistical Mechanics.* Elected to the American Hall of Fame in 1950.

Gibbs, Sir Philip (1877-), English author and journalist. Privately educated, he entered journalism in 1902, acting as editor of various London newspapers. From 1915 to 1918, he was war correspondent with the British armies in France and achieved distinction by his graphic accounts of the great conflict. His extensive writings include the novels *Venetian Lovers, The Individualist,* and *The Reckless Lady;* the historical works *Founders of Empire, The Battles of the Somme, Ten Years After,* and *Across the Frontiers.* He was knighted in 1920.

Gibson, Charles Dana (1867-1944), American illustrator, was born in Roxbury, Mass. He studied under Saint-Gaudens and, in 1886, he began his career as an artist with illustrations for periodicals. After a period of further study in Paris in 1889, he returned to New York. He resumed illustrating work for *Life, Scribner's, Century, Harper's,* and became a master of black-and-white pictorial art. He created the so-called "Gibson girl" type.

In 1905, Gibson began to study color painting in Europe, but later he returned to black-and-white illustration work. In 1921, he was elected member of the American Academy of Arts and Letters. Among his published works are *People of Dickens, Pictures of People, The Americans, A Widow and Her Friends, The Social Ladder,* and *Our Neighbors.*

Gide (*zhēd*), **André Paul Guillaume (1869-1951),** French novelist and essayist, was born in Paris. His earlier novels, the first of which appeared in 1893, reveal a disillusioned, anti-intellectual view of life. They were followed by fiction of increasing power and psychological insight which gained him a recognized place in the forefront of the liberal thinkers of his generation. Among his best-known works are *The Counterfeiters, The Immoralist, Strait Is the Gate,* and *Travels in the Congo.* He received the Nobel prize for literature in 1947.

Gifford, Sandford Robinson (1823-1880), American painter, was born in Greenfield, N. Y. He studied with J. R. Smith, a water-color painter, in New York, and was much influenced by the methods of Thomas Cole. In 1855-57, he sketched in England, Scotland, France, Belgium, the Netherlands, Switzerland, and Italy, and, in 1868-70 in Italy, Syria, Greece, Turkey, and Egypt.

Among Gifford's best pictures are "Morning in the Adirondacks," "Mansfield Mountain," and "Sunset on the Sweetwater." Among his most noted paintings of foreign subjects are "Ruins of the Parthenon" in the Corcoran Gallery, Washington, and "Tivoli" and "Near Palermo" in the Metropolitan Museum, New York. Gifford made artistic effect rather than pictorial detail his controlling aim. He was one of the best-known of the Hudson River School of painters.

Gifford, Walter Sherman (1885-), American industrial leader, was born at Salem, Mass. After being graduated from Harvard University in 1905, he entered the employ of the Western Electric Company. He became chief statistician of the American Telephone and Telegraph Company in 1911, vice president in 1919, and president in 1925. As executive head of the world's largest public utility corporation, he provided vigorous leadership in the scientific and technical development, not only of communication arts, but also in allied fields, including that of sound motion pictures. He wrote *Does Business Want Scholars?; Pensions, Charity and Old Age;* and *Can Prosperity Be Managed?* He was ambassador to Great Britain, 1950-1953.

Gilbert, Cass (1859-1934), American architect, was born at Zanesville, O. He was educated at Massachusetts Institute of Technology, and began practice as an architect in 1883. Among the buildings designed by him are the Minnesota Capitol at St. Paul, the New York Customhouse, and the Central Public Library, St. Louis. He was one of the architects of the new Union Club, New York, and made plans for the Arkansas capitol and for the universities of Minnesota and Texas. His most noted achievement is the Woolworth Building, New York. In 1914, he was elected member of the American Academy of Arts and Letters.

Gilbert, William (1540-1603), English physicist and physician was born at Colchester. He was educated at the University of Cambridge. Settling in London about 1573, he began medical practice, joined the College of Physicians, and was appointed physician to Queen Elizabeth. He became president of the College of Physicians in 1600 and was made court physician in the following year.

Gilbert devoted his spare time to scientific experiments, particularly in connection with the magnet. He demonstrated the bearing of magnetic phenomena on navigation and was the first investigator to use the terms "electric force," "electric attraction," and "magnetic pole." His treatise *De Magnete* was the earliest great work on physical science in England.

Gilbert, Sir William Schwenck (1836-1911), English dramatist, was born in London. He was graduated at London University; was a clerk in the privy council office from 1857 to 1862; and, in 1864, was admitted to the bar. He was for many years on the staff of *Fun,* in whose columns his *Bab Ballads* first appeared. His stage work began with a Christmas burlesque, *Dulcamara,* 1866, which was followed by a succession of burlesques, dramas, comedies, fairy comedies, and operas.

Gilbert won a world-wide reputation for the series of comic operas collaborated in conjunction with Sir Arthur Sullivan. Among these are *Thespis, Trial by Jury, The Sorcerer, H. M. S. Pinafore, The Pirates of Penzance, Patience, Iolanthe, Princess Ida, The Mikado, Utopia Limited,* and *The Grand Duke.* See *Bab Ballads.*

Gildersleeve, Basil Lanneau (1831-1924), American classical scholar, was born in Charleston, S. C. He was graduated from Princeton, 1849, and later studied at the universities of Berlin, Bonn, and Göttingen. He was professor of Greek at the University of Virginia from 1856 to 1876, when he was called to the chair of Greek in Johns Hopkins University, which he filled with distinction until 1915. He founded and, in 1880, became editor of the *American Journal of Philology.*

Gildersleeve's contributions to Greek and Latin syntax and to the history of Greek literature rank among the best products of modern scholarship. He is the author of several works, including a *Latin Grammar, Essays and Studies, Hellas and Hesperia,* and editions of Persius and Pindar. In collaboration with C. W. E. Miller, he produced the important work entitled *Syntax of Classical Greek from Homer to Demosthenes.* In 1908, he was elected member of the American Academy of Arts and Letters.

Gillette, William (1855-1937), American actor and playwright, was born at Hartford, Conn. He received an academic education with special university courses. He won much popularity playing with stock companies in many cities of the East and South and wrote several plays which were notably successful. Among these are *Secret Service, Because She Loved Him So, Settled Out of Court,* and *Clarice.* He became best known both in America and England for his dramatization and impersonation of Sir Conan Doyle's *Sherlock Holmes,* first produced in 1899. He acted also in *The Admirable Crichton* and *Dear Brutus* with great acclaim. In 1915, he was elected member of the American Academy of Arts and Letters.

Gilman, Charlotte Perkins (1860-1935), American author and lecturer, was born in Hartford, Conn. In 1884, she married C. W. Stetson and, in 1900, G. H. Gilman of New York. She began giving lectures on economics, sociology, and ethics in 1890. She contributed numerous articles on similar subjects to magazines and was well known for her efforts to improve labor conditions and for her interest in the advance of woman. She edited the *Forerunner* from 1909 to 1916. In 1914 her lectures entitled "The Larger Feminism" attracted wide attention. Among her writings are *Woman and Economics, In This Our World* (verse), *Concerning Children, The Man-Made World,* and *His Religion and Hers.* Suffering from an incurable disease, she took her own life.

Gilman, Daniel Coit (1831-1908), American educator, was born in Norwich, Conn. He was graduated at Yale in 1852 and continued studies at Yale, Harvard, and Berlin. He was librarian, secretary of the Sheffield Scientific School, and professor of physical and political geography, Yale, 1856–72. From 1872 to 1875, he was president of the University of California. In 1875, he was entrusted with the task of organizing Johns Hopkins University, which he made a graduate institution of pioneer influence in American education. He served as president until 1901. From 1901 to 1904, he was president of the Carnegie Institution, Washington. His writings include *James Monroe, University Problems, Introduction to De Tocqueville's Democracy in America, Life of James D. Dana, Geologist,* and *Science and Letters in Yale.* He was editor in chief of the *New International Encyclopædia.* In 1908, he was elected member of the American Academy of Arts and Letters.

Ginn (*gĭn*), **Edwin (1838-1914),** American publisher, was born at Orland, Me. He was graduated at Tufts College in 1862; engaged in publishing, and became head of the firm of Ginn and Company, publishers of school and college textbooks. The first book which he produced was Allen's *Latin Grammar,* published in 1868. Under his constructive policy, his house rose to foremost rank among American textbook publishers. He became deeply interested in social problems and in the movement for universal peace. In 1909, he set aside $1,000,000 for the endowment of a world peace foundation and, in 1913, established an international school of peace.

Giorgione (*jôr-jō'nā*), or **Giorgio Barbarelli (c. 1477-1511),** Italian painter, was born at Castelfranco. He studied at Venice under Giovanni Bellini, and soon developed a free and large manner, characterized by intense poetic feeling and by great beauty and richness of coloring. Several early portraits by him have disappeared, but his "Enthroned Madonna" is an altarpiece at Castelfranco. In Venice he was extensively employed in fresco painting but some fragments in the Fondaco de' Tedeschi are all that now remain of this work.

Of his existing works, "The Family of Giorgione" at Venice, "The Three Philosophers" at Vienna, "The Concert" at the Pitti Palace, Florence, and the "Sleeping Venus" in the Dresden Gallery are representative canvases. Giorgione ranks with the greatest of Venetian painters and powerfully influenced his contemporaries, including Titian.

Giotto (*jŏt'tō*) **di Bondone (c. 1266-1336),** Italian painter and architect, was born at Colle. He is said to have been a pupil of Cimabue and a friend of Dante, whose portrait he painted at Ravenna. He painted a series of fine frescoes at Assisi, and was probably the founder of the modern school of portrait painting. About 1298, he went to Rome, where he painted and worked in mosaics; he subsequently was employed at Padua and Florence, where he painted frescoes in the Peruzzi Chapel of Santa Croce.

Giotto painted also the "Miracle of the Loaves and Fishes," at Naples, and designed the beautiful campanile at Florence, often called "Giotto's Tower." Giotto was the greatest and most influential painter in Italy before the Renaissance. He humanized and vitalized Italian painting and imbued it with natural action and feeling. See *Painting.*

Girard (*zhē'rär'*), **Jean Baptiste (1765-1850),** "Le Père Girard," Swiss educator, was born at Fribourg. At the age of 16, he entered the Franciscan order, and, although engaged in teaching to a limited extent, did not devote himself definitely to education until 1798. He then published a *Projet d'éducation pour toute l'Helvétie,* and, in 1805, became director of primary schools at Fribourg, where he remained until 1823. He then taught philosophy at Lucerne until 1834, retiring in that year to Fribourg, where he wrote his noted *Enseignement regulier de la langue maternelle,* published, 1844–46.

Girard's theory emphasized the element of interest as the chief factor in learning and the awakening of it for all the elements of study as the chief factor in teaching. His influence has been very great in elementary teaching in France, Italy, and Switzerland. He stands next to Pestalozzi among Swiss educators.

Girard (*jĭ-rärd'*), **Stephen (1750-1831),** banker and philanthropist, was born near Bordeaux, France. He became a sailor and, before the Revolution, engaged as the master of vessels in the American coasting and West Indian trade. During the Revolutionary War, he was a grocer and sutler in and near Philadelphia. He was again in the West Indian and coastwise trade in partnership with John his brother, in 1780–90. Eventually, he became a banker, and amassed a large fortune. He was eccentric in his habits, a freethinker, ungracious in manner and ill-tempered, but a liberal benefactor of public charities. During several yellow-fever seasons in Philadelphia, no citizen was more active in relieving distress. At his death, nearly all his estate was bequeathed to various charitable and municipal institutions of Philadelphia and New Orleans and to the founding of Girard College.

Giulio Romano (*jōōl'yō rō-mä'nō*), **(c. 1492-1546),** Italian painter and architect, the most eminent of Raphael's pupils, was born at Rome. He assisted Raphael in the execution of several of his finest works, and at Raphael's death completed the "Apparition of the Cross" in the Vatican.

In 1524, Giulio Romano went to Mantua on the invitation of the duke. The drainage of the marshes and the protection of the city from the inundations of the Po and the Mincio attest his skill as an engineer, while his genius as an architect found scope in the restoration and adornment of the Palazzo del Té, the cathedral, and a ducal palace. In Bologna, he designed the façade of the church of San Petronio. Among his representative works are the "Martyrdom of St. Stephen," a "Holy Family," "Apollo and the Muses," "The Education of the Muses," and the "Madonna della Gatta."

Gladstone (*glăd'stŭn*), **William Ewart (1809-1898),** English statesman, orator, and man of letters, was born in Liverpool. He was graduated at Oxford, and, in 1832, entered the House of Commons. In 1838, he published his first work, *The State in Its Relations with the Church.* In 1845–46, he was colonial secretary under Peel and this was the only break in his remarkable parliamentary career, which extended from 1832 to 1894. In 1847, he was elected a member of Parliament for the University of Oxford, which he represented for 18 years. In 1858, he published an elaborate work on *Homer and the Homeric Age.*

In 1860, Gladstone carried through Parliament a commercial treaty with France. In 1866, as leader of the House of Commons, he brought in a reform bill, the defeat of which caused Earl Russell to resign. Gladstone, in 1869, disestablished the Irish Church; in 1870, he carried his Irish Land bill; and, in 1872, he carried the Ballot bill. In 1874, he dissolved Parliament, and, on the unfavorable result of the ensuing election, the Gladstone ministry resigned. In 1876, he strongly denounced, by voice and pen, the Turkish cruelties in Bulgaria. On the defeat of the Disraeli administration at the polls, 1880, he became premier, but resigned in 1885.

Early in 1886, after the short-lived administration of Lord Salisbury, Gladstone again came into power, and signalized his return to office by presenting in 1886 a dual scheme of Irish government—a land bill and a home rule bill. Intense and bitter opposition from Liberals and Conservatives alike greeted the measure, and the bill was rejected. In consequence, Parliament was dissolved and Gladstone and his colleagues appealed to the country, but

were defeated. During the succeeding years, 1887–91, Gladstone was in opposition, the chief incident in his career being his outspoken advocacy of home rule in Ireland and his consequent alliance with the Irish party. Following the general election of 1892, he became prime minister for the fourth time. He resigned in 1894 on account of advanced age and spent his last days chiefly in literary work. He died at Hawarden, and was buried in Westminster Abbey.

Glasgow, Ellen Anderson Gholson (1874-1945), American novelist, was born at Richmond, Va. She received a private education and began early to devote herself to literary work. She pictured realistically the transition of Southern life from ante-bellum conditions to the new order and advocated woman's emancipation. Her writings include *The Battleground, The Freeman and Other Poems, Phases of an Inferior Planet, Life and Gabriella, They Stooped to Folly,* and *Vein of Iron.* She was elected to the American Academy of Arts and Letters in 1938.

Glass, Carter (1858-1946), American politician and cabinet officer, was born at Lynchburg, Va. He was educated in private and public schools in his native town. After learning the printer's trade and working for eight years in a printing office, he became owner of daily newspapers at Lynchburg. Entering politics as a Democrat, he served in the Virginia senate, 1899–1903. In 1902, he was made member of Congress and was continuously re-elected for the period of 1903–19. On December 16, 1918, he was appointed Secretary of the Treasury, retiring January 27, 1920, to enter the United States Senate as senator from Virginia. He held this seat until his death.

Carter Glass distinguished himself in the field of financial legislation. In the administration of Woodrow Wilson, he played the leading role in the passage of the Federal Reserve Act; he played a similar role in the passage of the Banking Act of 1923, although he declined to go along with the Roosevelt administration in many of its later measures.

Glass, Montague (Marsden) (1877-1934), American story-writer, was born at Manchester, England, of Jewish parentage. He came to the United States in 1890, and was educated at the College of the City of New York and at New York University. He began the practice of law, but soon became a writer of short stories. He is most widely known as the author of *Potash and Perlmutter,* which appeared in 1910. This diverting story of the Jewish wholesale clothing trade in New York City was successfully dramatized in 1913. His plays, written chiefly in collaboration with other dramatists, include *Abe and Mawruss, Object: Matrimony, Business Before Pleasure, Why Worry?,* and *His Honor Abe Potash.*

Glauber (*glou'bĕr*), **Johann Rudolph (1604-1668),** German chemist and physician, was born at Karlstadt in Bavaria. In 1648, he discovered hydrochloric acid, and he was probably the first to procure nitric acid. His name lives in Glauber's salt (hydrated sodium sulphate), discovered by him in 1658 by treating sodium chloride (common salt) with sulphuric acid. He was a voluminous writer on chemical subjects.

Glazunov (*glä'zŏŏ-nôf'*), **Alexander (1865-1936),** Russian composer, was born in Leningrad. He received his early education at the Polytechnic Institute and soon determined upon a musical career. He studied under Rimski-Korsakov, and at 19 he wrote a symphony, which was produced at Weimar under the auspices of Liszt. In 1889, he publicly conducted his own compositions in Paris with notable success. In 1899, he became professor in the Leningrad Conservatory and, in 1900, was made director. With Rimski-Korsakov, he completed Borodin's famous opera *Prince Igor.* He was one of the most fertile and gifted of modern Russian composers and a prominent leader in the new Russian National School. His musical compositions were numerous and varied.

Glendower (*glĕn'dōōr*), or **Glendwr, Owen (c. 1369-c.1415),** Welsh chief, was educated in England, but in 1401 a dispute over land led him into war against the English. He proclaimed himself Prince of Wales and joined his English son-in-law, Mortimer, and Harry Percy (Hotspur) in a coalition against King Henry IV, which was defeated at Shrewsbury, 1403. In 1405 he received assistance from Charles VI of France, and, in spite of repeated defeats, carried on guerilla warfare against the English until his death. He is regarded as the Welsh national hero.

Glennon, John Joseph (1862-1946), American clergyman, was born in Kinnegad, Ireland, and was ordained priest in 1884. In that year he came to St. Patrick's Church in Kansas City. He became coadjutor bishop of Kansas City in 1896, and archbishop of St. Louis in 1903. He was created cardinal, February 1946.

Glinka (*glĭng'kä*), **Mikhail Ivanovitch (1804-1857),** Russian composer, pioneer of the National School and forerunner of Tchaikovsky, was born near Novospaskoi. He studied at Leningrad, Rome, and Berlin. In 1836, he wrote *A Life for the Czar,* the first Russian national opera. His second opera, *Russlan and Ludmilla,* similar in character, was also a great success. His compositions include symphonies, piano music, and songs. He died in Berlin.

Gluck (*glŏŏk*), **Alma (1884-1938),** stage name of Reba Fiersohn, American dramatic soprano, was born at Bucharest, Rumania. Her parents came to New York in 1890. She received her education in the public schools and at Union College, Schenectady, N. Y. After studying music under Buzzi-Peccia from 1906 to 1909, she was engaged by Gatti-Casazza for the Metropolitan Opera House, New York. She made her first appearance as Sophie in Massenet's *Werther,* and, during the first season, sang with notable success in eleven roles. Later, her popularity as a concert singer increased so that she practically withdrew from the operatic stage. Her career is noteworthy in that she attained high rank in grand opera and on the concert stage without European training. In 1914, she married Efrem Zimbalist, the violinist.

Gluck, Christoph Willibald (1714-1787), German composer, was born at Weidenwang, in Bavaria. He studied at Prague, Vienna, and Milan, and began his musical career at Vienna at the age of 22. His best-known works are *Alceste, Paride ed Elena,* and *Orfeo,* composed in Vienna, and *Iphigénie en Tauride,* composed in Paris. Gluck sought to reform the opera by putting into the music great expressive power and dramatic force. He cleared the way for the modern opera and was a forerunner of Wagnor and the later dramatic composers.

Godard (*gô'dăr'*), **Benjamin (1849-1895),** French composer, was born in Paris. He displayed marked musical talent at an early age. After receiving private instruction, he entered the Paris Conservatory, where he studied violin under Vieuxtemps and composition under Reber. At the age of 16, he published a violin sonata and soon thereafter was awarded a prize by the French Institute. His most successful opera was *La Vivandière.* Among his other compositions are *Pedro de Zalaméa, Jocelyn, Le Dante, Jeanne d'Arc,* and many symphonies, concertos, suites, and songs.

Godfrey, Arthur (1903-), American radio and television entertainer, was born in New York. He served in the United States Navy (1920-24) and in the Coast Guard (1927-30). He began as a radio announcer in Baltimore in 1930, and since 1934 has been a free-lance radio entertainer. His daily program, *Arthur Godfrey Time,* and his weekly program, *Arthur Godfrey's Talent Scouts,* are broadcast over the CBS network. He also has a weekly television show, *Arthur Godfrey and His Friends.* His home is in Virginia.

Godfrey de Bouillon (*bōō'yôN'*) **(c. 1061-1100),** Duke of lower Lorraine, gained distinction in the armies of the emperor Henry IV and was the great leader of the First Crusade. According to the chroniclers, he performed prodigies of strength and valor against the Saracens, and was proclaimed king of Jerusalem on its capture in 1099. He accepted the office, but declined the title. At Ascalon, with 20,000 men, he defeated the sultan of Egypt, who is said to have had a vastly greater force. He then devoted himself to organizing his government, and drew up, for his courts of justice, the assizes of Jerusalem, a code of laws which was the fullest embodiment of feudal jurisprudence. His deeds are celebrated in Tasso's *Jerusalem Delivered.*

Godowski (*gô-dôv'skê*), **Leopold (1870-1938),** Polish pianist, was born at Vilna. He received his early instruction from local teachers. From 1881 to 1884, he studied at Berlin, after which he made a concert tour in America. He studied with Saint-Saëns in Paris from 1886 to 1890, following which he made a tour of two years in the United States. In 1895 he became director of pianoforte teaching at the Chicago Conservatory. In 1900, he resumed concert playing in Europe, and, in 1909, was made director of the Imperial Piano-Teachers' School in Vienna. After a highly successful concert tour of the United States in 1912, he took up his residence in New York. Godowski's playing was characterized by brilliant technique, and he made many paraphrases of works by Chopin, Weber, and Strauss which required unusual technical skill.

Goebbels (*gûb'ĕls*), **Josef (1897-1945),** German political leader, born at Rheydt. After being graduated from Heidelberg University in 1920, he entered newspaper work in the Rhineland. He joined in the Nazi organization shortly after its inception and, as district leader in Berlin, built up the organization in northern Germany while Hitler worked in southern Germany. He founded and edited the party organ, *Der Angriff,* "*The Attack.*" After Hitler seized supreme power, Goebbels was made minister for propaganda and enlightenment, with control over the press, radio, and cultural activities generally. He was a leading spirit in the anti-Semitic aspect of Nazi policy. Under his direction, all open expression of opinion in Germany was attuned to the ideals of the Nazi party, inspired by the watchword of "strength through joy." He committed suicide at the fall of Berlin.

Goering, Hermann. See *Göring, Hermann.*

Goethals (*gō'thălz*), **George Washington (1858-1928),** American military and civil engineer, was born in Brooklyn. He was a student at the College of the City of New York, 1873-76, and was graduated from the United States Military Academy, 1880. He was appointed second lieutenant of engineers, 1880, and rose by successive promotions to major general of engineers, 1915. His early river and harbor work was the construction of the Muscle Shoals locks and dams on the Tennessee River.

In 1907, Goethals was appointed chief engineer and chairman of the military board of engineers authorized by President Roosevelt to construct the Panama Canal. His services in the performance of this great task, which he completed in 1914, a year in advance of his schedule, won him unqualified praise throughout the civilized world and the thanks of Congress. In 1914, he was appointed civil governor of the Canal Zone by President Wilson.

During the American participation in World War I, he was successively general manager of the emergency fleet corporation, acting quartermaster general of the United States, and chief of division of purchase, storage, and traffic. He was also a member of the war industries board. In 1918, "for especially meritorious and conspicuous service" in reorganizing the quartermaster's department, he was awarded the distinguished service medal. See *Panama Canal.*

Goethe (*gû'tē*), **Johann Wolfgang von (1749-1832),** German author, was born at Frankfort on the Main, Prussia. His father was a traveled and distinguished doctor of laws; his mother, a woman of noble and wide sympathies. He was a precocious, handsome, and sensitive child. Before he was ten years of age, he wrote in several languages and had a considerable familiarity with works of art. The circumstances of his early life favored the development of his great and varied powers. His boyhood came at the period when Germany was in the throes of the Seven Years' War and when Lessing was laying the foundation of philosophical literary criticism.

Education. Besides the common branches of education, Goethe busied himself with drawing, music, and natural history. He was sent to the University of Leipzig in 1765 to prepare for the legal profession. To law, however, he gave little heed, and he had a disgust for speculative philosophy. He paid more attention to classical studies and read extensively in French and English. The discrepancies existing between the different poetical schools, which he could not reconcile as yet by any critical theory he had met, almost gave him a distaste for poetry. He made some attempts at play writing and relieved somewhat the uneasy state of his mind by the study of fine arts.

In 1768, Goethe left Leipzig and resided in the country, where he studied alchemy, chemistry, and occult philosophy. A couple of years later he went to Strasbourg University and devoted himself earnestly to chemistry, anatomy, literature, antiquities, and law. At Strasbourg, he formed the acquaintance of Herder, who influenced Goethe's mind greatly and directed his reading to Ossian, Homer, Shakespeare, Goldsmith, and the Hebrew poets.

Earlier Literary Works. In 1771, Goethe took his degree of doctor of laws and went to Wetzlar, the seat of the imperial chamber of the German Empire, which afforded peculiar facilities for young men engaged in the study of public law. His profession, however, had less attraction for him than his literary pursuits. Wetzlar became to him the scene of the famous *Sorrows of Young Werther,* which was published in 1774, depicting the hopeless love of a young man for a married woman who chose to abide by her marriage. He returned to Frankfort in 1772, and, in the following year, published *Götz von Berlichingen.* This was cast in the mold of Shakespeare's dramatic histories. The novelty of the undertaking was as attractive as the force of imagination behind it. Here, as in *Werther,* the poet poured forth his emotions with infectious enthusiasm.

In its design, *Werther* was nothing more than a sentimental novel, and it thus bid for a popularity much wider than that of *Götz.* The German language possessed previously nothing comparable with either of these works. Goethe's success immediately enabled him to devote his energies, without interruption or anxiety, to literary study and composition.

Life At Weimar. In 1774, in the course of his travels, Goethe met the young son of the Duchess of Saxe Weimar and later accepted an invitation to the court at Weimar, then the intellectual center of Germany. Goethe was the leading spirit of the group, which included Wieland, Herder, and, later Schiller. Here he met Charlotte von Stein, who became his dearest friend and the object of his homage. He was ennobled, made privy councilor in 1779, and received other appointments; but, in the period of his greatest activity, his most important office was that of theatrical director.

In 1786, a visit to Italy gave fresh impetus to Goethe's literary and poetic interests, and he visited Italy again in 1790. At Rome, he finished his *Iphigenia at Taurus,* described as a "marriage between philosophy of Germany and the ancient Greek tragedy." *Egmont* followed *Iphigenia,* and *Tasso* appeared in 1790.

Goethe had returned to Weimar in 1788, and at that time he met Schiller. That autumn, he met Christine Vulpius, whom he married in 1806. He accompanied the Duke of Saxe Weimar in 1792, when the Prussian army invaded France. The most productive period of Goethe's life was between 1794 and 1805, during his intimacy with Schiller, the poet. This friendship gave a literary stimulus to the activities of each.

Wilhelm Meister's Apprenticeship was completed in 1796. In 1796-97, the charming epic idyl *Hermann and Dorothea* was written; also much of the first part of *Faust,* which, however, was not completed until 1808. It is impossible not to feel the singular poetic beauty of this wonderful poem, its unsurpassed felicities of imagery and diction, and the impressivenesss of the despondent melancholy, which is the ruling temper of the whole. Philosophically considered, *Faust* is a propounding of the enigma of human life, with a refusal to accept the solution offered by religion.

Later Works. Now occurred in Goethe's career a long interval marked by nothing of distinguished note. *Elective Affinities,* of 1809, however, may be regarded as the forerunner of the psychological novel. In 1811, he published his interesting autobiography, *Poetry and Truth.* In 1821, *Wilhelm Meister's Traveling Years* was completed. After this, Goethe's only sustained effort in poetry was the second part of *Faust,* which was finished near the end of his life.

Goethe was so versatile and initiated so much that it is difficult to say in what he was greatest. His *Götz* founded the romantic school; *Werther,* the sentimental school; *Metamorphosis of Plants* was one of the pillars of Darwinism; and, in *Faust,* Goethe appears as at once the representative and the prophet of the modern spirit. He was buried near Schiller in the ducal vault at Weimar. See *Faust.*

Gógol (*gō'gôl*), **Nikolai Vasilievitch (1809-1852),** Russian novelist, was born at Sorochinstki in Poltava. In 1828, he went to Leningrad, and became famous through two series of stories of Little Russia. One of the best Russian comedies is his *Inspector-General,* attacking the corruption, ignorance, and vanity of provincial officials. His masterpiece *Dead Souls* is a powerful social satire. He destroyed the second part of the work because of a religious mania, under the influence of which he believed his writing to be sinful. After unsatisfactory trials of official life and of public teaching, including university history lectures at Leningrad in 1834, Gógol left Russia in 1836 to live abroad. He resided chiefly in Rome until 1846, when he again settled in Russia. He was the first great master of the Russian novel and is regarded as the founder of realism in modern Russian literature. His other books include *The Cloak* and *Taras Bulba,* an epic of Cossack life.

Goheen, Robert (1919-), American educator, was born at Venguria, India, where his parents were medical missionaries. He lived in India until he entered Lawrenceville School in New Jersey at the age of fifteen. From there he went to Princeton, where he was graduated with honors in 1940. After a year of graduate work, he enlisted in the United States Army as a private, winning many decorations before his discharge in 1945 with the rank of lieutenant colonel. Returning to Princeton on a fellowship, he earned his Ph.D. in 1948, and then remained at Princeton as an assistant professor in the classics department. While serving as director of the National Woodrow Wilson Fellowship Program, Dr. Goheen continued to give courses in Latin and Greek. In December 1956, at the age of 37, he was elected sixteenth president of Princeton University, to succeed Dr. Harold Willis Dodds on the latter's retirement in June 1957.

Goldoni (*gôl-dō'nē*), **Carlo (1707-1793),** Italian dramatist, was born at Venice. He studied for the law, but his heart was set upon playwriting. A tragedy, *Belisario,* proved successful, but he soon discovered that his forte was comedy, and set himself to effect a revolution in the Italian comic stage. He spent several years in wandering over northern Italy until, in 1740, he settled in his native city, where for 20 years he produced comedy after comedy.

In 1761, Goldoni undertook to write for the Italian theater in Paris, and became Italian instructor to the king's children. He wrote a successful comedy in French, *Le bourru bienfaisant,* for Marie Antoinette's wedding, and was attached to the French court until the Revolution. In all, Goldoni produced about 150 comedies, among the most noted of which are *La donna di garbo, La bottega di caffe, Pamela nubile, La casa nova, Todero Bron-talon, Gli innamorati,* and *La locandiera.* He ranks as the foremost Italian writer of comedy.

Goldsmith, Oliver (1728-1774), British poet and novelist, was born in Ireland. He was graduated at the University of Dublin, 1749, studied medicine for a time at Edinburgh, and then led a wandering life on the continent, visiting

the Netherlands, France, Switzerland, and Italy. He returned to England but, failing in practice as a physician, became an usher in an academy. During this period he supported himself by contributions to the *Monthly Review*. His first publication of note, an *Inquiry into the Present State of Polite Learning in Europe*, was published in 1759. In 1764, *The Traveler* appeared and at once placed him in the front rank of English authors.

Two years later, Goldsmith published the classic novel *Vicar of Wakefield*, which permanently established his rank in the literary world. In rapid succession he produced other works, including the comedy of the *Good-Natured Man*, in 1768; *Roman History*, in 1769; *The Deserted Village*—the finest of all his poems—in 1770. In 1773, his comedy *She Stoops to Conquer* was produced at Covent Garden with great success. During the short period of his literary activity he is said to have written the most charming novel, the finest poem, and one of the best comedies of his time.

Goldwyn, Samuel (1882-), American movie impresario, was born in Warsaw, Poland. He came to the United States in 1896. Goldwyn has been an original and dominant figure in picture-making since 1913, when he and Jesse Lasky, another pioneer in the art, formed a company and made *The Squaw Man*. He was a founder of United Artists, and of the famous Metro-Goldwyn-Mayer, but his genius is a personal one, and he formed his own company, Samuel Goldwyn Productions, in 1914. It has enjoyed great box office and artistic success. Goldwyn's sure appreciation of talent was responsible for the film debuts of such stars as Vilma Banky, Eddie Cantor, Gary Cooper, and Danny Kaye. His production *The Best Years of Our Lives* won the "Oscar" award of the Academy of Motion Picture Arts and Sciences for the best picture of 1946. Another of Goldwyn's notable films was *The Secret Life of Walter Mitty*.

Golgi (*gôl'jē*), **Camillo (1844-1926)**, Italian biologist, was born in Corteno. He was educated at the University of Pavia. He studied and practiced medicine and taught at Siena and then at Pavia. In 1870, he was the first to use silver nitrate to color nervous tissue for histological study. In 1885, he proved that there is not a network but only an interlacement of nerves, which revolutionized the theory of nervous physiology. A group of nerve endings found in tendons are called the "organs of Golgi." His greatest work in pathology was the discovery of three varieties of the protozoan blood parasite which causes malaria. In 1906, jointly with Ramon y Cajal, he received the Nobel prize for medicine.

Gómez y Báez (*gō'mās ē bā'ās*), **Maximo (1826-1905)**, Cuban patriot, was born at Bani, Dominican Republic. He served in the Spanish army in his native country and in Cuba; became hostile to Spanish rule; and retired as a farmer. In the insurrection of 1868–78, he became a colonel and later commander of the insurgent forces in Port au Prince, retiring to the Dominican Republic after the war. In 1895, on the breaking out of the second revolution, he returned to Cuba, became general in chief of the Cuban army, and later put his force at the disposal of the American troops when they landed in Cuba. He aided the United States materially in the re-establishment of the civil government of the island.

Gompers (*gŏm'pĕrz*), **Samuel (1850-1924)**, American labor leader, was born in London, England. At the age of 10, he began work for a shoemaker, but was soon after apprenticed to a cigar maker and learned the cigar maker's trade. In 1863, he came to New York City with his parents. In his 15th year, he became an advocate of the rights of labor and took an active part in the organizing work of the Cigar Makers' International Union. In 1881, he assisted in founding the American Federation of Labor, and, in 1882, became its president. With the exception of one year, he held this office continuously for more than 40 years.

During this long period of leadership, Gompers maintained a policy of firmness and moderation, steadfastly opposing the formation of a labor party but urging the members of the organization to vote for candidates who were friends of labor. Some of the results of this policy are seen in the employers' liability laws, in the eight-hour day on government contracts, and in other legislation for the benefit of the laboring man. He took a vigorous stand in support of American participation in World War I, and, after its close, fought determinedly against radical movements. His opposition to government aid to labor impressed itself on the Federation's policy for many years.

Goodhue, Bertram Grosvenor (1869-1924), American architect, was born at Pomfret, Conn. He was educated at Russell's Collegiate and Commercial Institute, New Haven, Conn., and studied architecture for six years under James Renwick. From 1891 to 1914, he was a member of the architectural firm of Cram, Goodhue, and Ferguson. He then began professional practice alone. Among noteworthy buildings designed by him are the Dominican Church of Saint Vincent Ferrer, in New York City, the Baltimore Cathedral, and the State Capitol at Lincoln, Nebraska. His writings include *Mexican Memories* and contributions to the work entitled *Spanish Colonial Architecture in Mexico*, by Sylvester Baxter.

Goodrich, Samuel Griswold (1793-1860), American juvenile writer, better known as "Peter Parley," was born in Ridgefield, Conn. He was a book publisher, first in Hartford, Conn., and afterward in Boston, Mass. After settling in Boston, he began to write, under the name of "Peter Parley," books for young folks, of which he published more than a hundred. His "Peter Parley" books comprised geographies, histories, travels, stories, and works on the arts and sciences, and won him much fame.

Goodspeed, Edgar Johnson (1871-), American Greek scholar, was born at Quincy, Ill., and was educated at Denison, Ohio, Yale, Chicago, and Berlin universities. Subsequently to 1898, he was connected with the University of Chicago as a lecturer, being made professor of Patristic Greek in 1915 and serving as secretary to the president in 1920–24. He spent many years adapting the Bible to modern readers. He is the author of *The Conflict of Severus*, *The Story of the New Testament*, *Things Seen and Heard*, and, in collaboration with E. D. Burton, *Harmony of the Synoptic Gospels*. In 1923, he published *The New Testament—An American Translation* and, in 1940, *The Complete Bible—An American Translation*.

Goodwin, Nathaniel Carl (1857-1919), American actor, was born in Boston. He studied under Wyzeman Marshall, manager of the Boston Theater, and made his debut with Stuart Robson, at Boston, 1874, in *Law in New York*. Later, he starred as Captain Crosstree in *Blackeyed Susan* in New York. He subsequently starred in *Evangeline*, *Hobbies*, *The Member from Slocum*, *In Mizzoura*, *Nathan Hale*, *The Rivals*, *When We Were Twenty-one*, *The Merchant of Venice*, *The Genius*, *A Celebrated Case*, *Never Say Die*, *Oliver Twist*, and other plays. In 1914, he published an autobiography.

Goodwin, William Watson (1831-1912), American Greek scholar and educator, was born in Concord, Mass. He was graduated at Harvard in 1851 and subsequently studied at the universities of Göttingen, Berlin, and Bonn. He was tutor at Harvard from 1856 to 1860, when he was elected to the Eliot chair of Greek, in which he taught with increasing distinction for 40 years, becoming professor emeritus in 1901. In 1860, he published his valuable *Syntax of the Moods and Tenses of the Greek Verb*, which was followed in 1870 by his widely used *Greek Grammar*. He edited Demosthenes' *On the Crown* and *Against Meidias*.

Goodyear, Charles (1800-1860), American inventor, was born in New Haven, Conn. In 1844, after ten years' labor, amidst every disadvantage of poverty and privation, he discovered a process for vulcanizing rubber by means of sulphur. When treated with this process, rubber becomes more resistant to wear and will not melt at the warmer natural-air temperatures. He immediately became involved in a fresh series of troubles consequent to the infringement of his patents, which reached about 60 in number. Because of these infringements, he remained poor while others were enriched by his inventions.

Gordon, Charles George (1833-1885), British soldier, familiarly known as "Chinese Gordon." He served in the Crimean War, 1854-56, and was wounded at Sebastopol. Later, he entered the Chinese service and assisted in suppressing the Taiping rebellion, 1863-64, whence his sobriquet of "Chinese Gordon." In 1874, he took command of the forces employed to follow up Baker's African explorations, during which time he totally suppressed the slave traffic on the Red Sea.

In 1884, Gordon went to the Sudan, in lower Egypt, as an emissary of England to quiet the insurgent tribes under El Mahdi, the "false prophet of the Sudan." His memorable journey to Khartum with one or two attendants and the influence which his presence exercised over the tribes of the desert form one of the most thrilling episodes in his career. He was killed when Khartum was captured by El Mahdi.

Gordon, Charles William (1860-1937), "Ralph Connor," Canadian clergyman and novelist, was born in County Glengarry, Ontario. After graduation at Toronto University in 1883, he was classical master at Chatham High School, 1883-84. Upon graduating from the theological course, Knox College, Toronto, in 1887, he continued postgraduate study in New College, Edinburgh, Scotland, and spent a year in travel on the continent. He was a missionary to Banff and elsewhere in the Rocky Mountains from 1890 to 1894, when he became minister of Saint Stephen's Church, Winnipeg. In 1915, he became chaplain to Canadian forces at the front in France. His novels, which combine story-telling skill with a moral viewpoint, include *Black Rock*, *Beyond the Marshes*, *The Sky Pilot*, *Ould Michael*, *The Man from Glengarry*, *Glengarry School Days*, *The Prospector*, *The Doctor*, *The Foreigner*, *The Recall of Love*, and *The Runner*.

Gorgas (*gôr'găs*), **William Crawford (1854-1920)**, American sanitary engineer, was born at Mobile, Ala. He

was graduated from the University of the South in 1875, from Bellevue Medical College in 1879, and became a surgeon in the army in 1880. As chief sanitary officer at Havana, Cuba, 1898-1902, he eliminated yellow fever from the city. From 1904 to 1913, as chief sanitary officer of the Panama canal, he established and maintained remarkably healthful conditions for the workers, thereby preventing the enormous sacrifice of life that otherwise would have ensued among men not acclimated to the tropics.

In 1914, he was made surgeon general in the United States army with rank of brigadier general. In 1916, he was made major general, and, in 1918, was retired. He then became director of the yellow-fever work of the international health board established by the Rockefeller Foundation. In 1919, he accepted a contract to carry out a sanitary program for the government of Peru. Elected to American Hall of Fame in 1950.

Gorgias (*gôr'jĭ-ăs*) **(c. 483-c. 380 B. C.),** Greek sophist and rhetorician of the time of Socrates, was born at Leontini and settled in Greece, residing for the most part at Athens and at Larissa in Thessaly. He has been immortalized by Plato in a dialogue which bears his name. Two works attributed to him are extant, *The Apology of Palamedes* and the *Encomium on Helen.* He is known for a highly ornamented style abounding in balance and assonance.

Göring, Hermann Wilhelm (1893-1946), German statesman, was born at Rosenheim, Bavaria. He distinguished himself as an "ace" in the German air force in World War I. Participating with Hitler in the abortive attempt in Munich in 1923 to seize the government, he fled to Italy, returning in 1927, and became an active leader in the Nazi party. He was elected to the Reichstag in 1928 and was made president of it in 1932, assisting it in voting itself out of existence as a legislative body the next year.

Under Hitler, Göring was made cabinet minister for the air force, president of Prussia, minister of the interior with authority over the police, and general of infantry. In 1936, he was put in charge of the four-year plan and gradually became economic dictator. As air field marshal, he adopted new and effective methods of using airplanes in war, results of which were seen in the quick collapse of Poland in 1939, the capture of The Netherlands in 1940, and the spectacular overthrow of the French army. His air raids upon Britain were unsuccessful. He lost favor with Hitler before the close of the war. After the surrender of Germany, he was tried by the Nuremberg war crimes court and sentenced to death.

Gorky (*gôr'kĭ*), **Maxim (1868-1936),** is the pen name of Alexei Maximovitch Pyeshkov, a self-educated Russian novelist, born in Nizhni Novgorod, the son of an upholsterer. His birthplace was renamed Gorki in his honor after his death. After the death of his parents he was engaged in various occupations until his attention was turned to literary work. His first story, *Makar Chudra,* appeared in 1892 and, in 1895, his *Chelkash* met with great success. He was one of the most original and popular of modern Russian writers, excelling in the short story but not so successful in his longer works. In 1914, he enlisted in the Russian army, and was identified with the movement that led to the dethronement of Czar Nicholas in 1917. He opposed the Bolshevik regime at first but later became an enthusiastic supporter. Among his works are *The Song of the Falcon, The Song of the Petrel, The Orloff Couple, Malva, Foma Gordeyeff, Children of the Sun, The Barbarians, Three Men, The Spy, My Childhood, My University Days, In the World, A Confession,* and *The New Russia.*

Gort, John Standish Surtees Prendergast Vereker, Viscount (1886-1946), English general. He joined the army in 1905 as second lieutenant and, in 1913, was made aide-de-camp to the officer commanding the London district. He served throughout World War I, sometimes on the staff and sometimes in the field, being wounded four times and mentioned in dispatches nine times. From 1921 to 1927, he was an instructor in the army college and then had assignments in Shanghai and India, being made a major general in 1935.

Having been appointed chief of the British imperial staff in 1937, he led the English expeditionary force to France in 1939. In May 1940 the Germans invaded Belgium, the British army was cut off by the surrender of the Belgians and the collapse of the French line, and driven back upon Dunkirk. Gort succeeded in maintaining his army intact and holding back the Germans until, with the help of the navy, the air force, and hundreds of volunteer ships, he brought the greater part of his forces back to England. He was then placed in command of Gibraltar. In 1942 he was made governor and commander in chief of Malta. In 1944-45 he was high commissioner and commander in chief for Palestine, and high commissioner for Jordan.

Gosnold (*gŏs'nŭld*), **Bartholomew (?-1607),** English navigator, was born in England about the middle of the 16th century. He was associated with Sir Walter Raleigh in his attempt to found a colony in Virginia, and later headed an expedition to found a colony in New England. In 1602, he left Falmouth for this purpose with a ship and 20 colonists, attempting to cross the ocean in a direct line. After a tedious voyage of seven weeks, he reached the coast of Maine. Following the land line in a southwesterly direction, he discovered Cape Cod and Martha's Vineyard. In 1606, Gosnold united with a company, of which Captain John Smith was one of the leaders, to locate in Virginia. Through their joint efforts the settlement at Jamestown was established in 1607.

Gosse (*gŏs*), **Edmund William (1849-1928),** English poet, critic, and biographer, son of Philip Henry Gosse, was born at London. He was privately educated and, in 1867, became assistant librarian in the British Museum. In 1884, he was made lecturer in English literature at Trinity College, Cambridge, and from 1904 to 1914 was librarian to the House of Lords. While a writer of graceful lyrics and of clear prose, he was especially conspicuous for bringing to the attention of English readers the works of Ibsen and other foreign writers. Among his other writings are *On Viol and Flute, Thomas Gray, History of Eighteenth Century Literature, The Secret of Narcisse, The Jacobean Poets, Short History of English Literature, Jeremy Taylor, French Profiles, Sir Thomas Browne, Two Visits to Denmark, Inter Arma,* and *Some Diversions of a Man of Letters.*

Gottschalk (*gŏt'shălk*), **Louis Moreau (1829-1869),** American pianist and musical composer, was born in New Orleans. He studied in Europe and, from 1845 to 1852, made successful tours of the continent. Returning to America in 1853, he toured the country with notable success, playing and conducting his own compositions. His reputation now rests upon his piano pieces, among which are *Bamboula, Bananier, Savane, Ojos Creolas, Ossian,* and *The Last Hope.* He died at Rio de Janeiro.

Goudy, Frederick (1865-1947), American typographer, was born in Bloomington, Ill. He exerted a tremendous influence on all kinds of printing, and his impressive body of work seems destined to survive for centuries. Among the hundred or more type faces which Goudy created are Kennerley, Forum, Garamont, and many faces bearing his name. All are characterized by elegance and classic good taste. Goudy was an industrious writer, and his books offer valuable advice on effective typography. They are *The Alphabet, Typologia: Studies in Type Design and Typography,* and *The Elements of Lettering.*

Goujon (*gōō'zhôN'*), **Jean (c. 1515-c. 1566),** French sculptor and architect, was born in Paris. He was employed on the Church of Saint Maclou, at Rouen, 1540, and on the Cathedral there, 1541. With Pierre Lescot, architect of the Louvre, he worked on the restorations of Saint Germain L'Auxerrois, 1542-44. On the accession of Henry II, he entered the royal service. In the Louvre, he executed the reliefs of the Escalier Henry II, the carvings at the southwestern angle of the court, and the Tribune des Cariatides. He is the author of what is considered the masterpiece of French Renaissance sculpture, the "Diane Chasseresse," now in the Louvre collection. See *Sculpture.*

Gould, Benjamin Apthorp (1824-1896), American astronomer, was born at Boston, Mass. He was graduated at Harvard College in 1844, afterward studied at Göttingen, and was an assistant in the observatory at Altona, Germany. From 1855 to 1859, he was director of the Dudley Observatory at Albany, N. Y. In 1866, he established an observatory at Valentia in Ireland, and made the first determination of transatlantic longitude by telegraph cable. In 1870, he established an observatory at Cordoba, Argentina, where he did valuable work in southern celestial astronomy until his return in 1885. His principal works are *Report on the Discovery of the Planet Neptune, Smithsonian Institution Reports, Investigation of the Orbit of the Comet V, On the Transatlantic Longitude,* and many charts of stars.

Gould, Helen Miller, See *Shepard, Helen Miller Gould.*

Gould, Jay (1836-1892), American financier, was born at Roxbury, N. Y. He was brought up on his father's farm, attended Hobart Academy a short time, and acquired a taste for mathematics and surveying. Shortly after the panic of 1857, he began investing in railroad securities. He first purchased bonds of the Rutland and Washington railroad, and became president, treasurer, and superintendent of the road. Soon afterward he effected a consolidation of his road with the Rensselaer and Saratoga road. He then withdrew his capital, removed to New York, opened a broker's office, and began dealing in Erie stocks and bonds.

In association with James Fisk, Jr., he entered the directory of the Erie Railroad Company, and was elected president. On the reorganization of the company, 1872, he lost official connection with it. He then invested heavily in the various Pacific railroads, secured control of a number of important lines, built branches, and effected combinations

which resulted in the establishment of what is known as the "Gould system," controlling 10,000 miles of road. At his death, he left an estate of 80 million dollars.

Gould, Morton (1913-), composer and conductor, was born at Richmond Hill, Long Island. He was a child musical prodigy, and made many appearances as a composer-pianist while still very young. He has been guest conductor of leading American symphony orchestras, and his compositions have been played by Toscanini, Stokowski, Mitropoulos, and other famous conductors. He has arranged and led network radio programs and has composed ballets and written music for stage shows.

Gounod (*gōō'nō'*), **Charles François** (**1818-1893**), French composer of sacred and dramatic music, was born at Paris. He studied music at the Paris Conservatory, and, in 1839, gained the prize for composition. He then visited Rome and Vienna, and, in 1849, became an organist in Paris. He first attracted attention by his *Messe solennelle* and by his opera *Sappho* in 1851. These were followed by *Ulysse*, *La nonne sanglante*, and *Le médecin malgré lui*. In 1859, he brought out his noted opera *Faust*, his greatest success and one of the most enduringly popular operas of the modern stage. His next greatest success in dramatic music was the opera *Roméo et Juliette*, 1867.

Among other operas by Gounod are *Philémon et Baucis*, *Mireille*, *La reine de Saba*, and *La Colombe*. In sacred music, his most notable compositions are the *Messe de Sainte Cécile* and the oratorios *Mors et Vita* and *The Redemption*. He wrote many beautiful songs, including the widely known "Ave Maria," based on Bach's first prelude. His influence on contemporary French music was very great. See *Faust*.

Goya (*gō'yä*), **Francisco José de** (**1746-1828**), Spanish painter, was born at Fuendetodos, near Saragossa. He is said to have first studied under Martinez at Saragossa. Later, he went to Madrid, where he was influenced by the works of Velasquez and Tiepolo, and, after some years, he went to Rome. He was unrivaled as a painter of Spanish national customs, stood first among Spanish designers of tapestries, and achieved great distinction as an etcher. He inclined to grimly realistic scenes of battle, bullfighting, and torture. His work is characterized by great emotional intensity and power. Representative examples of his works are found in leading American collections.

Graaf (*grāf*), **Regnier de** (**1641-1673**), Dutch physician and anatomist, was born in Schoonhoven. He studied under Sylvius at the University of Leiden, also at Lowen and Utrecht, finally settling at Delft. He became especially distinguished by his discovery that all animals are oviparous. He also discovered the Graafian vesicles named after him, though he mistook their functions. He was the author of works on the functions of the pancreas and on the generative organs.

Grady, Henry Woodfin (**1851-1889**), American journalist and orator, was born at Athens, Ga. He was graduated at the State University at Athens in 1868 and took a postgraduate course at the University of Virginia. He began his journalistic career in 1870, winning wide notice by a series of articles in the Atlanta *Constitution* describing the resources of Georgia. For some time he acted as Southern correspondent of the New York *Herald*, and, in 1880, became part owner and managing editor of the Atlanta *Constitution*, which he conducted until his death. He was an eloquent speaker, a man of broad and liberal views, and during his brief public life did much to advance the interests of Georgia and the South. He was widely known for a brilliant after-dinner oration entitled *The New South*.

Graetz (*grĕts*), **Heinrich** (**1817-1891**), Polish historian, was born in Posen, Poland. He was mostly self-educated, became a teacher in the Jewish seminary at Breslau, and, in 1870, was made professor in the University of Breslau. His principal work is *Geschichte der Juden*, begun in 1853 and completed in 1875. This has been translated into many languages and has won for him the position of recognized master of Jewish history.

Grafly (*grăf'flĭ*), **Charles** (**1862-1929**), American sculptor, was born in Philadelphia, Pa. He was educated at the Pennsylvania Academy of Fine Arts, Philadelphia, and studied under Chapu and Dampt in Paris. In 1892, he became instructor in sculpture at the Pennsylvania Academy of Fine Arts, and, in 1917, he accepted a similar position in the school of the Boston Museum of Fine Arts. His works include "General Reynolds," Fairmount Park, Philadelphia; "Fountain of Man," made for the Pan-American Exposition at Buffalo; "From Generation to Generation," "Symbol of Life," "Vulture of War," and "Truth," in the Saint Louis Museum; "Mauvais Présage," in the Detroit Museum; "England" and "France," in the New York Customhouse; "In Much Learning," in the Pennsylvania Academy; and many portrait busts. He ranks high among American sculptors for his strong, thoughtful work, simply and truthfully modeled.

Graham, Hugh (**1848-1938**), Canadian journalist, was born in Huntingdon, Quebec, and received his education at the Huntingdon Academy. Early in life he began newspaper work in Montreal, where he became editor and publisher of the *Commerical Advertiser* and the *Evening Telegram*. In 1869, he founded the Montreal *Star*, which, under his constructive management, became one of the most influential and widely circulated Canadian journals, independent in politics and devoted to civic improvement and the promotion of humanitarian projects. He was knighted in 1908 and was created baron in 1917 with the title of Lord Atholstan.

Graham, Martha, one of the foremost figures in the modern American dance, was born in Pittsburgh, Pa. She studied under the famous Ruth St. Denis. Martha Graham's style and grace won for her the distinction of dancing in Stravinsky's ballet *The Rites of Spring* at its American premiere in 1930. She exercises a profound influence both for classical purity and for imaginative experimentation in the dance. She has appeared to great acclaim, both in America and abroad, often being accompanied by the world's great orchestras. She created and operates the Martha Graham School of Contemporary Dance in New York City.

Graham, (Billy) William Franklin (**1918-**), evangelist, was born in Charlotte, North Carolina. He was educated at various colleges and seminaries and was ordained a minister in the Baptist Church. He has engaged in nationwide evangelistic campaigns since 1946, and has made a number of preaching trips to Europe. He is speaker on the network radio and television program "Hour of Decision."

Grainger, Percy Aldridge (**1882-**), British pianist and composer, was born at Melbourne, Australia. He studied music with his mother in Australia until his tenth year and then went to Frankfort on the Main, Germany, where he studied several years. He then removed to London and, in 1914, took up his residence in the United States.

He gave concerts in all parts of the world, for many years producing over one hundred concerts annually and winning notable distinction as a musical artist. By his artistic settings he did much to revive interest in folk music. He wrote many compositions for the piano, voice, chorus, orchestra, and also chamber music. His publications include *British Folk-music Settings*, *Room-music Tit-bits*, *Kipling Settings*, *Father and Daughter*, and numerous piano pieces and songs.

Grand, Sarah (**1860-1943**), is the assumed name of Frances Elizabeth Clarke, British novelist, born in Ireland of English parents. At 16, she married Lieutenant Colonel McFall, who died in 1898. In 1893, she published *The Heavenly Twins*, which established her literary reputation. She was mayor of Bath in 1923, 1925, and several succeeding years. Her writings include *Singularly Deluded*, *A Domestic Experiment*, *Our Manifold Nature*, *The Beth Book*, *The Modern Man and Maid*, *Babs the Impossible*, *Emotional Moments*, *The Winged Victory*, and *Variety*.

Grandi (*grän'dē*), **Dino, Count** (**1895-**), Italian statesman, was born at Bologna. Educated for the law, he interrupted his studies to volunteer for service in World War I and was decorated several times for valor. After the war he turned to journalism and, in cooperation with Mussolini, helped organize the Fascist party. He was one of the leaders of the "march on Rome" in 1922. Thereafter he took a leading part in directing Italy's foreign relations. He was minister of foreign affairs from 1929 to 1932 and then went to London as ambassador for his country. In 1939, he returned to Rome and was made minister of justice. He retired with Mussolini in 1943.

Grant, (Hiram) Ulysses Simpson (**1822-1885**), 18th president of the United States, was born at Point Pleasant, Ohio; was graduated at the Military Academy, West Point, in 1843; and served under General Taylor in the war with Mexico, 1846, up to the capture of Monterey. His regiment was then transferred to the expedition under General Scott; he took part in every action from Vera Cruz to Mexico, and was brevetted first lieutenant and captain for meritorious conduct at Molino del Rey and Chapultepec. In 1852, he served in Oregon, but, in 1854, resigned his commission and settled in Saint Louis, Mo., whence, in 1860, he removed to Galena, Ill., and engaged in the leather trade.

At the beginning of the Civil War in 1861, Grant volunteered his services and was appointed colonel of an Illinois regiment. In August, he was appointed brigadier general, commanding the important post of Cairo, occupied Paducah, and led an expedition on the Mississippi. In February 1862, he distinguished himself in the capture of Fort Donelson, on the Tennessee River, and was made major general. On April 6 following, he won a great battle over the Confederates at Pittsburg Landing, or Shiloh.

Succeeding General Halleck in the West, Grant commanded the land forces which, in conjunction with the navy, captured Vicksburg. This action was followed by the fall of Port Hudson and the opening of the Mississippi. He then took command of the army of Tennessee, and defeated General Bragg at Chattanooga in September 1863. In the next year, Grant was appointed lieutenant

general and commander in chief, and personally directed the operations of the great final struggle in Virginia. In this campaign, the Northern forces, though often repulsed with heavy losses, finally compelled the evacuation of Richmond. April 2, 1865. This was followed on the 9th by the surrender of the Confederate army under General Lee, and soon after of the entire Confederate forces.

Congress, in recognition of Grant's eminent services, passed an act reviving the grade of "general of the army of the United States," to which Grant was immediately appointed. In 1868, he was elected, on the Republican platform, president of the United States, and, in 1872, was re-elected over a notable opponent, Horace Greeley of the New York *Tribune*. In 1877, after completing his second presidential term and failing to receive the hoped for nomination for a third term, Grant visited Europe, and toured the world, receiving an enthusiastic welcome, especially in England and France.

Simple, reticent, earnest, and persevering in his character, he owed his military success to singleness of purpose, relentless vigor, grim courage which rose higher with each obstacle, and, above all, to clear judgment as to the objects and issues of the war. Having lost his moderate fortune in an unfortunate investment, Grant wrote his *Personal Memoirs*, which now ranks among the best military biographies. The sales of this work earned for him and his family about a half million dollars. He was elected to the American Hall of Fame in 1900.

Granville-Barker, Harley (1877-1946), English actor, manager, and playwright, was born in London. Beginning under Ben Greet, continuing with the Elizabethan stage society, and later appearing with Mrs. Patrick Campbell, he worked his way to the front in the theatrical world. For many years he acted and produced plays for the stage society, presenting several of Bernard Shaw's plays for the first time. In 1904, he began the management of the Court Theater, where he introduced new plays by Shaw, Hankin, Barrie, Galsworthy, and himself. Combining keen observation with remarkable talent for dramatic expression, his plays are notably faithful portrayals of character. *The Voysey Inheritance* gives a fine picture of modern, middle-class English family life; *Waste* is a tragedy with a timely theme; *The Madras House* is a searching comedy of character. He wrote also *Prefaces to Shakespeare* and *On Dramatic Method*.

Grattan (*grăt'ăn*), **Henry (1746-1820),** Irish orator and statesman, was born in Dublin. He was educated at Trinity College, Dublin. In 1772, he was admitted to the Irish bar and, in 1775, was elected to the Irish parliament. Here he assisted in effecting the partial abolition of the heavy restrictions on Irish commerce. In 1800, he was elected to the Irish parliament from the borough of Wicklow to oppose the union with England. But the union was effected despite his efforts, and, in 1805, he was made member of the British Parliament. He was repeatedly re-elected and labored for Catholic emancipation until his death. His eulogy on Chatham and his invective against Bonaparte are not surpassed in British eloquence.

Graves, Robert (1895-), was born in London, and was educated at Oxford. He has had a busy and varied literary career. He taught literature in an Egyptian university, has written poetry and novels, and translated from the Greek. Graves is best known for his historical novels of ancient Rome, *I, Claudius* and *Claudius the God*, and for his two novels about a British soldier in the American Revolutionary War, *Sergeant Lamb's America* and *Proceed, Sergeant Lamb*. He has translated into English Apuleius' *The Golden Ass*. Graves is an active poet and collections of his works are published periodically.

Gray, Asa (1810-1888), American botanist, was born at Paris, N. Y. He was graduated in medicine at Fairfield College, and, in 1834, became botanist of the United States exploring expedition. He was afterward appointed professor of botany in the University of Michigan, but, before he had entered upon the duties of that office, he was elected in 1842 Fisher professor of natural history at Harvard University. His most important work was his now classic *Manual of the Botany of the Northern United States*, which passed through numerous editions. By its clearness, compactness, and accuracy, it was long indispensable to the student of eastern American botany.

Gray was the ablest and most influential of the early American advocates of Darwin's theory of evolution. His contributions to American scientific knowledge were monumental, and his personal influence upon two generations of American botanists was profound. He ranked among the leading botanists not only of America but of the age. He wrote *Elements of Botany; Flora of North America; How Plants Grow; Field, Forest, and Garden Botany; Darwiniana; Synoptical Flora of North America;* and *Natural Science and Religion*. He was elected to the American Hall of Fame, 1900.

Gray, Elisha (1835-1901), American inventor, was born at Barnesville, Ohio. He attended Oberlin College, where he supported himself by working as a carpenter. Becoming interested in electricity, he left college to devote himself to the improvement of electrical apparatus. In 1867, he received his first patent for a self-adjusting telegraph relay. He afterward invented the telegraphic switch and annunciator for hotels, the telephonic repeater, and the private telegraphic line printer. In all, he secured about 50 patents, chiefly for electrical inventions, among which were a system of multiplex telegraphy, a type-printing telephone, and the telautograph.

Gray entered claim to priority in the invention of the speaking telephone, which resulted in long litigation with Alexander Graham Bell. Bell's patent and rights were finally sustained by the Supreme Court. Among Gray's most important writings are *Experimental Researches in Electro-Harmonic Telegraphy and Telephony* and *Elementary Talks on Science*.

Gray, Thomas (1716-1771), English poet, was born in London. He was educated at Cambridge and, after many years of study and travel, was appointed professor of history and modern languages there in 1768. He had a just appreciation of the natural beauty of his native country, made notes wherever he went, and to his literary friends wrote copious descriptions of what he had seen. Gray was the most scholarly of early English romantic poets. He wrote but little, but some of his poems are notably perfect in form and finish. He published his *Ode to Eton College* in 1747 and his *Elegy Written in a Country Churchyard*, by which he is best known, in 1751. On the death of Colley Cibber, 1757, he was offered, but declined, the post of poet laureate.

Greeley, Horace (1811-1872), American journalist, was born at Amherst, N. H. He entered a printing office as an apprentice at East Poultney, Vt., 1826. On the completion of his apprenticeship, he worked for some time as a journeyman printer and, in 1834, founded the *New Yorker*, a literary weekly paper, for which he wrote essays, poetry, and other articles. After one or two other attempts at editorship, he founded, in 1841, the New York *Tribune* and became the leading editor. He was assisted by associates of unusual ability, including Bayard Taylor, Charles A. Dana, and George Ripley, and, for a quarter of a century, exercised a powerful influence in national affairs. The *Tribune*, under his editorship, was an earnest advocate of such causes as temperance, woman's rights, the abolition of slavery, organization of labor, and a protective tariff, and was recognized as the organ of the extreme or radical Republican party.

In 1848, Greeley was elected to Congress. His aspirations to high political position were defeated by the more conservative party leaders, and he, in turn, influenced the nomination of Lincoln instead of Seward in 1860. On the secession of several of the Southern states from the Union, Greeley at first admitted their right to secede, in accordance with the principles of the Declaration of Independence; but, when war broke out, he became its most zealous advocate. Later he sought to effect a compromise and, in 1864, with Lincoln's consent, arranged a fruitless conference with pretended Confederate delegates in Canada.

At the end of the war, he urged universal amnesty and signed the bail bond of Jefferson Davis. This brought upon him much hostile criticism and when, in 1872, he became presidential candidate against Grant, many of his stanchest friends accused him of conspiring to place the government in the control of the men who had recently sought to destroy it. Overwork and mortification at his overwhelming defeat hastened his death.

Greely, Adolphus Washington (1844-1935), American soldier, arctic explorer, and scientist, was born at Newburyport, Mass. Entering the volunteer service, he attained the rank of captain during the Civil War, and at its close was transferred to the regular army with the rank of lieutenant.

In 1881, he was assigned to the command of the Lady Franklin Bay expedition to northern Greenland. His expedition attained the then "farthest north," 83° 24′ N. He published an account of the expedition, in 1885, under the title of *Three Years of Arctic Service*. For this expedition, he was, in 1935, voted the Congressional medal of honor.

In 1887, he became chief of the United States Signal Service. Under his direction, 21,000 miles of military telegraph lines were built in the United States, Cuba, Puerto Rico, China, the Philippines, and Alaska. In 1906, he was made major general and was in command at San Francisco after the earthquake and fire. He retired in 1908. Besides many valuable scientific works, he wrote *American Explorers and Travelers, Handbook of Polar Discoveries*, and *Reminiscences of Travel and Adventure*.

Green, Hetty Howland Robinson (1835-1916), American financier, was born in New Bedford, Mass., daughter of Edward Mott Robinson, who died in 1865 leaving her a large fortune. In 1867, she married Edward H.

Green, who died in 1902. She was reputed to be the richest woman in America and was probably the greatest woman financier in the world. She personally managed a property of many millions in stocks, bonds, and real estate in Chicago, New York, and elsewhere, living meanwhile in a very economical fashion.

Green, John Richard (1837-1883), English historian, was born at Oxford and was educated at Magdalen College School and Jesus College. He was ordained as a minister in 1860 and was for some time vicar of Saint Philip's, Stepney, becoming librarian at Lambeth in 1869, after which he turned his entire attention to history and politics. Among his valuable works are *A Short History of the English People*, *A History of the English People*, *The Making of England*, and *The Conquest of England*. The last was published after his death by his wife, Alice Stopford Green, who assisted him in various works and herself wrote *Henry II* in the "Twelve English Statesmen" series.

Green, Thomas Hill (1836-1882), English philosopher, was born in Yorkshire. He was educated at Balliol College, Oxford, where he was elected to a fellowship in 1860 and became professor of moral philosophy in 1878. He was the most influential English representative of the Neo-Hegelian school of thought. His philosophical profundity and strong interest in social questions drew around him many of the best men at Oxford. In 1874, he contributed to the Clarendon press edition of Hume's *Treatise on Human Nature*, an introduction subjecting Hume's philosophy in detail to searching and hostile analysis from an idealist point of view. His *Prolegomena to Ethics*, left incomplete at his death, was edited by A. C. Bradley. His scattered essays in *Mind* and elsewhere were edited by R. L. Nettleship as *The Works of T. H. Green*.

Green, William (1873-1952), American labor leader, was born at Coshocton, O. Educated in the public schools, he became active in labor union work at an early age and was made president of a subdistrict of the United Mine Workers of America in 1900. He rose to the international secretary-treasurership of that organization in 1913, after having served two terms in the Ohio senate. In 1924, he was elected president of the American Federation of Labor, succeeding Samuel Gompers. Under his guidance, labor made substantial improvements in its position with very few of the costly hostilities which were the price of earlier gains.

The Federation, however, was divided in 1937 by the splitting off of the group later known as the Congress of Industrial Organizations. Both labor groups increased rapidly in membership although frequently found on opposing sides on political or legislative issues.

Greene, Graham (1904-), prolific English author of both intensely serious novels and suspense thrillers which he labels "Entertainments," was born in Hertfordshire and was educated at Balloil College, Oxford. Greene had his first book published in 1925. Among his early successes, all later adapted to the screen, were *This Gun for Hire*, *Brighton Rock*, and *Confidential Agent*. During World War II, he worked at the Foreign Office, and spent a period from 1942 to 1943 in West Africa, where he probably gained the material for *The Heart of the Matter*, his most successful religious-romantic novel, published in 1948. Greene is a convert to Catholicism. He has also written a number of books for children. Greene's style is powerful and notable in its range. In *Brighton Rock* it is often almost surrealistic; in *The Heart of the Matter* and *The End of the Affair* it is calm and moving.

Greene, James Sonnett (1880-), American physician, was born in New York City. Educated at Cornell University and in Berlin and Breslau, Germany, he began practice in New York. Having suffered from stuttering in early life, he gave his attention particularly to the diagnosis and cure of stuttering and other speech disorders lying on the borderland of physiology and psychology. In 1916, he founded in New York the National Hospital for Speech Disorders and acted as its medical director. In addition to many technical articles, he wrote *The Cause and Cure of Speech Disorders* (in collaboration) and *I Was a Stutterer*.

Greene, Nathanael (1742-1786), American general, was born in Patowomut, R. I., son of a Quaker preacher. In 1770, he was chosen a member of the Rhode Island Assembly and, to the great scandal of his fellow Quakers, was among the first to engage in the military exercises preparatory to resisting the mother country.

In 1774, he enlisted as private and, in 1775, was appointed to the command of the Rhode Island contingent to the army at Boston with the rank of brigadier general. At the battle of the Brandywine, he commanded a division and, by his skillful movements, saved the American army from utter destruction. In 1780, he succeeded Gates in the command of the army of the South. In 1781, with an army of new recruits, he entered upon active operations and finally defeated the English at Eutaw Springs, the hardest-fought field of the Revolution, which put an end to the war in South Carolina.

Congress presented him with a medal in honor of his services, and the Carolinas and Georgia made him valuable grants of land. When peace was restored in 1783, Greene returned to Rhode Island, where he received numerous testimonials of the public admiration. He was one of the ablest generals of the war, second, perhaps, only to Washington, whose intimate friend he was. In 1785, he retired with his family to his estate in Georgia, where he died of sunstroke.

Greenough (*grēn'ō*), **Horatio (1805-1852),** American sculptor, was born in Boston, Mass. He was graduated at Harvard in 1825 and, from that year until 1851, lived chiefly in Italy. His principal work is the colossal statue of Washington formerly in front of the Capitol and now in the Smithsonian Institution. Others are "Medora," "Venus Victrix," and a group of four figures, "The Rescue." His works are all in the severe classical style of the period, without personality or emotion.

Gregor, William (1761-1817), English chemist and mineralogist, was born at Trewarthenick, Cornwall. He was educated at Saint John's College, Cambridge. He entered the ministry and, in 1793, became rector of Creed, Cornwall, where he remained throughout his life. He was a painter and etcher of distinction and, after hearing a series of lectures on chemistry, devoted much time to analytical mineralogy. In 1791, in a peculiar black sand of the Menacchan Valley in Cornwall, he discovered a new metallic element, called by him menacchine, which Klaproth five years later described, and named titanium, although crediting the original discovery to Gregor. He conducted valuable researches in the analysis of minerals and published numerous papers.

Gregorovius (*grĕg'ô-rō'vĭ-ŭs*), **Ferdinand (1821-1891),** German historian, was born at Neidenburg in East Prussia. He studied theology, but devoted himself chiefly to poetry and literature. In 1852 he settled in Rome. His great work—the standard work on the subject—is the *History of the City of Rome in the Middle Ages*. He wrote on Italian geography and history, on Corsica, Capri, the graves of the popes, Lucrezia Borgia, Urban VIII, Athens, and the Byzantine empress Athenais; he also wrote a tragedy on the death of Tiberius and an epic, *Euphorion*.

Gregory I (c. 540-604), called "the Great,"pope, was born in Rome. He was appointed governor of Rome, but, on inheriting his father's wealth, resigned and became abbot of Saint Andrew's, Rome. After being secretary to Pelagius II, he succeeded him as pope in 590. Few pontiffs have surpassed Gregory as a constructive administrator. He organized the public services of the Church, perfected the ritual, and systematized sacred music. He composed chants, established a musical school in which he himself taught, and collected and arranged fragments of ancient hymns. He is the author of numerous sacred works, the chief of which is his *Morals from the Book of Job*. Gregory is the most notable figure in the ecclesiastical history of the middle ages and exercised a powerful and permanent influence on doctrine, organization, and discipline, being now regarded as one of the greatest doctors of the Church.

Gregory VII (c. 1020-1085), otherwise known as Hildebrand, a Roman pontiff, was born at Saona, near Siena, Italy. His youth was passed at Rome in the monastery of Saint Mary on the Aventine, of which his uncle was abbot. About 1045, he was made chaplain to Pope Gregory VI, whom he shortly afterward accompanied on his exile into Germany.

He attended the Diet of Worms in 1049, where Bruno, bishop of Toul, was elected pope as Leo IX. Hildebrand there came under the favorable notice of the new pope, over whom he won an ascendancy that he never thereafter lost. He virtually directed the conduct and succession of the Holy See through the reigns of five pontiffs, 1048–73. In 1050, he became a cardinal subdeacon, and, in the following years, he was intrusted with many important missions.

In 1073, Hildebrand was himself compelled by the tumultuous demands of the mob to accept the vacant tiara, and he was established on the papal throne under the title of Gregory VII. He lost no time in giving the utmost practical effect to the two leading ideas of his life: the establishment of the supremacy of the papacy within the Church and the assertion of the supremacy of the Church over the state. He repressed simony and enforced the observance of strict discipline among the clergy.

It was determined that any ecclesiastic who in the future should accept office from the hands of a layman should incur the penalty of deposition, while the secular lord who bestowed investiture should be excommunicated. Emperor Henry IV of Germany defied the ruling and, in 1076, declared Gregory deposed. Gregory lost no time in pronouncing against Henry a sentence of excommunication, which, according to the law of the Empire, involved a loss of the imperial prerogatives. Seeing that resistance

was impossible, Henry yielded, and sought absolution from the pope at Canossa in 1077. This triumph of Gregory's is regarded as the greatest temporal victory ever won by the papacy.

When Henry found his position sufficiently strong, he renewed his attitude of defiance and, in 1080, was again excommunicated. On this occasion, he retaliated by appointing the antipope Guibert, and proceeded to lay siege to Rome. In 1084, Gregory was compelled to take refuge in the castle of San Angelo, while Guibert was established on the pontifical throne as Clement III. Gregory retired to Salerno, where he spent his last days under the protection of Robert Guiscard. "I have loved justice and hated iniquity; therefore, I die in exile," were the last words he is said to have uttered before his death.

Gregory, Augusta, Lady (1859-1932), Irish dramatist, was born at Roxborough, County Galway. She worked many years for the creation of a national Irish theater and drama. With Yeats and others, she helped found the Irish National Theater Society, and she became director of the Abbey Theater, Dublin. She reconstructed ancient Irish legends, lectured extensively, and wrote numerous plays. She excels in one-act plays which are at once quaintly humorous, truly comic, kindly satirical, and intensely human. She translated plays by Molière, Sudermann, and Goldoni. Her publications include *Poets and Dreamers, Gods and Fighting Men, Saints and Wonders, The Kiltartan History Book, The Full Moon, The Golden Apple,* and *Aristotle's Bellows.*

Grenfell, Wilfred Thomason (1865-1940), English missionary physician, was born at Parkgate, near Chester, Eng. After being graduated from Oxford University, he took a course in medicine at the London Hospital, Whitechapel, after which he devoted himself to reform work among the mariners of the North Sea, establishing homes on land and mission vessels at sea. In 1892, he began similar work on the coast of Labrador, erecting hospitals, co-operative stores, factories, schools, and orphans' homes. In 1912, he opened a seaman's institute at Saint John's, Newfoundland. While primarily evangelistic in purpose, he laid great stress from the first on improving the physical, social, and economic conditions of the seamen of the northeast coast. Among his books are *Off the Rocks, Adrift on an Ice Pan, The Adventure of Life,* and *Labrador Looks at the Orient.*

Gresham (*grĕsh'ăm*), **Sir Thomas (1519-1579),** English financier and philanthropist. After studying at Cambridge he became connected, in 1543, with the Mercers Company, and, in 1551, was employed as king's agent at Antwerp. In two years, he paid off a heavy loan and restored the king's credit. As a Protestant, he was dismissed by Queen Mary but was soon reinstated. He was knighted by Queen Elizabeth in 1559 and was, for a time, ambassador at Brussels. The troubles in the Netherlands compelled him to withdraw in 1567 from Antwerp and thereafter he lived in London. Having lost his only son, Richard, he devoted a portion of his great wealth to building an exchange in imitation of that of Antwerp. He also made provision for founding Gresham College. He formulated Gresham's law regarding debased currency, according to which bad money drives out good money.

Greuze (*grûz*), **Jean Baptiste (1725-1805),** French painter, was born at Tournus, Burgundy. He studied under Grandon at Lyons and at the Academy of Paris. His first notable works were historical. After a visit to Italy, 1755, he painted Italian subjects; but he is seen at his best in such studies of girls as "The Broken Pitcher," the "Girl with Doves," and "Girl with Dead Canary." His art, full of delicacy and grace, won great acclaim in his day and many of his subjects are still popular in prints. He ranks high among 18th century painters.

Grevy (*grā'vē'*), **François Paul Jules (1807-1891),** French statesman, was born at Mont sous Vaudrey. Going to Paris to study law, he became interested in politics and took part in the revolution of 1830. As a member of the Constituent Assembly he also took a leading part in the revolution of 1848. His opposition to Louis Napoleon kept him out of public affairs from 1852 to 1868. After Napoleon's downfall he presided over the National Assembly of 1871 and worked for the establishment of the Third Republic. He was chosen president in 1879 and was re-elected in 1885, but resigned in 1887.

Grey, Charles Grey, Earl (1764-1845), English statesman, was born at Fallodon, Northumberland, and was educated at King's College, Cambridge. He became a Whig member of Parliament for Northumberland, 1786, and was one of the managers of the impeachment of Warren Hastings. In 1806, Grey, now Lord Howick, became first lord of the admiralty and, on the death of Fox, foreign secretary and leader of the House of Commons. In 1807, he succeeded his father as second Earl Grey.

Grey became prime minister in 1830 and immediately introduced a reform bill extending the right of franchise. Its defeat and the subsequent dissolution of Parliament were followed by the return of a government more favorable to the bill. A second bill of reform was introduced in 1832, passed the Commons, but was defeated in the House of Lords. Grey resigned, but returned to office with the power to have a sufficient number of peers created to pass the measure. The Duke of Wellington, who had led the opposition in the House of Lords, yielded and allowed the bill to pass. This bill was one of the chief landmarks in the growth of British democracy. Another important measure due to Grey's statesmanship was the act for the abolition of slavery in British territory. He resigned in 1834.

Grey, Edward Grey, Viscount (1862-1933), English statesman, was born in Northumberland. He was graduated at Balliol College, Oxford, and succeeded to the baronetcy in 1882; entered Parliament in 1885; and was undersecretary of foreign affairs, 1892-95. In 1905, he became secretary of state for foreign affairs and soon rose to commanding prominence in European diplomacy.

He brought about the triple entente uniting Great Britain, Russia, and France. Although he suffered diplomatic defeat in the international conference over the annexation of Bosnia and Herzegovina by Austria in 1908, his firmness in the Morocco affair of 1911 prevented unwarranted concessions to Germany by France. His masterly handling of Balkan problems at the London Conference of 1912 greatly hastened the ending of the Balkan War. In 1914, his efforts to secure arbitration of the Austro-Serbian quarrel failed, and World War I followed. He served as British ambassador to Washington in 1919. He wrote his memoirs, *Twenty-five Years—1892-1916* and *The Charm of Birds.*

Grey, Lady Jane (1537-1554), eldest daughter of Henry Grey, Duke of Suffolk, and second cousin of Edward VI, was born at Bradgate, England. She was early distinguished for her scholastic ability. Before the death of Edward VI, the Duke of Northumberland had her married, at 16 years of age, to his own son, Lord Dudley, and persuaded the king to leave the crown to Lady Jane Grey. She was kept in innocence of the plan and fainted when, on the king's death, she found herself proclaimed queen. She later consented to the arrangement, but the late king's sister Mary intervened vigorously and secured the succession to herself. Lady Jane Grey was imprisoned and, her friends having revolted, she was put to death.

Grieg (*grēg*), **Edvard Hagerup (1843-1907),** Norwegian composer, was born at Bergen. In 1858, he began a four years' course of study at Leipzig under Hauptmann, Richter, Reinecke, and Moscheles, and, in 1863, continued his studies at Copenhagen under Gade. His nationality became a strong element even in his earliest compositions. He spent the winter of 1865-66 and some months of 1870 in Rome, where he inaugurated a Norse music concert. He settled in Oslo, later at Bergen, and devoted himself to musical composition.

Of his larger works the best-known are the *Peer Gynt* suites, the overture *Im Herbst,* the suites *Sigurd Jorsalfar* and *Aus Holberg's Zeit,* the choral work *Olaf Trygvason,* and a fine piano concerto. His piano music is characterized by melodic freshness, rich harmony, and piquant rhythm, while his numerous songs rank among the most beautiful in modern music. Bülow styled him the "Chopin of the North."

Griffith, David Wark (1880-1948), American motion picture producer, was born at La Grange, Ky.; was educated in the public schools; and was an actor on the regular stage for two years. Beginning in 1908, he was identified with the motion picture business, first as actor, then as producer. His pictures are noteworthy for their spectacular and their emotional effects. Among the best known are *Birth of a Nation, Intolerance, Hearts of the World, Way Down East,* and *Orphans of the Storm.*

Grignard (*grē'nyär'*), **Victor (1871-1935),** French chemist, was born at Cherbourg. He was educated in the Ecole Normale at Cluny and at the University of Lyons. He lectured and taught at Besançon and Lyons in 1905-09 and, in 1910, became professor of chemistry at Nancy, later accepting a chair at the Lyons Institute Chémique. In his doctor's thesis, he announced the discovery of new organometallic compounds of magnesium and demonstrated reactions which have proved valuable in synthetic chemistry, particularly in the preparation of organic compounds, including hydrocarbons, alcohols, aldehydes, and acids. For this discovery and for subsequent researches with the Grignard reaction, he was awarded one-half of the Nobel prize for chemistry in 1912.

Grillparzer (*grĭl'pär-tsĕr*), **Franz (1791-1872),** Austrian dramatic poet, was born at Vienna. He studied law and, in 1813, entered the imperial civil service, in which he remained until 1856. He first attracted notice in 1817 by a tragedy, *Die Ahnfrau,* which was followed by *Sappho, Das goldene Vlies, Des Meeres und der Liebe Wellen,* and *König Ottokars Glück und Ende.* He produced much meritorious lyric poetry and one good prose novel, *Der Arme Spiel-*

mann. Grillparazer ranks as the greatest modern Austrian dramatist, and, in German literature, he is the link between Lessing, Goethe, Schiller, and Herder and the more modern school. He died at Vienna.

Grimm, Friedrich Melchior, Baron von (1723-1807), critic and writer, was born at Ratisbon. After studying at Leipzig and failing with a tragedy, he accompanied a nobleman to Paris and became reader to the crown prince of Saxe Gotha. He became acquainted with Rousseau in 1749 and, through him, with Diderot and Madame d'Epinay.

His connection with the encyclopedists, added to his own acquirements, opened to him a brilliant career. In 1753, he began to write for several German princes the now famous literary bulletins, which for nearly 40 years gave the most trenchant criticism of all important French books. This correspondence was confidential, but, after his death, it was collected and published in 17 volumes. In 1775, he was made a baron by the Duke of Gotha and was appointed minister plenipotentiary at the French court. At the Revolution, he withdrew to Gotha and afterward to the court of Catherine II, whence he was sent in 1795 as Russian minister to Hamburg.

Grimm, Jakob Ludwig Karl (1785-1863), German philologist and antiquary, was born at Hanau, in Hesse-Nassau. Though holding at various times important public offices, his life was devoted to philological and antiquarian studies. His German *Grammar*, in four volumes, is one of the greatest philological works of the age.

After 1814, in company with his brother Wilhelm, he published numberous popular works, the most celebrated of which is *Kinder-und Haus-märchen*, known in English as *Grimm's Fairy Tales*. From 1830 to 1837, they were joint professors at Gottingen; subsequently were joint librarians at Cassel; and, in 1841, settled in Berlin at the invitation of the King of Prussia. The greatest joint undertaking of the two brothers was the *Deutsches Wörterbuch*, begun in 1852. Jakob Grimm died in 1863, four years after his brother's death.

Griswold, Alfred Whitney (1906-), educator was born at Morristown, New Jersey. Following his graduation from Yale University, he became an instructor in history there and also a research assistant in international relations. Subsequently, in addition to being professor of history, he was director of foreign area studies and director of the civil affairs training school. In 1950 he was inaugurated president of Yale University. He is the author of *The Far Eastern Policy of the United States* (1938) and *Farming and Democracy* (1948).

Gropius, Walter (1883-), German architect, was born at Berlin, Germany, where he practiced architecture for several years before World War I. He was a founder and the first director (1918-28) of the famous Bauhaus Art School at Weimar, later at Dessau, where the emphasis was on modern functionalism in architecture and craftmanship. A leader in this field, Gropius left Germany on Hitler's rise to power, carrying on his work in London (1934-37). In 1938, he came to the United States, having accepted an appointment as professor of architecture at Harvard University, where he became chairman of the School of Architecture. He has designed numerous public buildings and private residences in Germany, England, and the United States. Gropius is the author of *The New Architecture and the Bauhaus* (1935), *Rebuilding Our Communities* (1946), and other publications.

Grosvenor (*grōv'-nēr*), **Gilbert Hovey (1875-),** American editor, was born at Istanbul, Turkey, of American parents. He was educated at the Presbyterian College, Istanbul, and Amherst College. After a brief period of teaching, he became connected with the *National Geographic Magazine* in 1899, being made editor in chief in 1903. He was made president of the National Geographic Society in 1920, in which capacity he sponsored many expeditions of exploration. His role in such expeditions is commemorated by the bestowal of the name Grosvenor upon a lake in Alaska and a mountain range in Antarctica. Among his writings are *Young Russia, Flags of the World, Discovery and Exploration*, and *A Maryland Pilgrimage*. He retired in 1954.

Grote (*grōt*), **George (1794-1871),** English historian, was born at Clay Hill, Kent. He was educated at Charterhouse; entered the family banking house; but devoted his leisure time to literary work. He published many pamphlets on reform and contributed to the *Westminster Review*. In 1832, he was elected to Parliament, and he continued to sit until 1841 as one of the "philosophical radicals." He wrote *A History of Greece*, still a standing work, which appeared between 1846 and 1856 and was followed by *Pluto and the Other Companions of Socrates*. During his parliamentary life, he made himself conspicuous by his advocacy of the ballot. He took an active part in the foundation of the University of London, of which he was vice chancellor at the time of his death. He was buried in Westminster Abbey.

Grotius (*grō'shĭ-ŭs*), **Hugo (1583-1645),** otherwise known as Hugo de Groot, Dutch jurist and the founder of international law, was born of noble parentage at Delft, Holland. At 12, he entered the University of Leiden and, at 15, received his doctorate in law from the University of Paris. His *Martianus Capella*, a prodigy of juvenile learning, was published when he was but 16. In 1599, he issued a treatise for the instruction of seamen in ascertaining the exact situation of a ship at sea, and enrolled himself as an advocate at The Hague. In 1607, he was nominated advocate general of the provinces of Holland and Zealand. He married Mary Reygersburgh.

In 1608, Grotius composed his *Mare Liberum*, which undertook to show that the sea was open to all without distinction. He was advanced in 1613 to the judicial station of pensionary of Rotterdam. Two years later, he went to England on an embassy representing the rights of fishing for whales in the Northern Seas, and there he formed many delightful connections at court and with eminent churchmen.

Shortly afterward, Grotius became deeply involved in the religious animosities which, at that time, vexed Holland. He had adopted the principles of the Arminian party in opposition to the tenets held by the followers of Gomar, the Calvinistic controversialist. Participation in the subsequent popular tumults caused Grotius to be arrested. In 1619, he was sentenced to life imprisonment and was confined in the castle of Loevestein. During his two years of captivity, he employed much time in legal studies and wrote a treatise entitled *The Truth of the Christian Religion*. By the aid of his wife, he escaped from prison in 1621.

Grotius made Paris his city of refuge. There he wrote, in 1622, his *Apology*, and, in order to place himself more fully under the protection of the French government, he obtained naturalization papers from Louis XIII. In 1625, he completed his greatest work, *De Jur Bellie et Pacis*, "The Law of War and Peace," which long remained the standard authority on international law. In order to estimate the magnitude and value of his labors, it must be considered that, before he wrote, the ground in this field was wholly unbroken.

In 1631, Grotius was invited by Prince Frederick of Orange to return to his native country, but a decree of perpetual exile was passed against him through the intrigues of his enemies. He was induced, partly by reason of Queen Christina's taste for literature, to enter the Swedish service. In 1635, he became resident ambassador for Sweden at the court of France, where he gained universal favor. He found himself at the Swedish court again in 1645, but the literary dilettantism there did not suit him.

Grouchy (*grōō'shē'*), **Emmanuel, Marquis de (1766-1847),** French marshal, was born in Paris. He entered the French army in 1781, rising, by 1794, to the rank of brigadier general. Because of his noble birth, he was compelled by the supporters of the Revolution to retire from the army but he was reinstated shortly and took a prominent part in many of Napoleon's victories.

For his services to Napoleon's cause on the latter's return from Elba, he was made marshal. He defeated the British and Prussian force at Ligny, but, by following to the letter Napoleon's order to pursue Blücher, he is believed to have caused the French defeat at Waterloo. On the return of the Bourbons to the throne, he was banished, and lived for five years in Philadelphia, 1814–19. He was later permitted to return and was restored to his estates and titles.

Grove, Sir George (1820-1900), British engineer and writer on music, was born at Clapham. He was trained as a civil engineer; erected lighthouses in the West Indies; and assisted on the Britannia tubular bridge over Menai Strait. He was secretary to the Society of Arts, 1849–52, and then secretary and director of the Crystal Palace Exhibition. He was editor of *Macmillan's Magazine;* was a large contributor to Smith's *Dictionary of the Bible;* became editor and part author of the great *Dictionary of Music and Musicians;* and published a work on Beethoven. He was knighted in 1883 on the opening of the Royal College of Music, of which he was director until 1894.

Gruenther, Alfred Maximilian (1899-), United States army officer, was born at Platte Center, Nebr., and was educated at West Point. He was commissioned a second lieutenant in the Field Artillery in 1918, progressing through the grades to general in 1949. He taught for a number of years at West Point. On the outbreak of World War II, he was made chief of staff of the Third Army. In 1942, Gruenther was appointed deputy chief of staff of Allied Force Headquarters at London, under General Dwight Eisenhower. In 1943, he was chief of staff of the Fifth Army during the North African, Sicilian, and Italian campaigns. He was chief of staff of the Allied Army Group in Italy in 1944–45 and then, following the defeat of Germany, served as deputy commander of U. S. forces in Austria. After fulfilling other assign-

ments, he was made chief of staff to General Eisenhower when Eisenhower became supreme allied commander in Europe in 1950. From 1953 to 1956 Gruenther was himself supreme allied commander in Europe. He retired from the Army in 1956 and in 1957 became head of the American Red Cross.

Guedalla, Philip (1889-1944), British historian and biographer, showed early as an Oxford University debater a wit and keenness of observation that won him popularity as an author. One of his epigrams, "Historians' English is an occupational disease," refers to a style of writing which he was careful to avoid. He galvanized history and biography into life by making them vivid and human. He wrote *Wellington, The Second Empire, The Hundred Days, Palmerston, Fathers of the Revolution, Mr. Churchill, Bonnet and Shawl,* and *The Two Marshals.*

Guericke (*gā'ri-kĕ*), **Otto von (1602-1686),** German physicist, was born at Magdeburg. He studied at Leipzig, Jena, and Leiden, and traveled in France and England. As a physicist, he is known chiefly for his discoveries relative to the nature and effects of air. The experiments of Galileo and of Pascal on the weight of air led Guericke to attempt the creation of a vacuum. This resulted in the first air pump, invented about 1654. Guericke's invention became famous, and he was summoned to the presence of the emperor Ferdinand III of Germany at Ratisbon. Here, in 1654, he made the famous experiment commonly known as the "Magdeburg hemispheres," in demonstration of atmospheric pressure. Two hollow hemispheres having been fitted together, the air from the resulting sphere was exhausted. The pulling power of eight horses was insufficient to separate the hemispheres.

Guesclin, Bertrand du. See *Du Guesclin, Bertrand.*

Guest, Edgar Albert (1881-), American press humorist, was born at Birmingham, England. He was brought to America at ten years of age and received a high school education at Detroit, Mich. Following 1895, he was connected with the Detroit *Free Press* in various capacities. His publications include *A Heap o' Livin', Just Folks, Path to Home, When Day Is Done, The Friendly Way, Life's Highway,* and *All in a Lifetime.*

Guido d' Arezzo (*gwē'dō dä-rĕt'sō*), or **Guido Aretino (c. 995-c.1050),** medieval musician and Benedictine monk, was born probably near Paris and was educated at Saint Maur des Fosses. At the Benedictine Monastery at Pomposa, he taught singing and introduced new methods in music. These met with local disfavor, which resulted in his flight to Arezzo, whence, about 1030, he was summoned to Rome to demonstrate his musical discoveries to Pope John XIX.

The invention of musical notation and the *solfeggio* are ascribed to him. He introduced the names Ut, Re, Mi, Fa, Sol, and La for the first six notes of the scale and originated the four-line staff, employing extra lines above and below whenever necessary. He used both lines and spaces, designating them by the first letters of the alphabet and thus insuring uniformity of pitch. He substituted fourths for the parallel fifths in the primitive harmonies of Hucbald. This innovation soon led to the use of the remaining intervals and hastened the development of harmony and measured rhythm, which distinguished modern musical composition from the purely melodic music of the ancients. In 1029, Guido became prior of the Monastery at Avellano, where he died.

Guido Reni. See *Reni, Guido.*

Guillaume (*gē'yōm'*), **Charles Edouard (1861-1938),** Swiss physicist, was born at Fleurier, Switzerland. Many important discoveries of alloys have been due to him. In 1896, he found a cheap alloy more stable than platinum. This alloy, called invar from its invariable quality and particularly its extremely small coefficient of thermal expansion, was found to be a suitable material for surveying instruments, reducing the cost to about 2 per cent of what it had been 20 years before. Guillaume was made director of the International Bureau of Standards in 1915 and, in 1920, received the Nobel prize in physics. He is the author of many technical publications on alloys and related topics.

Guilmant (*gēl'mäN'*), **Félix Alexandre (1837-1911),** French organist and composer, was born at Boulogne. His father, a professional musician, gave him his first musical instruction, and, at the age of 12, he began to play the organ as his father's substitute at the church of Saint Nicholas. He studied further under Carulli and, in 1853, was made organist at the church of Saint Joseph. In 1871, he became organist at La Trinité and, in 1896, was made professor of the organ at the Paris Conservatory. He was the foremost representative of the French school of organ music, a brilliant performer with a marvelous gift of improvisation. He made numerous successful tours in England, Russia, Italy, and the United States. His compositions include many works for the organ and orchestra, together with numerous choruses and masses.

Guinness, Alec (1914-), English actor whose bland countenance belies the remarkable range of the roles he has played, was born in London. He went on the stage first in 1933, and in 1938 acted the part of Osric in *Hamlet* at the Old Vic. Aside from playing the psychiatrist in T. S. Eliot's *The Cocktail Party,* and appearing in a few other plays, Guinness has devoted his considerable talent to the screen. Among the memorable films he has starred in are *Oliver Twist, Kind Hearts and Coronets* (in which his versatility and genius for makeup enabled him to play six parts), *The Lavender Hill Mob* (in which he played a bank thief), *The Captain's Paradise, The Prisoner* (in which he was an Eastern European churchman undergoing the torture of brainwashing), and *The Lady Killers,* in which he again became a fascinating rascal. In 1956, Guinness appeared in *The Swan* with Grace Kelly.

Guise (*gü-ēz'*), **Henri de Lorraine, Duke of (1550-1588),** French Catholic leader. At the age of 15, he distinguished himself fighting against the Turks in Hungary. He later took an active part in the wars against the Hugenots and in the massacre of Saint Bartholomew. Using his popularity with the Parisians, he formed the Holy League, which was designed to bring his family to the throne and to exclude that of Henry of Navarre. His ambitions were cut short by assassination in 1588.

Guizot (*gē'zô'*), **Francois Pierre Guillaume (1787-1874),** French statesman and historian, was born at Nimes. In 1805, he went to Paris, studied law, became a professor at the Sorbonne in 1812, and devoted himself to literature. His first work, the *Nouveau dictionnaire universel des synonymes de la langue française,* appeared in 1809. After the Second Restoration, he became general secretary to the minister of the interior and afterward to the minister of justice.

After the revolution of 1830, he became minister of the interior and, in 1832, minister of public instruction, an office which he held, with two interruptions, until 1837. On the outbreak of the Eastern disturbances in 1840, under Soult's administration, he was sent as ambassador to London; in 1847, became the official leader of the cabinet; was forced by the revolution of 1848 to flee to England; returned in 1849; but retired completely from politics after the *coup d'état* of 1851. Among his numerous works are his *History of the English Revolution, Life of Oliver Cromwell, History of Civilization in Europe,* and *History of Civilization in France.*

Gulick, Luther Halsey (1865-1918), American pioneer in physical education, was born at Honolulu, Hawaii. He specialized in physical education and became superintendent of physical training at the Y. M. C. A. Training School, Springfield, Mass., in 1887, continuing until 1900. He devised the Association's symbol. In 1903, he took charge of physical training in the public schools of New York City. With his wife, he founded the Campfire Girls. He also assisted in creating the game of basketball.

In addition to the editing of journals on physical education and of the Gulick hygiene series, he wrote *Manual of Physical Measurements, Physical Education by Muscular Exercise, The Efficient Life, Mind and Work, The Healthful Art of Dancing,* and *The Dynamic of Manhood.*

Gullstrand (*gōōl'ständ*), **Allvar (1862-1930),** Swedish physicist, was born in Landskrona, the son of a physician. He was educated at the universities of Upsala, Vienna, and Stockholm. In 1894, he became professor of ophthalmology in the University of Upsala and, in 1913, professor of physiological and physical optics. In recognition of his researches on diseases of the eye and on the mechanics of vision, he was awarded the Nobel prize for medicine in 1911. His scientific writings include *Allgemeine Theorie der monochromatischen Aberrationen, Die reele optische Abbildung,* and *Einführung in die Methoden der Doptrik des Auges des Menschen.*

Gunter (*gŭn'tĕr*), **Edmund (c. 1581-1626),** English mathematician, was born in Hertfordshire. He was educated at Westminster and Christ Church, Oxford, and, in 1619, became professor of astronomy in Gresham College, London. He invented the sector, with the lines known as Gunter's scale. His principal works are *Canon Triangulorum*—a table of logarithmic sines and tangents—and *New Projection of the Sphere.* He invented the widely used surveying chain called Gunter's chain, and made the first observation of the variation of the compass.

Gunther, John (1901-), undoubtedly the most widely travelled of American authors and foreign correspondents, was born in Chicago, Ill. After a brief period of local reporting, he was sent by the Chicago *Daily News* in 1924 to cover England and the Continent. Thus Gunther began a remarkably intensive and far-ranging repertorial career that has carried him to practically every country in the world, and into personal contact with almost every ruler and head of state. During World War II, Gunther was a radio commentator for two American networks, and was chosen by the combined American press to repre-

sent the news corps at the invasion of Sicily. Gunther is best known for his series of "Inside" books, which began with *Inside Europe* in 1936, and includes *Inside Asia*, *Inside Latin America*, *Inside America*, and *Inside Africa*. They reveal the skilled reporter at his best, presenting complete and accurate facts in a highly readable manner. Gunther has also written *Death Be Not Proud*, *The Riddle of MacArthur*, and is a frequent contributor of articles to magazines.

Gustavus I Vasa (*gŭs-tā'vŭs vä'sä*), **(1496-1560)**, king of Sweden, was born at Lindholmen. In 1518, during the struggle with Christian II of Denmark, Gustavus was treacherously carried off to Denmark as a hostage. After a year, he escaped to Lübeck and thence to Sweden, where he strove in vain to rouse a spirit of resistance against the Danes. Retreating to Dalecarlia, he wandered for months, with a price set on his head, and worked on farms and in mines. At last the massacre at Stockholm, 1520, roused the Swedes, and soon Gustavus had an army large enough to attack the enemy. His capture of Stockholm in 1523 drove the Danes from Sweden. Thus ended the Scandinavian union which had existed for 126 years, and Gustavus I was elected king of Sweden.

He found the whole country demoralized. Yet, after a 40 years' rule, he left Sweden a peaceful and civilized realm, with a full exchequer and, a well organized army. He promoted trade, fostered schools, and made roads, bridges, and canals.

Gustavus II Adolphus (1594-1632), king of Sweden, was born at Stockholm. He was the grandson of Gustavus Vasa and the son of Charles IX, at whose death, in 1611, Gustavus Adolphus succeeded to the throne of Sweden. He had been strictly brought up in the Lutheran faith, carefully trained in habits of business, and was one of the most accomplished princes of his age. He was acquainted with eight languages, five of which he spoke and wrote fluently, and he was well read in the classics and ancient history.

Having made various administrative reforms and availed himself of the short interval of peace to promote the material prosperity of the country, he intrusted the charge of the government to his chancellor, Oxenstierna, and set sail, in the summer of 1630, with an army of about 13,000 men, to aid the Protestants of Germany in their struggle against the Catholic League, which was backed by the power of the Empire. With and for the Germans he fought until his death on the battlefield of Lutzen, 1632. He was one of the greatest generals of modern times and made Sweden a power in northern Europe.

Gustavus III (1746-1792), king of Sweden, was born at Stockholm, and succeeded his father, Adolphus Frederick, in 1771. At this period the country was torn by the struggles of rival interests and classes. Failing to persuade them to cease hostilities, he staged a sham revolt and recovered all the legal powers that had been gradually lost by his immediate predecessors. In 1788, he entered upon a profitless war with Russia, and, in 1789, secured additional war powers from the diet. This so incensed the nobles that finally a conspiracy was formed against his life. In 1792, he was mortally wounded at a masked ball in the opera house which he himself had built.

Gustavus V (1858-1950), king of Sweden, was born at Drottningholm. He was educated at the University of Upsala, traveled extensively, entered the army, and, in 1881, married Princess Victoria of Baden, first cousin of the German emperor and a descendant of the old Swedish royal family of Vasa. He succeeded his father, King Oscar II, on December 8, 1907, having several times previously acted as regent.

Gutenberg (*gōō'tĕn-bĕrĸ*), **Johannes (c. 1400-1468)**, the inventor of printing from movable types, was born of noble parentage at Mainz, Germany. Recent investigations tend to show that he changed his true name Hans Ganzfleisch de Sulgelock and, for political reasons, assumed the name of his mother's family, Gutenberg.

In 1434, Gutenberg was in Strasbourg, where, two years later, he formed a partnership with Andrew Dritzehn in the business of polishing stones and manufacturing mirrors. Subsequently he entered into a second compact with Dritzehn and others "for the working out of certain secret processes invented by him." The "secret processes" undoubtedly comprehended the first steps in the art of printing. There is mention in the written agreement of "materials and utensils, of lead, of a press, of a vise for holding the parts together," and of the plan to complete the work for the fair at Aix la Chapelle in 1438.

In 1439, the death of Andrew Dritzehn involved Gutenberg in an unfortunate lawsuit with the former's brother George. About 1446, Gutenberg permanently located at Mainz. His means were exhausted, but, in 1450, he formed a new partnership with a rich goldsmith, Fust, for the further exploitation of his invention. A third partner, Schoeffer, entered the firm later. In 1445, a financial adjustment forced Gutenberg to abandon his claims and to sacrifice his apparatus and nearly all his stock. Fust and Schoeffer continued to print.

Ultimately, by the aid of Conrad Humery, a councilor of Mainz, Gutenberg again established himself in the same city and brought out the first printed Bible. Four editions of a work by Donatus are likewise ascribed to him, and, in 1457, Gutenberg issued the Latin *Psalterium*. Hard work and poverty rendered these later years exceedingly unhappy. In 1465, however, Adolph of Nassau, elector of Mainz, named him one of his courtiers and raised him to the rank of noble.

The obscurity of the early history of printing is increased through the precautions necessarily taken by the inventor and his partners to conceal their proceedings. Printing from engraved wooden blocks had been in use for more than half a century, especially in Germany and the Low Countries, but it was obviously inapplicable to works of considerable length. The comparative rapidity of the new method gave rise to grave suspicions among the authorities, for, to them, it was apparently due to magic. The immediate effect of printing was to make accessible the literature of Greece and Rome. By facilitating the spread of ideas, this invention has exerted an influence of incalculable magnitude on the history of the world.

Guthrie (*gŭth'rĭ*), **Samuel (1782-1848)**, American physician and chemist, was born at Brimfield, Mass. He studied medicine with his father and began practice at Sherburne, N. Y., where he became a pioneer in the introduction of vaccination. After the War of 1812, during which he served as examining surgeon, he established a vinegar factory, conducted experiments in the manufacture of gunpowder, and produced the first successful percussion powder.

In 1830, Guthrie invented a process for the rapid conversion of potato starch into sugar. Soon afterward he produced what is now known as chloroform by distilling a mixture of alcohol and chloride of lime. Concerning this discovery, he wrote an article in July 1831. Chloroform was independently discovered by Soubeiran in France, October 1831, and by Liebirg in Germany, November 1831. Guthrie was one of the earliest American investigators in practical chemistry and contributed his discoveries to the *American Journal of Science*.

Haakon VII (*hô'kŏn*), **(1872-)**, king of Norway, was the second son of King Frederick of Denmark and a nephew of Queen Alexandra of Great Britain. His baptismal name was Karl, but he assumed the above title when he became king, November 18, 1905, on the separation of Norway and Sweden. The king married Princess Maud Alexandra, daughter of King Edward VII, in 1896.

In 1940, Germany struck without warning at his country, overran Norway, and held it for five years. When further resistance was hopeless, the king embarked for England, and directed resistance from there. After the liberation of Norway, he returned, June 7, 1945, and was warmly welcomed by his people.

Haas, Francis Joseph (1889-), American educator and administrator, was born at Racine, Wisc. A graduate of the St. Francis Seminary, Milwaukee, he was ordained a priest of the Catholic Church in 1913 and taught at the seminary, 1915-19 and 1922-31. He made a special study of social questions and, in 1937, was chosen dean of the school of social science at the Catholic University of America. His interest in labor problems brought him appointment to the National Labor Board in 1934, to the United States conciliation service as special commissioner in 1935, and to the chairmanship of the Wisconsin Labor Relations Board in 1937, where he served until 1938. President Roosevelt appointed him to direct a committee for elimination of racial and religious discrimination in employment, from which he resigned in 1943 to become bishop of Grand Rapids, Mich. He wrote *Shop Collective Bargaining* and *Man and Society*.

Haber (*hä'bĕr*), **Fritz (1868-1934)**, German chemist, was born at Breslau. He was educated in the universities of Heidelberg, Charlottenburg, and Berlin. In 1894, he became assistant in the Institute of Chemical Technology at Karlsruhe and, in 1896, was made instructor in the Polytechnical School there. In 1898, he was appointed professor at Dahlem, near Berlin, and later became director of the Kaiser Wilhelm Institute for Physical and Electrical Chemistry. To him is due the discovery of a cheap process for converting nitrogen from the air into ammonia, in which form it may be used to make fertilizers and explosives. His publications include *Fundamentals of Electrochemical Technology* and *Thermodynamics of Gas Reactions*. In 1918, he was awarded the Nobel prize for chemistry.

Hackett, Francis (1883-), novelist and historian, was born in Kilkenny, Ireland. Coming to America in 1901, he secured work with a law firm in New York. He began to write for periodicals and, in 1906, joined the editorial staff of the Chicago *Evening Post*. From 1914 to 1922 he was associate editor of the *New Republic*. Thereafter he resided in England and Denmark. His first publications

dealt with his native land, Ireland, his *Story of the Irish Nation* appearing in 1922. Later he wrote a number of popular novels and histories, including *Henry the Eighth—A Personal History, Francis the First, The Green Lion, Queen Anne Boleyn,* and *I Chose Denmark.*

Hackett, James Keteltas (1869-1926), American actor and manager, was born of American parents at Wolfe Island, Ont. He was graduated at the College of the City of New York in 1891 and studied at the New York Law School. He made his debut in 1892 and became leading man at the New York Lyceum at the age of 24. His most notable earlier successes were in *The Prisoner of Zenda* and its sequel, *Rupert of Hentzau,* and in *The Pride of Jennico,* under the management of Daniel Frohman. His most noted later production was *Macbeth.* In 1918, he played the part of the Canadian in an all-star cast of *Out There* for the American Red Cross, through which that organization netted $700,000 in 3 weeks. Other plays in which he appeared include *A Grain of Dust, The Crook, Othello, Craig Kennedy,* and *The Better Ole.*

Hadley (*hăd'lĭ*), **Arthur Twining (1856-1930),** American educator and economist, was born in New Haven, Conn. He was graduated at Yale in 1876 and later studied at the University of Berlin. He was tutor and lecturer at Yale from 1879 to 1886, when he became professor of political science. In 1891, he was made professor of political economy serving until 1899, when he was elected president of the university. He filled this office with distinction until his retirement in 1921, as president emeritus.

Hadley's work on railway transportation established his position as an authority on the subject. His writings include *Railroad Transportation: Its History and Laws, The Education of the American Citizen, Freedom and Responsibility, Undercurrents in American Politics,* and *Standards of Public Morality.* In 1908, he was elected member of the American Academy of Arts and Letters.

Hadley, Henry Kimball (1871-1937), American composer, was born at Somerville, Mass. He studied music with G. W. Chadwick and S. A. Emery in Boston, and completed his training in Vienna. Returning to America in 1895, he became instructor of music at Saint Paul's School, Garden City, L. I. He was conductor of the San Francisco Symphony Orchestra, 1911–15, and toured Europe as guest conductor of his own works. His symphony *The Four Seasons* won the Paderewski prize in 1901. The list of his works includes a cantata, *In Musical Praise;* the symphonic poems *Salome, Lucifer,* and *The Culprit Fay;* the lyric drama *Merlin and Vivian;* and the operas *Safie, Azora, Bianca,* and *Cleopatra's Night.* He excels in descriptive music and ranks among the leading American composers. In 1924, he was elected to membership in the American Academy of Arts and Letters.

Hadrian, or **Publius Ælius Hadrianus (76 A. D.-138 A. D.),** Roman emperor, was elected by the army successor of Trajan in 117 A. D. His reign was one of the happiest periods in Roman history, the only important war which broke out during the reign being a rebellion of the Jews, which lasted for three years. He erected many magnificent works in various parts of his empire, the remains of some of which are still standing. He also founded several cities, including Hadrianopolis, now Adrianople. He was a lover of philosophy, poetry, and the fine arts. The mausoleum which he built for himself in Rome forms the groundwork of the present castle of Saint Angelo.

Haeckel (*hĕk'ĕl*), **Ernst Heinrich (1834-1919),** German naturalist and writer, was born at Potsdam, Prussia. He studied medicine and science at Würzburg, Berlin, and Vienna. In 1859, he went to Italy, and studied zoology at Naples and Messina, returning in 1861 to Jena, where he was appointed professor of zoology. He was a widely known exponent of monistic philosophy and was long regarded as the foremost supporter of Darwinism and the theory of evolution in Germany. He wrote in support of the thesis that the development of the individual recapitulates the evolution of the race. Among his works are *The History of Creation, The Origin of the Human Race, Life in the Deep Seas, The History of Man's Development, Popular Lectures on Evolution,* and *Voyage of H. M. S. Challenger.*

Hafiz (*hä'fĭz; hä-fēz'*), **Mohammed Shamsuddin,** or **Shams-Ud-Din (?-1388),** was a Persian lyrical poet. He was eminent also as a teacher of theology and mystic philosophy, but it was his poetic genius which gained for him a world-wide fame. The name of Hafiz is a household word throughout Iran, and his songs are recited in social gatherings, being much admired for their vigor and passion. He wrote love poems, drinking songs, and satires.

Haggard, Sir Henry Rider (1856-1925), English novelist, lawyer, and social reformer. He accompanied Sir Henry Bulwer, as secretary, to Natal in 1875, and formally hoisted the British flag over Transvaal territory, 1877. He retired from the colonial service in 1879; returned to England; and began the practice of law. His first book, *Cetywayo and His White Neighbors,* appeared in 1882. Subsequently he published *Dawn; The Witch's Head; King Solomon's Mines,* the work by which he established his reputation; and *She,* a novel of great power. These were followed by *Ayesha, Cleopatra, The Virgin of the Sun,* and numerous other works. He wrote also *Rural England* and *A Farmer's Year,* and made studies in socialistic settlements.

Hahnemann (*hä'nĕ-măn*), **Samuel Christian Friedrich (1755-1843),** German physician, founder of the homeopathic system of medicine was born at Meissen, Saxony. He completed a course in medicine at Erlangen in 1779. While translating Cullen's *Materia Medica* from English into German, 1790, he noticed a similarity between the effects of Peruvian bark, or cinchona, upon a healthy person and the results of certain diseases for the cure of which that drug was used. In other words, he rediscovered, quite independently, Hippocrates' old "law of similars." After many experiments, he became convinced of the truth of the principle *similia similibus curantur*—that is, the cure for a disease is the very drug that would in a healthy individual produce the symptoms of such disease.

Further investigation caused Hahnemann to conclude that the conventional doses of his day were injurious, and this led him to another principle, that of very minute doses, made by a process of "potentization," described by him at length in his *Organon,* 1810, which was translated into many languages.

Haidinger (*hī'dĭng-ĕr*), **Wilhelm von (1795-1871),** Austrian mineralogist and physicist, was born at Vienna. He was educated at Gratz and at Freiberg, and lived for a time at Edinburgh. After returning to Austria, he engaged in porcelain manufacture at Elbogen. In 1840, he was made curator of the imperial mineralogical collections at Vienna, and, about 1845, began to lecture on mineralogy. He was appointed director of the geological institute in 1849.

Among Haidinger's many contributions to mineralogical science is his discovery of the phenomenon known as "Haidinger's brush," affording a means of detecting plane polarized light. During his sojourn in Edinburgh, he translated Mohs's work on mineralogy, which he enlarged, improved, and published under the title *Treatise on Mineralogy.* He also edited a geological map of Austria.

Haig, Douglas Haig, Earl (1861-1928), British soldier, was educated at Clifton and at Brasenose College, Oxford. He joined the 7th Hussars in 1885, served with distinction at Atbara and Khartum in the Sudan campaign in 1898, and was chief of staff to General French during the Colesberg campaign in South Africa, 1899-1900. He was promoted to inspector general of the cavalry in India in 1903, was made major general in 1904, and general commander of the officers at Aldershot in 1912. In the early stages of World War I, he commanded a division of the British expeditionary forces in France with marked ability. Late in 1915, he succeeded Sir John French in the command of all British armies at the front in France.

Haig continued in command of the British expeditionary forces in France during the great campaigns and battles of the ensuing three years. In 1917, he was made field marshal. The culmination of his generalship came on September 28, 1918, when, in conjunction with a co-ordinated attack by the American, French, and Belgian armies on other parts of the front, the British army broke through the Hindenburg line between Cambrai and Saint Quentin. Thereafter, there was a steady and victorious advance along the whole British front until the day of armistice.

Haile Selassie (1891-), king of Ethiopia, was born in the province of Herrar. He was known in private life as Ras Tafari. Receiving an education of the European type from French monks, he became regent for his aunt, Empress Zaditu, in 1916, and succeeded to the throne on her death in 1930. Shrewdly consolidating his power over semi-independent chieftains, he centered his attention on modernizing the defense of his realm while playing against one another the European nations seeking a foothold in the kingdom. He succeeded in having Ethiopia admitted to the League of Nations in 1923. In 1935, Italy seized the occasion of a border incident to invade Ethiopia. Haile Selassie's inferior armaments and divided subjects were no match for the Italian army, which occupied the capital, Addis Ababa, in 1936. Haile Selassie took ship to England and continued vainly to seek restoration of his kingdom through the League of Nations, which refused to recognize the Italian conquest. When British forces invaded Ethiopia in 1941, he returned to assist in overthrowing the Italians.

Hakluyt (*hăk'lōōt*), **Richard (c. 1553-1616),** English geographer, was born at London. He was a lecturer on geography at Oxford University, and was the first to teach the use of globes. His work came to the notice of Sir Edward Stafford, who facilitated his request by taking him as his chaplain to Paris, 1583. Queen Elizabeth gave him an ecclesiastical appointment in 1586. He compiled information for making maps of the New World, chiefly by con-

sulting navigators. The first map on which the name Virginia occurs was published by him in 1588. His purpose was encouragement of American settlements. He was a member of the London Company which, under Raleigh's leadership, put up capital for sending colonists to Virginia. His chief work is *The Principal Navigations, Voyages, and Discoveries of the English Nation*, commonly called *Hakluyt's Voyages*. He was buried in Westminster Abbey.

Haldane, Richard Burdon, Viscount (1856-1928), British statesman and philosophical writer, was born at Cloanden, Perthshire, Scotland. He was educated at the universities of Edinburgh and Göttingen and, in 1879, was called to the bar. From 1885 to 1911, he was continuously elected to Parliament as a Liberal. In 1911, he was created Viscount Haldane of Cloanden. He was secretary of state for war, 1905-12, and lord chancellor, 1912-15. His influence effected a reorganization of the army and important reforms in education. Because of his German affinities, Haldane withdrew from political activity during World War I, devoting himself to philosophical studies and to the promotion of national education. He served as rector of Edinburgh University and as chancellor of the University of Bristol. In 1924, he became lord chancellor in Ramsay MacDonald's Labor cabinet. Among his writings are *Essays in Philosophical Criticism, Life of Adam Smith, The Pathway to Reality, Education and Empire, The Reign of Relativity*, and *The Philosophy of Humanism*.

Hale, Edward Everett (1822-1909), American clergyman and writer, was born in Boston, Mass. He was graduated at Harvard University in 1839, studied theology, and was ordained to the Unitarian ministry. He was pastor of the Church of the Unity, Worcester, Mass., from 1846 to 1856. He then became pastor of the South Congregational (Unitarian) Church in Boston, and for a half century was an active and forceful figure in the philanthropic movements of his city and time. In 1903, he was appointed chaplain of the United States Senate.

He wrote *My Double and How He Undid Me*, his first widely popular story; *The Man Without a Country*, a classic of patriotic fiction; *Ten Times One is Ten*, his most influential book, which with *In His Name* led to formation of lend-a-hand clubs, king's daughters, and similar organizations. In 1908, he was elected member of the American Academy of Arts and Letters.

Hale, George Ellery (1868-1938), American astronomer, was born at Chicago, Ill. He was graduated at the Massachusetts Institute of Technology in 1890; studied at Harvard College Observatory, 1889-90, and at the University of Berlin, 1893-94. He was director of the Kenwood Astrophysical Observatory in Chicago from 1890 to 1896. From 1892 to 1905, he was at the University of Chicago, first as associate professor of astrophysics, then as professor, and, from 1895 to 1905, as director of the Yerkes Observatory. In 1905, he became director of the Mount Wilson Observatory at Pasadena, California. He invented the spectroheliograph, first used in 1892, with which he discovered the solar vortices and magnetic fields of sun spots. By his solar and stellar spectroscopic work, Hale achieved an international reputation. Among his numerous scientific writings are *The Study of Stellar Evolution, Ten Years' Work of a Mountain Observatory, Beyond the Milky Way*, and *The New Heavens*. See *Sun Spots*.

Hale, Sir Matthew (1609-1676), English lawyer and jurist, was born at Alderley. He was graduated from Oxford, studied law at Lincoln's Inn, and was admitted to the bar in 1637. He became a judge of common pleas in 1653, and sat in Parliament until the Restoration in 1660, when he was made lord chief baron of the exchequer. In 1671, he became lord chief justice, and resigned shortly before his death. His *Analysis of the Law* provided Blackstone with an outline for his famous commentaries, and his *History of the Pleas of the Crown* is highly regarded.

Hale, Nathan (1755-1776), American patriot, was born in Coventry, Conn. He was graduated at Yale College in 1773, and devoted himself to the cause of the colonies in the contest with Great Britain. After the defeat of the colonial army on Long Island, he endeavored to obtain knowledge of the enemy's plans and position for the information of Washington. He obtained the knowledge, but was arrested by the British before he could return. The papers containing the information being found on his person, he was hanged as a spy, by order of Sir William Howe. His last words were, "I only regret that I have but one life to lose for my country." Statues to his memory have been erected in Hartford and New York City.

Hale, Sarah Josepha (1788-1879), American writer, author of *Mary's Lamb*, was born at Newport, N. H. On her husband's death, in 1822, she devoted herself to authorship, and became, in 1828, editor of the *Ladies' Magazine* (afterward *Godey's Lady's Book*). She helped to procure the employment of woman medical missionaries, to complete the Bunker Hill monument, and to secure the observance of Thanksgiving Day in all the states. Her works include poems, novels, and biography.

Halévy, Ludovic (1834-1908), French novelist and dramatic author, was born at Paris. He received his education at the Lycée Louis le Grand and entered the service of the government but resigned to devote himself to the drama. He was the librettist of many of Offenbach's operettas. With Henri Meilhac, he produced *La Belle Hélenè*, which had a great success; *La Barbe Bleue; La Grande Duchesse;* and *Frou Frou*, which was one of the notable theatrical successes of the century. In 1873 appeared the first of his three clever volumes on the *Cardinal Family*. In 1882, he wrote the novel, *L'Abbé Constantin*, which became widely known for its fresh and wholesome charm. While he wrote many trivial and farcial pieces, his serious literary work is characterized by exquisite taste, refinement, and pathos. He was elected to the French Academy, 1884.

Haliburton (*hăl'ĭ-bûr't'n*), **Thomas Chandler (1796-1865),** Canadian humorist, was born at Windsor, Nova Scotia. He was judge of the Supreme Court of Nova Scotia, but is best known as a satirical writer. In 1837, he published *The Clockmaker, or the Sayings and Doings of Samuel Slick of Slickville*, which became very popular. He is also the author of *The Attaché, or Sam Slick in England*, which was the result of a visit to that country in 1841. In 1856, he went to England to reside permanently, and, in 1859, entered the House of Commons as member for Launceston, which seat he held until within a few months of his death. Besides the works already mentioned, he wrote *The Old Judge, The Letter Bag of the Great Western, Traits of American Humor*, and several other books. See *Slick, Sam*.

Halifax, Charles Montagu, Earl of (1661-1715), English statesman and financier, was born at Horton. He was educated at Trinity College, Cambridge. He first attracted attention in 1685, by a poem in praise of Charles II and, in 1687, he wrote *The Town and Country Mouse* as a parody on *Dryden's Hind and Panther*. Montagu was a member of Parliament in 1689 and a lord of the treasury in 1692. In the latter year he proposed to raise a million sterling by way of loan. By placing of this loan, the British national debt was established.

In 1694 money was again wanted and Montagu supplied it by originating the Bank of England as proposed by William Paterson. For this service Montagu was made chancellor of the exchequer, in which office he appointed Newton in 1695 to recoin the money with a ribbed edge so as to make clipping easily detectable. In 1697 he became premier, but his arrogance and vanity soon made him unpopular. He was twice impeached for breach of trust, both times unsuccessfully.

Halifax, Edward Frederick Lindley Wood, Viscount (1881-), English statesman and diplomat. Educated at Oxford, he was elected to Parliament in 1910 and held various cabinet posts until 1925, in which year he was created Baron of Irwin. From 1926 to 1931, he was viceroy of India. Of a religious turn of mind, he established a basis of understanding with the mystic Gandhi, although opposing his objective of independence for India. In the years before World War II, he supported Chamberlain in avoiding a showdown with Hitler, but, when war broke out, he urged its prosecution to the limit. He became leader of the House of Lords in 1940, and Churchill relied heavily on his advice. He was ambassador to the United States from 1941 to 1946.

Hall, Charles Martin (1863-1914), American inventor, was born at Thompson, Ohio. He was graduated from Oberlin College in 1885. In February 1886, he invented an electrolytic process for obtaining aluminum, and, in 1888, a company was organized for the commercial manufacture of the metal, later utilizing extensive water power at Niagara Falls. The priority of his invention and the validity of his patents were upheld by the courts so that until 1912 his company controlled the production of the metal in the United States. By his process, aluminum, formerly as expensive as silver, became a common article of commerce, extensively employed in the arts, and largely used for cooking utensils and in airplanes. He was awarded the Perkin medal for chemistry in 1911. See *Aluminum*.

Hall, Granville Stanley (1846-1924), American educator and psychologist, was born in Ashfield, Mass. He was graduated at Williams College in 1867 and received the degree of doctor of philosophy at Harvard University in 1878. From 1872 to 1876, he was professor of psychology at Antioch College. He then pursued further studies in Berlin, Bonn, Heidelberg, and Leipzig. He was professor of psychology in Johns Hopkins University from 1881 to 1888, when he was elected president and made professor of psychology in Clark University. For 32 years he filled this chair and office with marked distinction, resigning in 1920.

As a champion of the culture-epoch theory of mental development, he won wide attention, and, by his important work on *Adolescence*, rose to an authoritative place among American educators. His writings include also *Aspects of German Culture; Youth—Its Education, Regimen, and Hygiene; Educational Problems; Founders of Modern*

Psychology; Jesus the Christ in the Light of Psychology; Recreations of a Psychologist; and *Morale: The Supreme Standard of Life and Conduct.* He founded and, in 1887–1921, was editor of *The American Journal of Psychology.* His later works include *Senescence* and *Life and Confessions of a Psychologist.*

Hall, James Norman (1887-1951), American writer, was born at Colfax, Iowa. He was graduated from Grinnell College in 1910, entered journalism, and rose to prominence as a writer during the early period of World War I. His earlier writings include *Kitchener's Mob,* published in 1916, and *High Adventure,* which appeared in 1918. After an extended journey in the Australasian region, he wrote, jointly with C. Nordhoff, an interesting book of travel entitled *Faery Lands of the South Seas,* which was published in 1921. This was followed by *Mid-Pacific, Mutiny on the Bounty,* and *Hurricane,* in which life and adventure in the South Sea Islands were made familiar to large numbers of readers.

Hallam, Henry (1777-1859), English historian and critic, was born at Windsor. He was graduated at Christ Church, Oxford, 1799, and subsequently was called to the bar. His first writings were published in periodicals, especially the *Edinburgh Review.* He became distinguished for the extensive learning, powers of generalization, taste, judgment, and conscientiousness exhibited in a succession of notable works, the chief of which are *Europe during the Middle Ages, The Constitutional History of England,* and *Introduction to the Literature of Europe.* During the greater portion of his life he lived in London, devoting himself to linguistic and historical studies. His son, Arthur Henry, was the "A. H. H." of Tennyson's *In Memoriam.*

Halleck, Fitz-Greene (1790-1867), American poet, was born in Guilford, Conn. After working in a bank, he became the confidential agent of John Jacob Astor, who left him in his will an annuity for the rest of his life and named him one of the original trustees of the Astor Library. Halleck then retired from active life and passed the rest of his days at Guilford.

His earliest poem, the graceful and genial *Twilight,* was printed in 1818. In 1827, a volume of his poetry appeared. This included *Marco Bozzaris,* a spirited lyric, by which he will probably be longest remembered. A bronze statue to his memory has been erected in Central Park, New York.

Haller (*häl'ĕr*), **Albrecht von (1708-1777),** Swiss anatomist, botanist, physiologist, and poet, was born at Bern. He began practice in 1729, but, in 1736, was called to a chair at Göttingen. Here he organized a botanical garden, an anatomical museum and theater, and an obstetrical school. He also assisted in founding the academy of sciences, and took an active part in the literary movement of the day. In 1753, he resigned his professorship and returned to Bern. After this he wrote *Elements of Human Physiology* and prepared four large works on the bibliography connected with botany, anatomy, surgery, and medicine. His poems are descriptive, didactic, and lyrical.

Halley, Edmund (1656-1742), English astronomer, was born at London. He studied at Oxford and, in 1676, went to Saint Helena to study the southern heavens. In 1679, he published his *Catalogus Stellarum Australium.* In 1682, he observed the comet known by his name. His prediction of its return was the first of the kind that proved correct. In 1683, he published his *Theory of the Variation of the Magnetic Compass,* and from an examination of Kepler's laws of the planetary motions inferred that the centripetal force always varies inversely as the square of the distance.

Halley prevailed on Sir Isaac Newton to complete his *Principia,* the first volume of which was printed by Halley at his own expense. In 1703, he was chosen Savilian professor of geometry at Oxford. In 1720, he was appointed astronomer royal and for 20 years carried on the operations of the Greenwich Observatory. He made many astronomical discoveries, including the proper motions of the fixed stars and the acceleration of the moon's mean motion. See *Comet.*

Halliburton, Richard (1900-1939), American traveler and author, was born at Brownsville, Tenn. On graduating from Princeton University in 1921, he set out to travel. Beginning without money, he earned his way with the help of income from magazine articles. His adventures in the Swiss mountains, Egypt, India, Tibet, Thailand, Bali, China, Japan, and Siberia were narrated in his *Royal Road to Romance,* which attained great popularity.

On his later travels he conceived the idea of reliving fabulous exploits of history. He traced the wanderings of Ulysses, swam the Hellespont, ran over the course from Marathon to Athens, dived into the Mayan well of death, and spent several months on an island believed to have been Robinson Crusoe's abode. He also swam the length of the Panama Canal and flew by plane over Mount Everest. Among his later books recounting his adventures are *The Glorious Adventure, New Worlds to Conquer, The Flying Carpet,* and *The Seven-League Boots.* He set out in a small sail boat in 1939 to cross the Pacific Ocean. His boat was last seen in the mid-Pacific, where it was overtaken by a typhoon, and he was not heard of again.

Hals (*häls*), **Frans (c. 1580-1666),** the elder, Dutch portrait and genre painter, was born, probably at Antwerp. He settled in Haarlem about 1604. Hals is regarded as the founder of the Dutch school of genre painting. His subjects of feasting and carousal are treated with marvelous vivacity and spirit. He is the first great painter of the Dutch National School, equaling Rembrandt in technical skill though inferior in imagination. His works are distributed among the chief galleries of the continent, England, and America. Excellent examples may be seen in the Metropolitan Museum, New York, in the Art Institute, Chicago, and in the Museum of Fine Arts, Boston. See *Painting.*

Halsey, William Frederick (1882-), American naval officer, was born at Elizabeth, N. J. After studying at the University of Virginia, he was graduated from Annapolis in 1904, and advanced through the grades to vice-admiral in 1940. In 1942, after heavy American losses at Guadalcanal, he was placed in command of the United States fleet in the South Pacific and was later promoted to admiral. He convoyed the American forces invading the Philippines, and decisively defeated the Japanese main fleet. His command, the Third fleet, bombed the coasts of Japan in the closing days of the war. He retired in 1947.

Hamilcar Barca (*hă-mĭl'kär bär'kä*) **(c. 270 B. C.- 228 B. C.),** Carthaginian general. While very young he was appointed to the command of the Carthaginian forces in Sicily in 247 B. C., at which time the Romans had possession of almost all the island. He established himself in Mount Ercte (now Pellegrino, near Palermo), making raids from there and resisting all the Roman attempts to dislodge him. After three years he left Ercte and established himself on Mount Eryx. He maintained his position there until 241, when, the Carthaginian fleet being hopelessly defeated off the Ægates Islands, Hamilcar was compelled to abandon Sicily. Still holding to his hatred of Rome, he went to Spain five years later and spent the next nine years in founding a new empire for Carthage. He was killed in battle with the Vettones.

Hamilton, Alexander (1757-1804), American statesman, was born in the West India Island of Nevis, son of a Scotch father and a French mother of Hugenot descent. His father failed in business and his mother died in 1768. In consequence, Alexander at the age of 12 entered the employ of an American merchant. His extraordinary abilities, however, induced some of his friends to procure for him a better education than could be secured at home. He was accordingly sent to a grammar school at Elizabethtown, N. J., and shortly afterward entered Columbia College, New York.

On the first appearance of disagreement between Great Britain and her colonies, Hamilton, still a schoolboy and barely 18, wrote a series of papers in defense of the rights of the latter. These articles were at first taken for the production of the statesman Jay, and secured for the writer the notice and consideration of the popular leaders. On the outbreak of the war, Hamilton obtained a commission as captain of artillery, gained the confidence of Washington, was made his aide-de-camp in 1777, and acquired great influence with him as his friend and adviser. On the termination of the war, he left the service with the rank of colonel, and, betaking himself to legal studies, soon became one of the most eminent lawyers in New York.

In 1782, Hamilton was elected by the state of New York a representative to the Continental Congress. In 1786, he became a member of the New York legislature, and, in 1787, he was appointed one of the delegates to the convention which met at Philadelphia for the purpose of revising the Articles of Confederation. In conjunction with Madison, he had the most important share in drawing up the Constitution afterward adopted. He was a strong supporter of the Federal as opposed to the Democratic party, and, along with Jay and Madison, defended the Constitution against all attacks by a series of letters in the New York *Daily Advertiser.* These letters were afterward collected and published under the title of *The Federalist.* It is due more to Hamilton than to any other one man that the Constitution was adopted in its present form and that the United States received a strong central organization.

On the establishment of the new government in 1789, with Washington as president, Hamilton was appointed secretary of the treasury. The disorder of the public credit and the lack of official accounts of the state treasury rendered this office one of peculiar difficulty. In order to re-establish public credit, he carried, in spite of much opposition, a measure for the funding of the domestic debt, founded a national bank, rearranged the system of duties, and altogether showed himself one of the greatest of American financiers. In 1795, he resigned his office and resumed the practice of law in New York.

When conflict with France arose in 1798, Hamilton was made major general of the United States army; and, on the death of Washington, he succeeded to the chief command. When peace was restored, he returned to his civil duties, but became involved in a political quarrel with Aaron Burr. This finally culminated in a duel, in which Hamilton was fatally wounded. He was elected to the American Hall of Fame, 1915.

Hamilton, Sir William (1788-1856), Scottish philosopher, was born at Glasgow. He studied at Glasgow and at Oxford; was admitted to the bar, but rarely practiced. In 1821, he became professor of history at Edinburgh, and was professor of logic and metaphysics there, 1936-56. An influential teacher, he gave impetus to the study of German philosophy in England. He held that, since the mind cannot grasp boundlessness such as that which characterizes space, reason is not sufficient in the search for truth but must be supplemented by faith. His chief books were *Discussions in Philosophy, Literature and Education, Metaphysics, Logic,* and *Lectures.* He left his library to the University of Glasgow.

Hamilton, Sir William Rowan (1805-1865), British mathematician was born in Dublin. He was educated at Trinity College, Dublin, and, at 19, undertook original investigation in conical refractions. In 1827, he was appointed professor of astronomy at Dublin and Irish astronomer royal. He invented quaternions, a mathematical tool which was to prove highly useful in the 20th century in the demonstration of the quantum theory. His earlier essays connected with caustics and contact of curves grew into the *Theory of Systems of Rays.* He wrote many important treatises and papers, including his *Lectures on Quaternions* and *Elements of Quaternions.*

Hamlin, Hannibal (1809-1891), American statesman, was born in Paris, Me. He studied law, was admitted to the bar, and, in 1833, began practice at Hampden, Me. In 1835, he was elected member of the state legislature, and entered upon an active political career of nearly 50 years. In 1842, he was elected to Congress; was United States senator from 1848 to 1856, when he was elected governor on the Republican ticket, but resigned immediately on again being elected senator. In 1861, he became vice president under Lincoln, serving until 1865. He was again senator from 1869 to 1881, and, from 1881 to 1883, he was minister to Spain. He was chiefly instrumental in passing the Wilmot Proviso through the House of Representatives. During the Civil War, he was a valued adviser of President Lincoln, whose views he shared and whose policy he staunchly supported.

Hammarskjöld (*hăm'ər-shĕld*), **Dag Hjalmar Agne Carl (1905-),** Swedish statesman, was born at Jönköping, Sweden. The son of a former Swedish prime minister, he was educated at Uppsala University and Stockholm University. He first intended a literary career, but went to work as a civil servant. He was under secretary of finance 1936–1945; under secretary of foreign affairs 1949–1951; and deputy foreign minister 1951–1953. In 1953 he succeeded Trygve Lie as secretary general of the United Nations.

Hammerstein (*hăm'ĕr-stīn*), **Oscar (1847-1919),** American impresario, was born in Berlin, Germany. At the age of 16 he came to America and, after a varied experience as inventor and playwright, he became, in 1870, manager of the Stadt Theater in New York. Prospering in this undertaking, he built, in 1888, the Harlem Opera House, his first theater. He established several other successful playhouses, among them the New York Theater, the Belasco, and the Victoria.

In 1906, Hammerstein opened the Manhattan Opera House with artists of the first rank as a rival of the well established Metropolitan Opera House. This greatly stimulated operatic interest and production in America, and to Hammerstein is due the credit of establishing French opera in the United States. He built the Philadelphia Opera House In 1908, and, in 1919, opened the London Opera House, which he was compelled to abandon on account of lack of interest in French opera in England. In 1912, he built the American Opera House in New York, which he opened in 1914 as the Lexington Theater. In his last years he was beset with financial difficulties.

Hammerstein, Oscar, II (1895-), librettist for the enormously successful *Oklahoma* and *South Pacific,* and many other musical plays, was born in New York City. He is a grandson of the famed Oscar Hammerstein who introduced the operas *Thaïs* and *Louise* to New York, and who built the London Opera House. Oscar Hammerstein II was graduated from Columbia University and quickly began a brilliant career as author and co-author of some of the most memorable stage productions in American dramatic history. Among them are *Rose Marie* (1924), *Sunny* (1925), which starred Marilyn Miller, and *The Desert Song* (1928), starring Dennis King. In collaboration with Richard Rodgers, the song writer, he produced the Pulitzer prize winners *Oklahoma* and *South Pacific,* and *The King and I,* which opened with the late Gertrude Lawrence in the lead. Hammerstein wrote the lyrics for "Old Man River," "The Last Time I Saw Paris," "Oh, What A Beautiful Morning," and a long list of equally popular songs. His style is marked by a refreshing combination of common idiom and unexpected originality of phrasing.

Hammond, James Bartlett (1839-1913), American inventor, was born in Boston. He was graduated at the University of Vermont in 1861; was newspaper correspondent during the Civil War; and was graduated at Union Theological Seminary in 1865. Later, he studied philosophy and science at the University of Halle, Germany, and devoted many years to mechanical experiments. In 1880, he patented a typewriting machine constructed on new scientific principles. In the Hammond typewriter, he introduced the "ideal" keyboard and a device for securing accurate alignment. He placed his machine on the market, 1884, and realized a substantial fortune from its sale.

Hammond, John Hays (1855-1936), American mining engineer, was born in San Francisco. He was graduated at the Sheffield Scientific School, Yale, in 1876 and later pursued a mining course at the Royal School of Mines, Freiberg, Saxony. In 1880, he was appointed special expert of United States Geological Survey, examining California gold fields. Later, he became consulting engineer of the Union Iron Works, San Francisco, and of the Central and the Southern Pacific railway. He examined mining properties in all parts of the world. In 1893, he became consulting engineer for Barnato Bros. in South Africa, and later for Cecil Rhodes, of whom he became a strong supporter.

Hammond was made consulting engineer of the consolidated gold fields of South Africa, of the British South Africa Company, and of the Randfontein Estates Gold Mining Company. He was one of the leaders in the reform movement in the Transvaal, 1895–96. After the Jameson raid, he was arrested and sentenced to death. Sentence was afterward commuted to 15 years' imprisonment and later he was released by the Boer leaders on payment of a fine of $125,000. He then went to London and became interested in many large mining companies. In 1900, he returned to the United States and became associated with important financial groups, purchasing and promoting extensive mining properties in the United States and Mexico. He was active also in the development of hydroelectric enterprises and irrigation projects.

Hammurabi (*hăm'ōō-rä'bē*), king of Babylonia, flourished about 2150 B. C., the sixth of the so-called first dynasty, and seems to have extended his suzerainty over Assyria, whose great cities of Assur and Nineveh he mentions as part of his domain. He became famous as an organizer of his empire, and, in his inscriptions, he makes record of building canals, of granaries for wheat, and of many other constructive undertakings in Babylon and other cities of his domain. In order to establish justice and promote prosperity, he made an extensive classification of the laws embodied in the famous "code of Hammurabi." These laws and many records revealing the social life of Babylonia have been preserved. Hammurabi was one of the greatest of the Babylonian kings.

Hampden (*hăm'dĕn*), **John (1594-1643),** English patriot, was born in London. He was graduated at Oxford, studied law, and, in 1621, entered the House of Commons. In 1627, for refusing to pay his proportion of the general loan which the king attempted to raise on his own authority, Hampden was committed to close imprisonment. Subsequently, he was unconditionally liberated by order of council. After the dissolution of the Parliament of 1628–29, he retired to his country estate.

In the Short Parliament of 1640, Hampden took a prominent part in the great contest between the crown and the House of Commons. For his resistance to the king's proceedings, he was one of the five members whom Charles, in 1642, rashly attempted in person to seize in the House of Commons. On the outbreak of the Civil War he raised and became colonel of a regiment in the Parliamentary army under the Earl of Essex. Prince Rupert having attacked a Parliamentary force at Chinnor, near Thame, Hampden put himself at the head of a small troop of cavalry that was rallied in haste to oppose him. In the fight that ensued at Chalgrove Field, Hampden received a wound, of which he died.

Hampden, Walter (1879-1955), known in private life as Walter Hampden Dougherty, American actor, was born at Brooklyn, New York. He was educated at Harvard University and the Polytechnic Institute, Brooklyn. His first appearance on the stage was in 1901 at London, where, in the following six years, he acted many classic roles, including that of *Hamlet.* He returned to America in 1907, taking part in many plays, including *A Doll's House, The Servant in the House,* and *Salome.*

Hampton (*hăm'tŭn*), **Wade (1818-1902),** American politician and soldier, was born at Columbia, S. C. He was a grandson of General Wade Hampton, and, though op-

posed to secession he joined the Confederate army and raised a force called "Hampton's legion." These troops he led with distinction at the first battle of Bull Run. He subsequently served at Seven Pines, at Antietam, and at Gettysburg. In 1865, he commanded a body of cavalry. He attained the rank of lieutenant general, and was four times wounded. In 1877–79, he was governor of South Carolina; from 1879 to 1891, he was United States Senator; and, from 1893 to 1897, he was commissioner of railroads.

Hamsun (*hăm'sōōn*), **Knut (1859-1952)**, Norwegian writer, was born at Loni, Norway. Receiving practically no school education, he engaged in farming, was a clerk in a store and post office, and became a teacher of small children. In early life, he spent several years in the United States, and, for a time, he was a street car conductor in Chicago. His experiences in various difficult and unhealthful occupations led him to return to Norway in 1888 with very unfavorable impressions of America. In consequence, his early work on *American Spiritual Life* contains severe criticisms of American institutions and manners. He settled at Grimstad, Norway, and devoted himself to writing and to farming.

Hamsun excels in psychological analyses of morbid types, and his style abounds in striking metaphors. His works of fiction include *Hunger, Growth of the Soil, Pan, Mysteries, The Woman at the Well, Vagabonds, August,* and *The Road Leads On.* In 1920, he was awarded the Nobel prize for literature.

Hancock, John (1737-1793), American patriot, was born at Braintree, now a part of the city of Quincy, Mass. He was one of the leaders in the revolt in Massachusetts; was very active in denouncing the "Boston massacre"; and was one of the persons whose seizure was attempted by the expedition which led to the battle of Lexington. He was president of the Continental Congress, 1775–77; was governor of Massachusetts, 1780–85 and 1787–93; and was the first signer of the Declaration of Independence. He presided at the state constitutional convention of 1788, and favored the adoption of the Federal Constitution.

Hancock, Winfield Scott (1824-1886), American general, was born at Montgomery Square, Pa. After being graduated from West Point in 1844, he served with great gallantry during the Mexican War. Appointed brigadier general of volunteers in 1861, he took part in the campaign on the Potomac, fought at Antietam, and commanded a corps in the battle of Gettysburg, where he was wounded, 1863. In 1864, he became brigadier general in the regular army, and, in 1866, major general. In 1880, he was the unsuccessful Democratic nominee for president.

Hand, Learned (1872-), eminent American jurist, was born in Albany, N. Y., and was educated at Harvard. He practiced law in Albany before he entered the judicature in 1909 as United States District Judge in New York State. He joined the Second United States Circuit Court in 1924, and served it with great distinction until his retirement in 1951. Learned Hand's profound beliefs on the meaning and the exercise of the law as a beneficial human agency were brilliantly summed up in his book *The Spirit of Liberty,* published in 1952.

Handel (*hăn'dĕl*), **George Frederick (1685-1759)**, German composer and chief founder of oratorio, was born at Halle, Prussian Saxony, though for almost half a century he resided in England, his adopted country.

In his eighth year, he played for the Duke of Saxe Weissenfels, who was so impressed with his genius that he persuaded Handel's father to renounce his plan of training him for the law and to place him under the instruction of the organist Zachau. Handel now composed cantatas, learned all the orchestral instruments, and familiarized himself with the works of the most celebrated German composers. His education was furthered at the University of Halle, which he entered in 1702. He subsequently took a place in the orchestra of the Hamburg Opera House. Here he composed several operas and various works for the church and gave lessons to many pupils.

In 1707-08, Handel visited Italy. During the first year, he produced his *Rodrigo* at Florence, and his journey was continued with triumphal progress. On his return to Germany in 1709, Handel became chapelmaster at the court of the elector of Hanover.

In 1710, he visited London, where he performed his *Rinaldo* and was charmed with his reception by Queen Anne and the nobility. Compelled by his engagement to return to Hanover, he quitted England only to return in 1712. When, in 1714, his patron, the elector of Hanover, ascended the throne as George I of England, Handel again secured his favor by the composition of a symphony and several instrumental pieces and determined to remain in England. He was appointed musical director to the Duke of Chandos, for whom he composed the celebrated *Chandos Anthems* and his first English oratorio, *Esther.*

He next attempted to place Italian opera upon a firm foundation in London, and, through the Royal Academy of Music, he successfully produced many Italian operas of his own composition. From 1728 to 1734, Handel produced several operas in partnership with Heidegger of the Haymarket Theater. During the following three years, he produced independently at Convent Garden, but he was forced by heavy financial losses to abandon this project.

With shattered health and bankruptcy before him, Handel applied himself to sacred music and his famous oratorios—the works by which he achieved his lasting reputation. *Deborah* was composed in 1733, *Israel in Egypt* in 1738, and his superb masterpiece, the *Messiah,* at Dublin in 1742. Handel became blind in 1751, yet he continued to give concerts of sacred music and to compose.

Handel's art was universal, but he was also greatly influenced by the national spirit of his adopted land. He was in a singular degree the musical expression of the English, who at that time were saturated with biblical ideas and accustomed to public demonstrations of national and patriotic enthusiasm. His music is characterized by grandeur and sublimity. The operas are now seldom performed, but his oratorios hold a place in music similar to that of Shakespeare's plays in English drama. Handel was buried in Westminster Abbey.

Handy, William Christopher (1873-), American Negro composer and trumpeter, was born at Florence, Ala. Known as "The Father of the Blues" because he made this distinctive type of music available to interpreters and listeners everywhere, Handy began his musical career singing in the Methodist Church of which his father was minister. Forbidden to play any musical instrument except the church organ, he managed to acquire a cornet which he played in the local brass band. Following a number of years of teaching and playing in a quartet in Chicago and St. Louis, he joined Mahara's Minstrels as bandmaster and cornet soloist, and toured the United States and Canada. At length, he settled in Memphis, where he organized his own band.

He published the first of his famous "blues" compositions, "The Memphis Blues," in 1909, and in 1914 wrote "The St. Louis Blues." These were followed by many others, including "The Beale Street Blues" (1917) and "The Atlanta Blues," not to mention his many arrangements of popular songs.

Hanna, Marcus Alonzo (1837-1904), American merchant and politician, was born in New Lisbon (now Lisbon), Ohio. He was educated in the Cleveland public schools and at Western Reserve University, leaving college, however, to engage as partner in his father's wholesale grocery house. In 1867, he entered the firm of Rhodes and Company, dealers in coal and iron, and obtained control of mines, furnaces, ships, a bank, the local street car system, and a theater. Entering politics, he soon controlled the Republican party in Ohio, through which he supported William McKinley as governor of Ohio. He later was instrumental in having him nominated as president of the United States and conducted the campaign successfully with an appeal to "property rights."

In 1897, Hanna was appointed to the United States Senate as a Republican by Governor Bushnell, to fill a vacancy caused by the resignation of John Sherman, and, in 1898, he was elected for a full term, serving until his death. See *Standpat Policy.*

Hannay, James Owen ("George A. Birmingham") **(1865-1950)**, Irish novelist, the son of a Belfast clergyman, was born in the north of Ireland. He received his education at Haileybury, England, and at Trinity College, Dublin. He took orders and was made rector at Westport in 1892, and, in 1912, was made canon of Saint Patrick's Cathedral, Dublin. In 1922, he was made British chaplain at Budapest; two years later he became rector of Mells, England.

In his novels *The Seething Pot, Hyacinth, The Red Hand of Ulster,* and *Northern Iron,* Hannay made serious studies of contemporary life in Ireland. *The Lighter Side of Irish Life, The Major's Niece,* and *Spanish Gold* contain more or less fantastic stories and comic sketches. In his earlier novels he introduced, as easily recognizable characters, numerous Irishmen prominent in literature and politics. His later works include *Adventures of Dr. Whitty, Irishmen All, Eleanor's Enterprise, From Dublin to Chicago, Gossamer, The Island of Mystery, The Lady of the Abbey, The Runaway,* and *Magiligan Strand.*

Hannibal (c. 247 B. C. -183 B. C.), Carthaginian general, the son of Hamilcar Barca, was born about 247 B. C. He remained with his father when the latter was building up in Spain a strong Carthaginian colony to dispute with Rome the mastery of the peninsula. When the boy was nine years old, he took an oath at his father's instance, swearing eternal enmity to Rome. After his father's death, he was employed by his brother-in-law Hasdrubal in military undertakings, and, when Hasdrubal was assassinated in 221, Hannibal was made commander in chief.

Hannibal began his activities against Rome by attacking one of that city's allies, Saguntum. After an eight months' siege, the city was taken, and the Romans

declared war against the Carthaginians in 218. Hannibal took the initiative by setting out to invade Italy immediately with 90,000 foot and 12,000 horse. His passage of the Alps with unprecedented rapidity and in spite of hostile tribes was costly, but it stands as one of the most celebrated exploits in military history.

In Italy, Hannibal forced into his service the Celtic tribes in the north and hastened to meet the Roman forces sent against him. He defeated successively three Roman armies at the river Ticenus, the river Trebia, and Lake Trasimenus. In 216, he virtually annihilated a Roman army of 90,000 men at Cannæ. One Roman counsul was slain, and the city itself remained without effective protection. The victor hesitated, however, to march against the city, waiting to receive the capitulation of various Latin towns throughout Italy. The delay enabled Rome to organize a defense, and most of the Italian towns remained loyal. This miscalculation and the subsequent defeat of re-enforcements under his brother Hasdrubal, at Metaurus river in 207, heralded the failure of Hannibal's enterprise. After maintaining himself in Italy for upward of 15 years, he was recalled to Carthage, whither the Roman general Scipio had led an army of invasion. In the battle of Zama, 202, Hannibal met Scipio and was defeated.

Although his power was broken, he undertook to renew it in order finally to crush Rome. But upon the defeat of Antiochus, whom he had joined at Ephesus, the surrender of Hannibal to the Romans was stipulated as a condition of peace. Foreseeing such a result, he fled to Bithynia, and, seeing no hope of escape, he committed suicide by taking poison.

Hansen, Harry (**1884-**), American literary editor and newspaperman, was born in Davenport, Iowa. A war correspondent in Europe in World War I, he turned to writing about books and was literary editor of the Chicago *Daily News* from 1920 to 1926, a period during which Chicago still retained much of the heady intellectual atmosphere that had helped to inspire such writers as Sherwood Anderson and Theodore Dreiser, and later during the 1920's, helped produce such phenomena as Charles MacArthur and Ben Hecht. Hansen went to New York in 1926. He was book reviewer on the *World* and, after merger, on the *World-Telegram;* in all, he spent twenty-two years on the two papers, besides reviewing for *Harper's Magazine* from 1929 to 1939, and serving for a number of years as editor of the annual O. Henry Prize Stories. Hansen has lectured widely and is the author of many books. Since 1948, he has been editor of the *World Almanac.*

Hanson, Howard (**1896-**) American composer and educator, was born at Wahoo, Nebr. He was a fellow of the American Academy in Rome from 1921 to 1924, and on his return was made director of the Eastman School of Music, Rochester, N. Y., a position he has held for more than thirty years. He has served as guest conductor of leading orchestras in this country and abroad. His compositions cover a wide range, including symphonies, symphonic poems, operas, choruses, and other works for particular instruments. His *Merry Mount* (1933) is considered outstanding among American operas.

Hapgood, Norman (**1868-1937**), American editor, author, and critic, was born in Chicago, Ill. He was graduated at Harvard in 1890. He was dramatic critic of the New York *Commercial Advertiser* and of the *Bookman*, 1897-1902. From 1903 to 1912, he was editor of *Collier's Weekly*, and, from 1913 to 1916, he was editor of *Harper's Weekly*, attracting wide attention by the force and versatility of his editorials. He edited *Hearst's International* in 1923-25. His writings include *Literary Statesmen, Daniel Webster, George Washington, Abraham Lincoln, The Stage in America*, and *The Advancing Hour.*

Hard, William (**1878-**), American writer, was born at Painted Post, N. Y. He was educated at University College, London, and at Northwestern University, Illinois. He was head of the Northwestern University settlement in 1901-02, and, later, was an editorial writer for the Chicago *Tribune*, and a contributing editor for the *Metropolitan Magazine*, the *New Republic*, and other periodicals. He conducted for several years the William Hard service, reporting Washington News for various evening papers, and later became a staff writer for *The Reader's Digest.*

Hardenberg (*härd'děn-bĕrĸ*), **Karl August von, Prince** (**1750-1822**), Prussian statesman, was born at Essenrode in Hanover. On Beyreuth's union to Prussia in 1791, he became a Prussian minister and, in 1804, first Prussian minister. His policy was to preserve neutrality in the war between France and England; but, in 1806, under Napoleon's influence, he was dismissed. In 1810, he was appointed chancellor, and addressed himself to the task of completing the reforms begun by Stein. In the war of liberation, he played a prominent part, and, after the Treaty of Paris in 1814, was made a prince. He took part in the Congress of Vienna and in the treaties of Paris. To Hardenberg Prussia is mainly indebted for the improvements in her army system, the abolition of serfdom and the privileges of the nobles, the encouragement of municipalities, and the reform of education.

Hardie (*härd'dĭ*), **James Keir** (**1856-1915**), British labor leader, was born in Legbrannock, Scotland. He was a worker in the coal mines from the age of 7 to 24; became secretary of a miners' union; edited the Cumnock *News*, 1882–86, and the *Labor Leader*, 1887–1903. He was elected to Parliament in 1892; founded the Socialist Independent Labor party in 1893; and, in 1896, became the leader of the Labor party in the House of Commons. His writings include *Labor Politics, From Serfdom to Socialism*, and *After Twenty Years.*

Harding, Warren Gamaliel (**1865-1923**), 29th president of the United States, was born at Corsica (then Blooming Grove), Morrow County, Ohio. He attended Ohio Central College at Iberia, 1879–82. He taught a country school for a year and read law for a short time. In 1884, he entered the newspaper business at Marion, Ohio, and later became editor and publisher of the Marion *Star.*

Encouraged to enter political life by Senator Foraker, Harding was elected to the Ohio senate, 1900–04; was lieutenant governor of Ohio, 1904–06; Republican candidate for governor in 1910; United States senator, 1915–21.

During his term in the Senate, Harding urged preparedness for national defense. He gave his support to the declaration of war against Germany and to all the important war measures, including the Selective Draft Bill and the Espionage Bill. He favored the prohibition amendment and voted for the Volstead Act enforcing war time prohibition, over President Wilson's veto. He stood for the exemption of American shipping from Panama Canal tolls and supported woman suffrage. He was opposed to the Covenant of the League of Nations, favored the Lodge reservations to it, and voted against the ratification of the peace treaty as submitted by President Wilson.

In 1920, at the Republican national convention held in Chicago, he was nominated for president. Strongly opposing the unconditional ratification of the Versailles Peace Treaty, he won overwhelming endorsement at the polls. He received about 7 million more votes than J. M. Cox, his Democratic opponent. The electoral vote was 404 to 127 in Harding's favor.

In his first message to Congress, President Harding urged a "return to normalcy," advocating retrenchment in national expenditures, reduction of war-time taxation, the enactment of an emergency tariff, and the adoption of a national budget system. Upon President Harding's invitation, authorized by Congress, delegates from the leading nations met at an Arms Conference in Washington, November 1921, to consider the reduction of naval armaments and the status of international relations in the Pacific.

Among important legislative and executive enactments supported and approved by President Harding were the declaration of peace between the United States and Germany, the Fordney-McCumber tariff, the restriction of post-war immigration, the restoration of the railways to private control, the refunding of the British war loans, and the withdrawal of American forces from Germany.

In 1923, President Harding made an extensive tour of the western United States, in connection with which he also visited Alaska, with the view of furthering the development of the territory. While returning from this journey, he became ill and died suddenly at San Francisco. He was buried near Marion, Ohio, and, in 1931, a memorial was erected about his grave.

Hardwicke, Sir Cedric (**1893-**), British actor and producer, was born at Lye, England. World War I interrupted his stage career, which he resumed as a member of the Birmingham Repertory Company. Some of his most successful roles were in George Bernard Shaw's plays; for example, Cæsar in *Cæsar and Cleopatra* and King Magnus in *The Apple Cart.* He came to America in 1936 and first attracted general notice when he was given the Drama League's 1938 award for his acting in *Shadow and Substance.* In addition to his work in the theater, he has done much acting and directing in film plays.

Hardy, Arthur Sherburne (**1847-1930**), American diplomat and author, was born at Boston, Mass. He was graduated at West Point in 1869, served one year in the United States artillery, and was professor of civil engineering, Iowa College, 1871–73. He studied at Ecole des Ponts et Chaussées, 1873–74. From 1874 to 1878, he was professor of civil engineering and, from 1878 to 1893, was professor of mathematics, Dartmouth College. After serving as editor of the *Cosmopolitan Magazine*, 1893–95, he was United States minister to Iran, Greece, Rumania, Serbia, Switzerland, and Spain.

His mathematical works include *Elements of Quaternions, Elements of Calculus*, and *Imaginary Quantities.* He is better known, however, for his novels, among which are *But Yet a Woman, Diane and Her Friends*, and *No. 13, Rue du Bon Diable.* He wrote also the poetical works *Songs of Two* and *Francesca of Rimini.*

Hardy, Thomas (**1840-1928**), English novelist, was born in Dorsetshire. He was educated as an architect, but,

in 1868, gave up his profession to devote himself to literature, and won a high place among modern writers of fiction. He achieved his first success in *Far from the Madding Crowd*, published anonymously in 1874 and generally attributed to George Eliot. *The Return of the Native* and *The Woodlanders* are usually considered his masterpieces, but his later novels, *Tess of the D' Urbervilles* and *Jude the Obscure* more accurately embody his mature style and spirit. He combined the technique of the Victorian writers with a frank objectivity which was more characteristic of his younger contemporaries. Hardy's numerous works include *Desperate Remedies, Under the Greenwood Tree, Life's Little Ironies, The Pursuit of the Well-Beloved, Poems of the Past and the Present, The Dynasts, Time's Laughingstocks and Other Verses, Satires of Circumstance, Moments of Vision,* and *Late Lyrics*. He was buried in Westminster Abbey.

Hargreaves (*här'grēvz*), **James** (**c.1745-1778**), English mechanic and inventor, was born probably at Blackburn. He was an illiterate weaver and carpenter of Stanhill, near Blackburn. In 1760, he invented a carding machine and, about 1764, the spinning jenny, although the first machine of the latter type was not known to the public until 1867. His fellow spinners, prejudiced against machinery, broke into his house and destroyed his frame in 1768. He removed to Nottingham, where he erected a spinning mill, but his patent proved invalid. He continued to carry on business as a yarn manufacturer until his death.

Harkness, Edward Stephen (**1874-1940**), American philanthropist, was born at Cleveland, Ohio, and was graduated from Yale University in 1897. Inheriting a fortune from his father, he made many gifts to colleges, hospitals, and museums. He served as a trustee of the Metropolitan Museum and the Presbyterian Hospital in New York, and the Commonwealth Fund, founded by his mother, Mrs. Stephen V. Harkness, in 1918. He expanded the endowment of the fund, and in 1918 founded the Pilgrim Trust for the benefit of Great Britain. Substantial grants from this trust have been made for the repair of ancient buildings, ecclesiastical and secular, the preservation of historical records, the support of learned societies, the purchase of works of art, and the assistance of social welfare schemes.

Harlan (*här'lăn*), **John Marshall** (**1833-1911**), American jurist, was born in Boyle county, Ky. He was graduated at Centre College, Ky., in 1850 and studied law at Transylvania University. After practicing at Frankfort, Ky., he was elected county judge in 1858. He removed to Louisville in 1867 and practiced law there. He served as colonel in the Union army, 1861–63; was attorney general of Kentucky, 1863–67; and then returned to practice. He was a member of the Louisiana commission in 1877 and one of the American arbitrators on the Bering Sea tribunal, which met in Paris in 1893. In 1877, he became associate justice of the United States Supreme Court, a position which he filled with marked ability for 34 years.

Harlan, John Marshall (**1899-**), lawyer and grandson of Justice Harlan, was born in Chicago. He was educated at Princeton (1920), Balliol College, Oxford (1923), and New York Law School (1924). Admitted to the New York bar in 1924, he served as assistant U. S. attorney for the Southern District of New York 1925–27, and assistant attorney general of New York 1928–30, 1951–53. During World War II he served overseas as colonel with the United States Army Air Force. He was a member of a New York City law firm from 1932 until he was made associate justice of the United States Supreme Court in 1955.

Harley, Robert. See *Oxford, Robert Harley, Earl of.*

Harnack (*här'näk*), **Adolf** (**1851-1930**), German Church historian, was born in Dorpat, Estonia. He studied at Dorpat University, 1869–72, became professor of church history at Leipzig in 1876, at Giessen in 1879, at Marburg in 1886, and at Berlin in 1889. His strong and inspiring personality attracted to his lectures many hundreds of students from Europe and America. His writings include many standard works on theology, among the most important of which are, entitled in their English translations, *What is Christianity?* and *History of Dogma*.

Harnett, William Michael (**1848-1892**), still-life artist. Born in Cloakilty, near Cork, Ireland, he was brought to Philadelphia when a child. Trained as an engraver, he studied at the Pennsylvania Academy of Fine Arts and afterwards in New York. He went to Germany in 1878, where he remained four years, studying in Frankfort and Munich. Too poor to employ a model, he painted still-lifes. Neglected for more than half a century after his death, he has come to be recognized as one of America's greatest still-life painters.

Haroun-al-Raschid (**c.765-809**), (*hä-rōōn'äl-rä'shēd*) caliph of Baghdad, the fifth of the Abbasside dynasty, became caliph in 786. He invaded Greece and obtained from the empress Irene 70,000 gold dinars. He was successful also in numerous Byzantine wars, and, in 801, he sent presents to Charlemagne. With the help of the Barmecides Jahia and Jiaffar, whom he murdered later in 803, he raised Baghdad to unprecedented eminence in learning, commerce, and splendor. He is a character in the *Arabian Nights* and in other Oriental tales.

Harper, William Rainey (**1856-1906**), American educator and Hebrew scholar, was born in New Concord, Ohio. He was graduated at Muskingum College in 1870 and received the degree of doctor of philosophy at Yale University in 1875. He was instructor in Masonic College, Macon, Tenn., and in the preparatory school of Denison University until 1879, when he became professor of Hebrew, Baptist Union Theological Seminary, Chicago, where he developed a method of teaching Hebrew by correspondence. From 1886 to 1891, he was professor of Semitic languages at Yale. He was then made first president and head of Semitic languages at the University of Chicago and occupied this chair and office until his death.

Harper was one of the foremost American Hebraists, and, in addition to high scholarship, possessed great ability as an organizer and administrator. The rapid and substantial growth of the University of Chicago was due largely to his constructive leadership. The Harper Memorial Library was erected in his honor. He is the author of many textbooks and philological papers, founded and edited several publications, and extended the work of the university by offering correspondence instruction.

Harriman, Edward Henry (**1848-1909**), American capitalist and railroad administrator, was born at Hempstead, N. Y. At 14 he became a broker's clerk in Wall Street and later a stockbroker on his own account. He became president of the Southern Pacific railway, reorganized it and placed it on a prosperous footing. This success led to the acquisition of other large holdings. His contest, in 1909, with James J. Hill for railway control precipitated a financial crisis in Wall Street and led to increased government regulation of railroads. He left an estate of over $200,000,000.

Harriman, W(illiam) Averell (**1891-**), American business man and diplomat, the son of Edward H. Harriman. Graduating from Yale, he succeeded to his father's business position. After serving at Washington he was sent to Great Britain and later to Russia to arrange for lend-lease aid. He was ambassador to Russia and later to Great Britain, 1943-46. He was secretary of commerce, 1946-48, resigning to become chief European representative of the Economic Cooperation Administration. In 1950 he left his post as roving ambassador for the E C A to become special assistant to President Truman. In 1954 he was elected governor of New York. In 1956 he was defeated by Adlai Stevenson for nomination for president on the Democratic ticket.

Harris, Frank (**1856-1931**), Irish American novelist and biographer, was born at Galway, Ireland. Coming to America, he studied at the University of Kansas and became a naturalized citizen. He later took up his residence in England and edited various literary journals, including the *Saturday Review*. He gathered about him a group of writers who later became famous, including George Bernard Shaw and Max Beerbohm. His numerous writings, distinguished by scholarship and originality of approach, include several volumes of Shakespeare studies; two volumes of stories, *The Veils of Isis* and *Undream'd of Shores; The Life and Confessions of Oscar Wilde;* and *My Life and Loves* in three volumes. The frankness of the last named work led to its suppression in England and the United States.

Harris, Joel Chandler (**1848-1908**), American author, was born in Eatonton, Ga. He served an apprenticeship to the printing trade, and, for 25 years, was one of the editors of the Atlanta *Constitution*. Here he produced his Afro-American folklore studies which brought him world-wide popularity. His *Uncle Remus* tales have become classic, and no writer has more charmingly pictured the humorous and imaginative side of Negro character.

Among his many books are *Uncle Remus: His Songs and His Sayings, Nights with Uncle Remus, Mingo, Little Mr. Thimblefinger, Mr. Rabbit at Home, Stories of Georgia, Tales of the Home Folks, Evening Tales, Chronicles of Aunt Minervy Ann, On the Wings of Occasion, Gabriel Tolliver, Wally Wanderoon,* and *The Tar-Baby and Other Rhymes*. In 1905, he was elected a member of the American Academy of Arts and Letters. See *Br'er Rabbit*.

Harris, Robert (**1849-1919**), Canadian painter, was born in the Vale of Conway, North Wales. He received his education at Prince of Wales School, Charlottetown, Prince Edward Island, and became a land surveyor. After practicing as a self-taught painter for a time, he studied under Legros in London and with Bonnat in Paris. Following a period of travel in Italy and other European countries, he located in Toronto but soon removed to Montreal, where he was director of the art school,1883-87. He became an original member of the Canadian Royal Academy in 1884 and is known chiefly as a genre and por-

trait painter. Among his best-known works are "The Fathers of the Confederation," in the Parliament Building, Ottawa, "The School Trustees," in the National Gallery, and "A Man of Small Importance," in the Montreal Museum.

Harris, William Torrey (1835-1909), American educator and philosophical writer, was born at North Killingly, Conn. He entered Yale with the class of 1858, but was not graduated. From 1867 to 1880, he was superintendent of the Saint Louis public schools. He was an ardent Hegelian and contributed much to make Hegelian philosophy influential in America. In 1867, he established the *Journal of Speculative Philosophy.* He edited the department of philosophy in *Johnson's Cyclopædia,* writing many important articles, and was editor in chief of *Webster's New International Dictionary.*

In the field of education, Harris was one of the most vigorous American advocates of Froebel's principles. Under his leadership, assisted by Miss Susan Blow, the kindergarten was first made a part of the public school system in Saint Louis in 1873. As United States commissioner of education for 17 years, beginning in 1889, he rendered distinguished service. His works include *Introduction to the Study of Philosophy, The Spiritual Sense of Dante's Divina Commedia, Hegel's Logic,* and *Psychologic Foundation of Education.*

Harrison, Benjamin (1833-1901), 23d president of the United States, was born in North Bend, Ohio. He was a great-grandson of Benjamin Harrison, signer of the Declaration of Independence, and grandson of William Henry Harrison, 9th president of the United States. He was graduated at Miami University in 1852 and studied law in Cincinnati. He removed to Indianapolis, Ind., in 1854, and laid the foundation of a lucrative legal practice. Entering the Union army in 1862, he served with conspicuous gallantry in the Atlanta campaign, finally returning to civil life at the close of the war with the rank of brevet brigadier general.

In 1881, he entered the United States Senate and, in 1888, was nominated for the presidency of the United States by the Republican national convention. He was elected in the ensuing November and was inaugurated in 1889. His administration was quiet, successful, and measurably popular. It was marked by the amicable settlement of a dispute with Chile and by the passage of the McKinley Tariff Bill. In 1892, he again received the nomination in the national Republican convention. By this time, however, the able and persistent attacks of the Democrats on the high tariff policy led to a general repudiation of it, and, at the election, he was defeated by Grover Cleveland. He was the chief representative of the United States at the Hague Conference, 1899.

Harrison, John (1693-1776), British inventor, was born at Foulby. By 1726, he constructed a timekeeper with compensating apparatus for correcting errors due to variations of climate. In 1713, the government had offered three prizes for the discovery of a method to determine the longitude accurately. After long perseverance, Harrison invented and constructed a chronometer which, in a voyage to Jamaica in 1761-62, determined the longitude within 18 geographical miles. After further trials, he was awarded the largest prize of £20,000. He made other inventions and improvements for timepieces.

Harrison, Thomas Alexander (1853-1930), American landscape painter, was born in Philadelphia, 1853. He studied art at the Pennsylvania Academy of Fine Arts in his native city and later under Gérôme and Bastien-Lepage in Paris. He became noted for his fine marine paintings. After many visits to the United States, he finally established himself in Paris, where he attained high rank among the American group of artists. In America he is represented by "Castles in Spain," in the Metropolitan Museum, New York; "Amateurs," in the Art Institute, Chicago; "Twilight," the Saint Louis Museum; and "The Great Mirror" and "Marine" in the Wilstach collection, Philadelphia. His "Arcady" and "Solitude" are in the Luxembourg Museum, Paris. Among his other important works are "Setting Sun," "Golden Sands," and "Caressing Waves." With Winslow Homer and C. H. Woodbury, he ranks among the leading American marine painters.

Harrison, William Henry (1773-1841), 9th president of the United States, was born in Virginia, son of Benjamin Harrison, who signed the Declaration of Independence. In 1791, he joined the army which Wayne was leading against the Indians of the Northwest and served until 1798. In 1801, he became governor of Indiana territory, and, as its representative in Congress, succeeded in passing a law relating to the sale of the Federal land in sections or parts of sections. To this act the Western states owe much of their prosperity.

In the war against the Indians in 1811, which soon became also a war against the English in Canada, Harrison, as commander in chief of the American army, showed great military talent. He defeated the Indians in an important battle at Tippecanoe, and, by the victory of Perry on Lake Erie, was enabled to pursue the British invaders into Canada, where, in 1813, he totally routed them in the battle of the Thames. In 1814, he resigned his commission in the army; in 1816, he was elected to Congress; and, in 1825, became a member of the United States Senate. The Whig party tried in vain to make him president of the United States in 1836, and succeeded in 1840. He died after serving one month.

Hart, Albert Bushnell (1854-1943), American educator and historian, was born in Clarksville, Pa. Graduated at Harvard in 1880, he received the degree of doctor of philosophy from the University of Freiburg in Baden, Germany, in 1883. He was successively instructor, assistant professor, and professor of history in Harvard University from 1883 to 1910. From 1910 to 1926, he was professor of government. He became prominent as a leader in developing the method of studying history direct from original sources. Among his numerous works are *Formation of the Union, Practical Essays on American Government, Studies in American Education, Foundations of American Foreign Policy, Slavery and Abolition, The Southern South, The Monroe Doctrine, America at War,* and *We and Our History.*

He was editor of *Epochs of American History, Source-Book of American History, The American Nation,* and other works. He was joint editor of *American History Leaflets* and the *Cyclopædia of American Government.*

Harte (*härt*), **Francis Bret (1839-1902),** American poet and novelist, was born in Albany, N. Y. He was at different times a miner, school teacher, printer, and editor. From 1864 to 1870, he was secretary of the United States mint at San Francisco. From 1868 to 1871, he edited the *Overland Monthly.* In 1870, he published his famous poem "The Heathen Chinee." He was appointed American consul at Crefeld in 1878, at Glasgow in 1880, and, after leaving Glasgow in 1885, he lived in London. His most widely known stories and poems depict frontier life on the Pacific slope In the early gold mining days. He was a realist and portrayed life with great vividness and vigor.

In his best stories, *The Luck of Roaring Camp, The Outcasts of Poker Flat,* and *Tennessee's Partner,* Harte introduced an entirely new type of fiction, which became immensely popular. In his later work he did not sustain his early success. Among his other writings are *Tales of the Argonauts, A Millionaire of Rough and Ready, Devil's Ford,* and *A Ward of the Golden Gate.* See *Luck of Roaring Camp.*

Hartmann (*härt'män*), **Karl Robert Edouard von (1842-1906),** German philosopher, was born at Berlin. He served as an artillery officer from 1861 to 1865. From 1867 until his death, he lived in Berlin, working out his philosophical scheme, a synthesis of Hegel, Schelling, and Schopenhauer, in which "the Unconscious" plays the role of creator and providence. His great work was *The Philosophy of the Unconscious.* This was followed by books on the ethical consciousness, the development of the religious consciousness, German æsthetics, Lotze, and Kant, besides a work on the self-destruction of Christianity, criticisms of Neo-Kantianism and contemporary philosophies, defenses of his own system, and political and educational treatises. He was a pessimist as regards the inevitable misery of existence, but an optimist as champion of evolutionary progress.

Harvard, John (1607-1638) founder of Harvard College, was born in Southwark, England. He was graduated at Emmanuel College, Cambridge, in 1631, and, in 1637, was married and came to America. He was made a freeman of Massachusetts, and received a tract of land in Charlestown, where he began preaching as a Congregational minister. He bequeathed about £400 and about 300 volumes from his library for the establishment of a college. This was added to £400 which the colony in 1636 had voted to establish "a schoale or colledge," which, in 1637, was ordered to be at "New Towne." In 1638, the town was named Cambridge, and, in 1639, the school was named Harvard College.

Harvey, Edmund Newton (1887-), American physiologist, was born in Philadelphia. Educated at the University of Pennsylvania and Columbia University, he was instructor in physiology, 1911–15, assistant professor, 1915–19, professor from 1919 to 1933, when he was made H. F. Osborn professor, at Princeton University. He made extensive researches in bioluminescence, regulation in plants, cell permeability, and nerve conduction. In 1920, he published a valuable work entitled *The Nature of Animal Light.*

Harvey, George Brinton McClellan (1864-1928), American editor and diplomat, was born at Peacham, Vt. He was educated at Peacham Academy, entered journalism, and, during the period 1882–86, was reporter for several leading newspapers. In 1890–91, he was insurance commissioner of New Jersey. From 1891 to 1893, he was

managing editor of the New York *World*. During the period 1894–98, he was the constructor and president of various electric railways. In 1899, he purchased and became editor of the *North American Review*, and, in 1903, he bought the *Metropolitan Magazine*. He edited *Harper's Weekly* from 1902 to 1913. Harvey is said to have been the first to suggest Woodrow Wilson as a presidential possibility. He later became one of Wilson's bitterest critics. In 1921, he was appointed ambassador to England and served until his resignation in 1923. His writings include *Women* and *The Power of Tolerance and Other Speeches*.

Harvey, William (1578-1657), English anatomist and discoverer of the circulation of the blood, was born at Folkestone, England. He was graduated at Cambridge University in 1597. The next four years he spent at Padua, Italy, in the study of medicine under Fabricius, Casserius, and Galileo.

Harvey married in 1604 and settled down to the practice of medicine in London. He devoted himself assiduously to his professional duties and rose rapidly to distinction. When, in 1615, he was chosen lecturer on anatomy and surgery to the College of Physicians, he began to expound orally his views on the action of the heart and the motion of the blood through all parts of the body in a continuous circle.

It was not until 1628 that he gave wider publicity to his discoveries by the appearance at Frankfort on the Main of his *Treatise on the Motion of the Heart and Blood*. Harvey availed himself of the discovery, made by Fabricius, of the valves in the veins, which favor the flow of blood in a special direction. He then showed the precise manner in which the mechanism worked. It was the first application of the laws of mechanical science to biology. Being at variance with current and long-accredited notions, Harvey's inferences were at first unanimously rejected by the authorities of continental Europe.

Though his scientific inquiries led to the decline of his general practice, Harvey's reputation grew steadily at court and in the world at large. He was physician to James I and later to Charles I. In 1636, at Nuremberg, he met Hoffmann, the chief opponent of his theory, and demonstrated conclusively its anatomical particulars and necessary conclusions.

Oxford University conferred upon Harvey an honorary degree, and, in 1645, he was made warden of Merton College. In 1651, he published his *Treatise on Generation of Animals*. This was a new field, in which he presented a mass of carefully classified observations on the reproduction of human beings and other animals. He was one of the first to perceive the relations between the simplest and the most highly organized beings and, by means of the simplicity of structure and function of the lower orders, to explain the complexity of the others.

In 1654, he was elected president of the College of Physicians, but he declined the office on account of his age. He died in London.

Hassam, Childe (1859-1935), American artist, was born in Boston. He was educated in Boston public schools and studied art in Boston and under Boulanger and Lefebvre in Paris, 1886–89. He exhibited widely in this country and in Europe, and followed generally the methods of the French impressionist school. His pictures are represented in many American galleries. Among his most important works are "Evening Bells," "The Little June Idyll," "Winter," "Manhattan's Sunset Towers," "Aphrodite," "Lorelei," and "The Summer Sea." He was elected to the American Academy of Arts and Letters in 1920.

Hastie, William Henry (1904-), American Negro jurist, was born at Knoxville, Tenn. He was graduated from Amherst College in 1925 and from Harvard Law School in 1930. After engaging in the general practice of the law, he was, in 1933, made assistant solicitor of the Department of the Interior. In 1937, he was named district judge of the Virgin Islands, where he served two years. Returning to the United States, he was from 1939 to 1946 dean of Howard University School of Law. He was then appointed governor of the Virgin Islands, serving from 1946 to 1949. In 1949, he was appointed judge of the U. S. Circuit Court of Appeals.

Hastings, Thomas (1860-1929), American architect, was born in New York City, 1860. He was graduated from the Ecole des Beaux-Arts, Paris, in 1884, and at once entered into partnership with J. M. Carrère, forming the firm of Carrère and Hastings. Among the notable buildings designed by them jointly are the Ponce de Leon and Alcazar hotels at Saint Augustine, Fla.; the Edison Building, the Century Opera House, and the New York Public Library, New York City; and the Senate Office Building at Washington, D. C. Hastings was elected a member of the American Academy of Arts and Letters and was made chevalier of the Legion of Honor.

Hastings, Warren (1732-1818), English statesman and administrator, was born at Churchill, Oxfordshire. He went to Bengal as a writer in 1750, and, seven years later, was appointed agent of the East India Company at the court of the nabob of Bengal. In 1764, he returned to England, where he remained four years studying Eastern literature. On his return to India, he became a member of the council of Madras and, in 1772, governor of Bengal, an office which, in 1774, became that of governor general of India. He was continuously involved in quarrels with his council, which seemed determined upon his downfall. In order to obtain money, he took measures against the rajah of Benares and the nabob of Oudh, which were afterward charged against him, but he left the affairs of the company in a very prosperous condition.

Three years after his return to England, he was impeached before the Lords for high crimes and misdemeanors, but, after a trial which proceeded at intervals for seven years and in spite of the eloquence of Burke and Sheridan, he was acquitted in 1795. He was ruined by the expense, but was granted an annuity by the East India Company. To him the British government is largely indebted for its political and judicial organization in India and for its method of Indian administration.

Hatcher, Harland Henthorne (1898-), American writer and educator, was born at Ironton, Ohio. After he was graduated from Ohio State University in 1922, he became an instructor in English there (1922-28), then assistant professor (1928-32), and professor (1932-44). He was dean of the College of Arts and Sciences from 1944 to 1948, and vice president from 1948 to 1951. In the latter year, he was made president of the University of Michigan.

Among the books he has written about Ohio and the Northwest Territory are *Buckeye Country* (1937), *Lake Erie* (1945), *The Western Reserve* (1949), and *A Century of Iron and Men* (1950). Before turning to non-fiction, Dr. Hatcher had published three novels, *Tunnel Hill* (1931), *Patterns of Wolfpen* (1934), a poetic novel of Kentucky hill folk, and *Central Standard Time* (1937).

Hauptmann (*houpt'măn*), **Gerhart (1862-1946)**. German dramatist and novelist, was born in Obersalzbrunn, Silesia. At 18, he decided to become a sculptor and studied at Breslau and Jena, and later in Italy. In 1885, he settled in Berlin and devoted himself to literary work. His first play, *Before Dawn*, inaugurated a new dramatic movement in Germany and brought him wide reputation. This was followed by *The Festival of Peace*, *Lonely Lives*, and *The Weavers*, which reflect the influence of Zola, Ibsen, and Tolstoy in their realistic protest against social conditions in a capitalistic and militaraistic state.

In *The Sunken Bell*, his best-known work, which he calls a "fairy drama," in *Florian Geyer*, and in *Hannele*, he changed from naturalism to mysticism. By these and many other powerful plays, he attained the foremost rank in German drama, and is recognized as one of the finest poets and strongest novelists of modern times. His works include *Drayman Henschel*, *The Rats*, *Pippa Dances*, *The Bow of Odysseus*, *Atlantis*, *The Heretic of Soana*, and *The Island of the Great Mother*. He was awarded the Nobel prize for literature in 1912. See *Sunken Bell*.

Havelock (*hăv'lŏk*), **Sir Henry (1795-1857)**, English general, was born at Bishop Wearmouth, in Durham. He entered the army a month or two after the battle of Waterloo; went to India in 1823; and honorably distinguished himself in the Afghan and Sikh wars.

On the outbreak of the Indian mutiny in 1857, Havelock was directed to organize a small movable column at Allahabad and to push on to the relief of the British at Lucknow. He made a forced march to Futtehpur, where, at the head of 2000 men, he engaged and broke the rebels. He continued his march upon Cawnpore and twice defeated the enemy. The consequence of the latter victory was the massacre of all the European women and children in the hands of Nana Shahib. After fighting eight battles with the rebels, in all of which he was victorious, his little army found itself so thinned by fatigue and sickness that it was obliged to retire upon Cownpore.

Early in September 1857, General Outram arrived with re-enforcements, and Havelock again advanced to the relief of Lucknow. The army fought its way with desperate bravery through streets of houses, each forming a separate fortress, until they gained the British residency, to the indescribable joy of the beleaguered garrison. The victorious army was now in turn besieged, but held its own until November, when Sir Colin Campbell (Lord Clyde) forced his way to its rescue. Havelock died five days after the relief.

Hawkins, Sir Anthony Hope (1863-1933), English novelist, widely known as "Anthony Hope," was born in London. He was educated at Marlborough and at Balliol College, Oxford, and was admitted as a barrister of the Middle Temple, 1887. In 1894, he achieved immense popular success with his *Prisoner of Zenda*, which ran to 60 editions in 20 years. His other works, similarly semimodern and semiromantic, include *The God in the Car*, *The King's Mirror*, *Tristram of Blent*, *The Intrusions of Peggy*, *A*

Servant of the Public, Second String, and *Lucinda.* He was knighted in 1918.

Hawkins, Sir John (1532-1595), English naval commander, was born at Plymouth. He followed the sea from an early age, making several voyages to the Canaries before 1561. Between 1562 and 1567, he made voyages to the west coast of Africa, taking Negro slaves to the West Indies and South America and exchanging them for merchandise. In 1568, his fleet of six ships, one of which was commanded by Francis Drake, was attacked by a large Spanish fleet in the harbor of Vera Cruz, Mexico; but Hawkins and Drake succeeded in escaping with two ships. Hawkins was elected to Parliament in 1572 and, in 1573, was made treasurer of the navy. In 1588, as rear admiral commanding the *Victory,* he took part in the defeat of the Spanish armada and was knighted for bravery in action. In 1595, he accompanied Sir Francis Drake on a voyage to the West Indies and died at sea off Puerto Rico.

Hawthorne, Nathaniel (1804-1864), American novelist, was born at Salem, Mass. He was graduated at Bowdoin College in 1825 and, three years later, published his first novel, *Fanshawe.* He then wrote a number of stories for the journals, which he afterward collected and published under the title of *Twicetold Tales.* In 1843, he took up his residence in the village of Concord, in a manse which had formerly been the dwelling of William Emerson and which suggested the title of his next work, *Mosses from an Old Manse,* published in 1843. These sketches, in which he gives some interesting recollections of his boyhood, first made his name known in Europe.

In 1842, he published *The Liberty Tree* and, in 1845, *The Journal of an African Cruiser.* After a three years' residence at Concord, he accepted a place in the customhouse at Salem and removed to that city. This, however, did not stop his literary work. His masterpiece, *The Scarlet Letter,* appeared in 1850 and was received with universal approbation, as was likewise *The House of the Seven Gables,* published in 1851. His *Blithedale Romance,* published in 1852, may be regarded as a kind of autobiography and is founded on incidents in his own life. In 1853, he was appointed consul at Liverpool by his friend President Pierce, whose life he had written.

Hawthorne resided in Liverpool discharging the duties of his office for five years and afterward went to Italy to recruit his impaired health. This journey furnished him with material for his fantastic romance *The Marble Faun,* generally regarded as one of the best of his works. After his return to America, he published a sketch of England and the English.

As a writer, Hawthorne combined a true poetic spirit with a charming style and displayed a deep knowledge of human nature. As a character analyst, no early American writer excels him and he holds a place in the foremost rank among American novelists. He was elected to the American Hall of Fame in 1900. See *Marble Faun, Scarlet Letter, Twicetold Tales.*

Hay, John (1838-1905), American statesman and writer, was born in Salem, Ind. He was graduated from Brown University, 1858, and settled in Illinois as a lawyer. He went to Washington in 1861 as one of Lincoln's private secretaries. He served under generals Hunter and Gillmore and was subsequently in the United States diplomatic service, stationed at Paris, Vienna, and Madrid. In 1897, he was made ambassador to England and, in 1898, became secretary of state.

As secretary of state, Hay inaugurated the "open door" policy for all nations, in China, and laid the foundation for subsequent diplomatic relations with the Orient. In coolness, foresight, and statesmanlike appreciation of current and coming events, he had no superior among contemporary diplomats. His literary reputation rests upon *Pike County Ballads; Castilian Days,* a volume of travel; and the *Life of Abraham Lincoln,* of which he was coauthor with J. G. Nicolay. He was one of the seven original members of the American Academy of Arts and Letters.

Hayden (*hā'd'n*), **Ferdinand Vendeveer (1829-1887),** American geologist, was born in Westfield, Mass. He was graduated at Oberlin College. Prior to the Civil War, in which he served as a surgeon, he explored the Bad Lands of Dakota in search of fossils of extinct animals. After spending the years from 1865 to 1872 as professor of geology in the University of Pennsylvania, he acted as director of the territorial survey and, after 1879, as a geologist on the United States Geological Survey. His explorations in Dakota, Wyoming, Colorado, and Utah had, as a direct result in addition to their scientific value, the establishment of Yellowstone Park.

Haydn (*hā'd'n;* G., *hī'd'n*), **Joseph (1732-1809),** Austrian composer, was born at Rohrau, Austria, the son of a poor wheelwright. He early manifested great musical talent and was received at the age of eight into the choir of the Cathedral of Saint Stephen's at Vienna. Subsequently Metastasio introduced him to the celebrated singer Porpora, who employed Haydn to accompany him on the piano during his singing lessons and from whom Haydn obtained the instruction in composition he so anxiously desired. In 1760, Prince Paul Esterházy placed him at the head of his private chapel. For him and his successor Nicholas Esterházy, Haydn composed his beautiful symphonies and the greater number of his magnificent quartets. He is often called "Father Haydn," as having been the inventor of the symphonic form essentially as we now know it.

After the death of Prince Nicholas Esterházy in 1790, Haydn accompanied Salomon, the violinist, to England, where, in 1791-92, he produced six of his "Twelve Grand Symphonies." In England, he first obtained that recognition which afterward fell to his share in his own country. On his return to Austria, he purchased a small house with a garden in one of the suburbs of Vienna. Here he composed his oratorios, the *Creation* and the *Seasons.* The former work, the harmonies of which are pervaded with the fire of youth, was written in his 65th year.

Hayes, Helen (1900-), American actress, was born at Washington, D. C. She was educated at the Sacred Heart Academy, Washington, and took part with the Columbia players in local performances. She toured with John Drew and acquired a reputation as an actress with unusual gifts. Among her more successful plays in which she starred were *Dear Brutus, Bab, Mary of Scotland, Victoria Regina,* and as Viola in Shakespeare's *Twelfth Night.* In motion pictures she played the title role in *The Sin of Madelon Claudet,* her acting being recognized by the award of a gold statuette by the Motion Picture Academy of Arts and Sciences in 1932. She later appeared with conspicuous success in the film version of Sinclair Lewis's *Arrowsmith.* She married Charles MacArthur in 1928.

Hayes, Patrick Joseph (1867-1938), American prelate, was born in New York City. He was educated at Manhattan College, New York, and at the Catholic University of America. Having been ordained a Roman Catholic priest in 1892, he acted as president of Cathedral College from 1903 to 1914, when he was consecrated auxiliary bishop of New York. In 1917, he was made Catholic chaplain bishop for the American army and navy. He became archbishop of New York in 1919 and cardinal in 1924. He lent his influence to the furtherance of social and industrial reforms.

Hayes, Roland (1887-), American Negro singer, was born at Curryville, Ga. Working his way through Fisk University, he first took singing lessons from a teacher in Chattanooga, Tenn., who encouraged him to continue the cultivation of his voice, a rich tenor. He studied singing further in Boston and in Europe. In 1916, he conducted his own concert tour in the United States winning great applause for his interpretations of classic songs and Negro spirituals. In 1921, he went to Europe, appearing with great success in the leading cities. He later returned to America and sang with the Boston, Philadelphia, Detroit, and New York symphony orchestras.

Hayes, Rutherford Birchard (1822-1893), 19th president of the United States, was born at Delaware, Ohio. He was graduated at Kenyon College and at Harvard Law School, and began the practice of law at Fremont in 1845. He removed in 1849 to Cincinnati, where he was city solicitor, 1858–61. At the outbreak of the Civil War, he was appointed major of infantry, and shortly afterward he became lieutenant colonel. He distinguished himself in the campaigns of West Virginia, and in the battles around Winchester, and was severely wounded at South Mountain. In 1864, he was made brigadier general and, in 1865, was brevetted major general.

Hayes was elected to Congress from Ohio, 1864–66, and was governor of that state, 1868–72 and 1876–77. He was the Republican candidate for the presidency in 1876 and, after a memorable contest with Samuel J. Tilden, was inaugurated in 1877. As chief magistrate, his career was marked by moderation and wisdom. He favored civil service reform and sought to heal the wounds of the Civil War by withdrawing Federal troops from the South.

Hayne (*hān*), **Paul Hamilton (1831-1886),** American poet, was born at Charleston, S. C. He was educated at South Carolina College and studied law, but gave up practicing to follow his literary bent. Between 1850 and 1855, he edited *Russell's Magazine* and made notable contributions to the *Southern Literary Messenger.* He became a prominent figure in a brilliant literary group led by William Gilmore Simms, and he published, between 1855 and 1859, three volumes of poems. During the Civil War, in which he engaged in active service, he suffered the loss of health and fortune, and his library was burned. In 1865, he removed to a small cottage home near Augusta, Ga., which he named Copse Hill, and there he continued literary work in partial invalidism. Hayne belongs in the first rank of Southern poets, and his graceful verse reflects the spirit of the land and the people. His books include *Legends and Lyrics* and *The Mountain of the Lovers.*

Hayne, Robert Young (1791-1839), American statesman, was born in South Carolina. He was admitted to the

bar in 1812; served in the war with Great Britain; and, at its close, returned to his practice in Charleston. He sat in the United States Senate from 1823 to 1832. He was a vigorous opponent of protection and, in 1832, boldly supported in Congress the doctrine of nullification. The great debates between Daniel Webster and Hayne on the principles of the Constitution, the authority of the general government, and the rights of the individual states are of unusual historical value. In November 1832, South Carolina adopted an ordinance of nullification; in December, Hayne was elected governor, and the state prepared to resist the Federal power by force of arms. A compromise, however, was agreed upon, and the ordinance was repealed. He was mayor of Charleston, 1835–37. See *Nullification, Right of.*

Hays, William Harrison (1879-), American administrator, was born at Sullivan, Ind. He was educated at Wabash College and practiced law for several years. Having served as a director of the People's State Bank at Sullivan, Ind., and the chairman of numerous committees of the Republican party, he was appointed postmaster general in the cabinet of President Harding. From 1922 to October 1945 he was president of the Motion Picture Producers and Distributors of America, through which position he acted as "censor" for the industry by agreement with most producing companies.

Hazen, Charles Downer (1868-1941), American historian, was born at Barnet, Vt. Educated at Dartmouth, Johns Hopkins, and various European universities, he occupied a chair in history at Smith College, 1894–1914, and in 1916, became professor of history at Columbia University. His *Modern Europe*, following a number of other able historical works, established him in the foremost rank of American historical writers. He was elected to the American Academy of Arts and Letters in 1924.

Hazlitt (*hăz'lĭt*), **William (1778-1830)**, English essayist and critic, was born in Kent. In 1802, he visited Paris and studied in the Louvre. On his return, he attempted to support himself by portrait painting; but, as he could please neither himself nor his patrons, he relinquished the easel and devoted himself to literature, for which he was much better adapted. In 1803, he went to London and, shortly afterward, published his *Essay on the Principles of Human Action*. In conjunction with Leigh Hunt, he wrote essays for the *Examiner*, which were afterward republished in a volume entitled *The Round Table*. He wrote also *Characters of Shakespeare's Plays, Review of the English Stage, Life of Napoleon*, and *The Spirit of the Age*.

Hearn, Lafcadio (1850-1904), writer on Japan, was born in Leucadia, one of the Ionian Islands, of Irish and Greek parentage. He adopted the name Lafcadio, a phonetic adaptation of the name of his birthplace. Educated in England and France, he came, at the age of 19, to the United States, where he engaged in journalism, exhibiting picturesque descriptive powers. In 1891, he went to Japan, where he taught English in Tokyo University. He became a citizen of Japan and married a Japanese wife. His later writings represent an attempt to interpret the life of Japan to the Western world. They include *Out of the East, Gleanings in Buddha Fields*, and *Japan: An Attempt at an Interpretation*.

Hearst (*hûrst*), **Phebe Apperson (1842-1919)**, American philanthropist. She taught school for a short period and, in 1862, married George Hearst, United States senator from California, a man of large wealth. She established and maintained kindergarten classes in San Francisco several years; also classes and a training class for kindergarten teachers in Washington, D. C., and later at Lead, S. D., where she had important mining interests. She made donations to the American University at Washington, the National Cathedral School for girls at Washington, the University of California, and free libraries at Lead, S. D., and Anaconda, Mont., which she had founded.

Hearst, William Randolph (1863-1951), American newspaper publisher and politician, was born in San Francisco. He was educated in the public schools of San Francisco and at Harvard. He became editor and proprietor of the San Francisco *Examiner*, 1886; bought the New York *Journal*, 1895; and later purchased the New York *Advertiser* to secure a news franchise, changing its name to the New York *Morning American*. He started the Chicago *American* in 1900 and, in 1902, the Chicago *Morning Examiner*. In 1904, he acquired the Boston *American* and the Los Angeles *Examiner*, and he later bought various other newspapers and magazines, including several in England. He was elected to Congress, 1903–07, as a Democrat; was candidate for mayor of New York in 1905 and 1909, and for governor in 1906.

Hearst's group of newspapers became known for its sensational features. Among his innovations was the "spread news head." He also developed the syndicate known as the International News Service. In his later years he resided mainly in a magnificent retreat which he built at San Simeon, Calif.

Heber (*hē'bẽr*), **Reginald (1783-1826)**, English hymn-writer and bishop, was born at Malpas, Cheshire. He entered Brasenose College, Oxford, 1800, and, in 1803, wrote prize-winning poem, *Palestine*. He was ordained for the ministry in the English Church in 1807; was appointed a prebendary of Saint Asaph in 1812; and became Bampton lecturer in 1815 and preacher of Lincoln's Inn in 1822. In 1823, he accepted the see of Calcutta, serving there as bishop throughout the remainder of his life. He published *Sermons, A Journey Through India*, and *A Life of Jeremy Taylor*. As a poet, his fame rests upon *Palestine* and his hymns, which include "Lord of Mercy and of Might," "From Greenland's Icy Mountains," "Holy, Holy, Holy," and "The Son of God Goes Forth to War."

Hébert (*ā'bâr'*) **Louis Philippe (1850-1917)**, French Canadian sculptor, was born in the province of Quebec. He studied sculpture in Montreal and afterward in Paris, and, in 1882, won a prize given by the Dominion government for a statue of Georges Cartier. His chief works consist of statues and monuments, among which are the statues to Maisonneuve and Chénier, Montreal; the McKenzie, Macdonald, and Queen Victoria monuments in Parliament Square, Ottawa; the Laval monument, Quebec; and the Howe monument, Halifax.

Hecker, Isaac Thomas (1819-1888), American priest, was born in New York. His brothers established the Hecker mills; but he was not content to labor in mercantile pursuits, and, in 1843, he joined the Brook Farm community in West Roxbury, Mass. Later he established a similar communistic society at Fruitlands, Mass., then took up study for the Episcopal ministry, but, in 1845, joined the Roman Catholic Church and became a Redemptorist father. Having difficulties with other members of the order, he was expelled, but the Pope released him from his vows and gave permission for the founding of the Paulist fathers, of which order he served as the first superior. Much of his time was devoted to literature. He founded the *Catholic World*, organized the Catholic Publication Society, and wrote *Questions of the Soul, Aspirations of Nature*, and *The Church and the Age*.

Hedin (*hĕ-dēn'*), **Sven Anders (1865-1952)**, Swedish traveler and geographer, was born in Stockholm. He was educated at Stockholm, at Upsala, and in Germany. He began his explorations in Iran in 1885, traveled through Khorassan and Turkestan, and several times through Tibet and other parts of Central Asia. His books, some of which have been translated into many languages, include *Through Asia, Scientific Results of a Journey in Central Asia, Trans-Himalaya, From Pole to Pole, With the German Armies in the West, Southern Tibet, The Gobi Desert, A Conquest of Tibet*, and *The Silkroad*.

Hegan, Alice Caldwell. See *Rice, Alice Caldwell Hegan*.

Hegel (*hā'gĕl*), **Georg Wilhelm Friedrich, (1770-1831)**, German philosopher, was born at Stuttgart, Württemberg. The gravity, straightforwardness, and perseverance that he inherited from a long line of Swabian ancestors declared itself early in his life and conversation. His student days evidenced indefatigable industry rather than precocity of genius.

At the University of Tübingen, to which he proceeded in 1788, he met Schelling, the philosopher, who proved a kindred spirit and lifelong friend. After completing his university course, Hegel devoted himself to tutorial duties in Switzerland and Frankfort and to the study of ancient history and the philosophy of religion. In 1801, he began lecturing on philosophy at the University of Jena as an instructor. Here, by careful thought, he laid the foundations of his rigorous and logical system, which first found expression in *The Phenomenology of the Spirit*. This work he completed after he had accepted the chair of philosophy at Jena and on the eve of the victory of Napoleon over the Prussians.

In 1808, Hegel was made rector of the *Gymnasium* at Nüremberg. In 1811, he married Marie von Tucher. He remained at Nüremberg, seeing the first two volumes of his *Logic* through the press and giving elementary courses in philosophy and religion, until 1816, when he accepted the professorship of philosophy at Heidelberg. In the ensuing years, he completed his *Logic* under the title of *Encyclopedia of the Philosophical Sciences*, His entire scheme of philosophy is comprised in this work.

In 1818, Hegel accepted the chair of philosophy in the University of Berlin, becoming rector in 1829. His fame increased rapidly and his lectures attracted hearers from all ranks and professions. He rose to great political influence by reason of his defense of existing political institutions. The noted aphorism in which he summed up his teaching, "The rational is the actual, and the actual is the rational," was taken to imply that the Prussian organization was the perfection of reason and freedom.

Hegel's system, which is usually termed the "philosophy of the absolute," falls into three departments: logic, or the science of thought in its pure unity with itself; the philosophy of nature, in which the ideal principle is shown

to underlie even the material world; and the philosophy of spirit. Hegelianism compelled men to think and to stand for or against it. Its influence has been extensive throughout Europe and America.

Heidenstam (*hī'dĕn-stăm*), **Karl Gustav Verner von (1859-1940)**, Swedish novelist and poet, was born at Olshammar. He studied painting at the Stockholm Academy, but, after extensive travel, devoted himself to literature. He published, in 1888, *Vallfart och Vandringsar*, which quickly established his rank as a poet. He published his first story, *Endymion*, in 1889 and, in 1892, produced his fantastic romance, *Hans Alienus*, by which his literary style is best known. His *Charles XII and His Wars* brought him great popularity and was followed by *Saint George and the Dragon*, *The Pilgrimage of the Holy Bridget*, *Classicism and Teutonism*, *Folkungaträdet*, *Dagar och händelser*, *Stridsskrifter*, and other novels and essays which assured his position in Swedish literature. In 1916, he was awarded the Nobel prize for literature.

Heifetz (*hī'fĕts*), **Jascha (1901-)**, violinist, was born at Vilna, Poland. He began learning the violin at the age of three and made his first public appearance when less than five years old. Four years later, at Lenigrad, he gave his first recital, later touring the greater part of Europe and visiting Australia and New Zealand. Following his first performance in America, at New York in 1917, he obtained recognition in all musical centers of the country as a master of the violin. He donated a concert hall to Tel-Aviv.

Heine (*hī'nĕ*), **Heinrich (1797-1856)**, German lyric poet and satirist, was born at Düsseldorf, of Jewish parents. He was educated privately by Catholic monks and French intellectuals, and early exhibited a spirit of daring skepticism. He learned English, French, and Italian, and began his career as a merchant in Hamburg. The venture failed, and he devoted himself to study successively at Bonn, Göttingen, and Berlin, obtaining an advocate's license in 1825. Five years later, he went to Paris, where he resided throughout the remainder of his life.

Heine possessed two incompatible elements in his character—a Greek joy of life and a congenital Hebrew earnestness. The lack of harmony between these elements resulted in a spirit of mocking irony which, combined with an extraordinary keenness of wit and a capacity for writing the most exquisite lyrics, made Heine one of the most striking figures in European literature. His preference for French culture prevented his full recognition in Germany during his life and for many decades later.

His *Gedichte*, which appeared in 1822, contains many of the finest lyrics in the German language. The *Nordsee Cyclus* places Heine among the best poets of the sea. The *Reisebilder*, largely in prose, was banned by the Prussian censor for its revolutionary tendency. His *Buch der Lieder* was published in 1827. *Die romantische Schule* procured him great popularity in France, where he met Madame Recamier, "George Sand," Balzac, Béranger, Chopin, Liszt, and other famous people. About 1845, he was attacked by a disease of the spine and was thereafter almost continuously bedridden. Nevertheless, in this period were written some of his wittiest satires and most delicately graceful songs.

Heins (*hīnz*), **George Lewis (1860-1907)**, American architect, was born in Philadelphia. He was educated at the University of Pennsylvania and studied architecture at the Massachusetts Institute of Technology, where he was graduated in 1882. In 1883, he began practice in Minneapolis with C. G. LaFarge. In 1886, the firm was established in New York, where, in collaboration with his partner, Heins designed the Protestant Episcopal Cathedral of Saint John the Divine. He was the architect of numerous other buildings in New York, including those of the New York Zoological Park. He was first state architect of New York from 1898 until his death.

Heller, Stephen (1815-1888), Hungarian composer and pianist, was born in Budapest. He displayed marked musical ability at an early age and, when only 9, was sent to Vienna to continue his studies. At 13, he played publicly in Vienna and, at 15, began with his father an extensive concert tour through Europe. This was interrupted in the following year, 1830, by his serious illness at Augsburg, where he remained, continuing his musical studies, until 1838. He then went to Paris, where he formed intimate friendships with Chopin, Liszt, and Berlioz and soon became well known as a pianist. His compositions, characterized by exquisite melody and by fresh and vigorous treatment of theme, won their way to fame much more slowly. In style, Heller much resembles Mendelssohn, whom he surpasses in the originality of his themes. His studies for the piano rank among the very best and are still in wide use.

Hellriegel (*hĕl'rē-gĕl*), **Hermann (1831-1895)**, German agricultural chemist, was born at Mausitz, Saxony. From 1857 to 1873, he was director of the agricultural experiment station of Brandenburg at Dahme. He was traveling instructor at Bernberg from 1873 to 1882, when he was made director. While he made many agricultural investigations, his permanent fame rests upon his demonstration of the ability of the leguminous plants—such as peas, beans, clover, and alfalfa—to assimilate free nitrogen from the air, thus acting as fertilizers of the soil. He discovered also that this process takes place in the tubercles on the roots of the plants.

Helmholtz (*hĕlm'hôlts*), **Hermann Ludwig Ferdinand von (1821-1894)**, German physiologist and physicist, was born at Potsdam, Prussia. In 1838, he entered the Royal Medicochirurgical Institute of Berlin, at which he was graduated in 1842. The thesis which he presented at that time was itself an important contribution to the minute anatomy of nerve cells and fibers. For several years he acted as assistant surgeon in the army. Being then relieved of further military duties, he became assistant at the Anatomical Museum at Berlin, lecturer on anatomy at the Academy of Arts, and professor extraordinary of physiology at Albert University. The first of his scientific writings to attract general attention was an essay on the *Conservation of Force*, published in 1847. It proved to be one of the most important scientific contributions of the 19th century.

In 1849, Helmholtz was appointed to the chair of physiology and general pathology in the University of Königsberg. From 1851 to 1856, his researches were confined mainly to physiological optics, with an occasional paper on electrical problems. His systematic investigation of the eye resulted in the invention of the myograph, the ophthalmometer, and the ophthalmoscope, thus making possible the examination of the inmost recesses of the living eye.

Helmholtz was appointed professor of physiology at the University of Bonn in 1855, and, in 1858, he accepted a similar chair at Heidelberg. In 1863, he published *Sensations of Tone as the Physiological Basis of Music*. He was at work on optics while still engaged in the study of sound, and his *Handbook of Physiological Optics* appeared in sections in 1856, 1860, and 1867.

In 1871, Helmholtz became professor of physics at the University of Berlin, a post which, after 1887, he held concurrently with that of director of the Physicotechnical Institute at Charlottenburg, near Berlin. During his last 23 years, he devoted his energies almost entirely to the investigation of physical problems. His greatest researches fall under the following heads: the conservation of energy; hydrodynamics; electrodynamics and theories of electricity; meteorological physics; optics; and the principles of dynamics. In these fields, he succeeded, by the technical merits of his work, in establishing for himself a foremost place among the scientific thinkers of the world.

Honors of all sorts were showered upon him. He was ennobled by William I in 1883. The kings of Sweden and Italy, the grand duke of Baden, and the president of France bestowed the insignia of various orders. Academies, universities, and learned societies participated in the national celebration of his 70th birthday.

Helmont (*hĕl'mônt*), **Jan Baptista van (c. 1577-1644)**, Belgian chemist, was born at Brussels. He studied at Louvain, where he was graduated in medicine in 1599. In 1609, he settled at Vilvorde, near Brussels, where he practiced medicine gratuitously for 30 years and carried on notable experiments in chemistry. He paid much attention to the study of the gases, and he claimed to have been the first to apply the term *gases* to elastic aeriform fluids. Of these gases he distinguished several kinds. His works were published under the title *Ortus Medicinæ*.

Hemans (*hĕm'ănz*), **Felicia Dorothea (1793-1835)**, English poet, was born in Liverpool. She was the daughter of George Browne, a Liverpool merchant, and became the wife of Captain Hemans. A few years after their marriage, Captain Hemans removed to Italy, and they never afterward met. Mrs. Heman's subsequent life was spent in North Wales, in Lancashire, and in Dublin. Her shorter pieces are by far the most popular. Many of these, such as *The Better Land*, *Casabianca*, *The Treasures of the Deep*, *The Homes of England*, and *The Lost Pleiad*, have become standard English lyrics, and upon them depends her chief claim to remembrance.

Hemingway, Ernest (1899-), American novelist, was born at Oak Park, Ill. Educated in the public schools, he entered service in World War I when 19 and his experiences at the front left an indelible impression upon him. From his first stories, published in 1923, his writings were preoccupied with the theme of death and the psychological unsettlement which characterized the war generation. *A Farewell to Arms*, published in 1929, one of the most poignant and tragic love stories of recent times, established his reputation as a novelist of power. His unadorned, direct style evoked many imitators. He spent most of his years in Europe after the War, chiefly in France and Spain, and, during the Spanish Civil War, reported it for an American news service. This war was made the setting also for one of his most impressive

novels, *For Whom the Bell Tolls*. He wrote also *The Torrents of Spring*, *The Sun Also Rises*, *Death in the Afternoon*, *To Have and to Have Not*, and *The Old Man and the Sea*. In 1954 he was awarded the Nobel prize in literature.

Henderson, Arthur (1863-1935), British labor leader and statesman, was born in Glasgow, Scotland. He served an apprenticeship in an iron works at Newcastle and became prominent in the labor movement. Entering politics, he was mayor of Newcastle in 1903 and was elected to Parliament the same year, becoming chairman of the Labor party in 1908. During World War I he was taken into the cabinet as labor member. Although defeated in the postwar election in 1918, he was later returned to Parliament and, in the labor administrations of Ramsay MacDonald, he was home secretary in 1924 and foreign secretary in 1929–31. He presided at the disarmament conference which met in 1933 at London. Although this conference accomplished little, Henderson's efforts were rewarded by the Nobel peace prize in 1934.

Henderson, Leon (1895-), American economist and administrator, was born at Millville, N. J. Educated at Swarthmore College and the University of Pennsylvania, he taught economics at the Carnegie Institute of Technology, 1922–23; was deputy secretary of Pennsylvania, 1924–25; and director of consumer credit research for the Russell Sage Foundation until 1934. Henderson then entered the employ of the Federal government, first as economic adviser to the National Recovery Administration and later to the Works Progress Administration. He was appointed to the Securities and Exchange Commission in 1939 and the next year President Roosevelt selected him as member of the defense advisory commission to control price increases. As director of the Office of Price Administration in 1941–42, he made this policy effective, though it was unpopular with Congress, and he resigned.

Hendrick, Burton Jesse (1871-1949), American biographer and historian, was born at New Haven, Conn. Educated at Yale University, he edited a paper in New Haven, 1896–98, and then was employed on the staff of the New York *Post* and *McClure's Magazine*. He was associate editor of *The World's Work* from 1913 to 1927. Meanwhile he had been writing on an exhaustive work on the *Life and Letters of Walter H. Page*, which established his reputation for scholarly and skillful handling of source material. This and *The Training of an American* (Page) received Pulitzer prize awards as biographies, as did his *Victory at Sea*, written with Admiral Sims, as history. His other biographies include *The Life of Andrew Carnegie*, *The Lees of Virginia*, and *Statesmen of the Lost Cause*.

Henley, William Ernest (1849-1903), English poet, playwright, critic, and editor, was born at Gloucester. While enduring months of illness in Edinburgh Infirmary, 1873–75, he wrote *Hospital Rhymes* and *A Book of Verse*, which won much attention and were followed by *Views and Reviews*, *The Song of the Sword*, *For England's Sake*, and *Hawthorn and Lavender*. He edited the *Magazine of Art*, the *Scots Observer*, and the *New Review*, besides an edition of Burns. He also collaborated with R. L. Stevenson in four plays: *Deacon Brodie*, *Beau Austin*, *Robert Macaire*, and *Admiral Guinea*. He was a brilliant writer with a vigorous, pungent style and the originality, power, and intensity of his poems insure them a permanent place among modern lyrics.

Hennepin (*hĕn'ê-pĭn;* Fr., *ĕn'păN'*), **Louis (1640-c. 1701)**, French priest, missionary, and traveler, was born in Ath, Belgium. He served in the army as chaplain and, in 1675, went to Canada as a missionary priest. When La Salle undertook his exploration of the Mississippi valley, Father Hennepin was assigned to his command. They visited Niagara Falls and Hennepin wrote the first description of it. The party traveled west as far as Mackinac, proceeding thence to Peoria, on the Illinois River. From this point Father Hennepin and two companions in a canoe went down the Illinois River to its mouth in the Mississippi, where they fell into the hands of a party of Sioux Indians. He spent three months among the Indians and was finally rescued by Du Lhut, after whom Duluth was named. Hennepin discovered and named the falls of Saint Anthony, now in Minneapolis. Upon his return to Europe, he published a history of his travels, which is of the greatest value in dealing with the early explorations of the Mississippi Valley.

Henri (*hĕn'ri*), **Robert (1865-1929)**, American painter, was born at Cincinnati, Ohio. He studied art in Philadelphia and in Paris. After an extensive period of travel in Italy, France, and Spain, he established himself in New York, where he became the leading representative of the radical movement in American art. As the head of the "independent" school, he exercised a marked influence upon the younger group of American painters. His style is characterized by bold originality, sincerity of purpose, and simplicity. Among his best-known paintings are "Snow," in the Luxembourg Gallery, Paris; "Spanish Gypsy," in the Metropolitan Museum, New York; "Young Woman in Black," Art Institute, Chicago; and "Equestrian," Carnegie Institute, Pittsburgh. His work includes portrait, landscape, and figure paintings. He wrote *The Art Spirit*.

Henry I (1068-1135), king of England, the youngest son of William the Conqueror. When his predecessor, William II, was found slain, Henry's brother Robert, Duke of Normandy, was in Italy. Henry seized the opportunity and had himself crowned king, maintaining his position against Robert, whom he defeated at Tinchebrai in 1106 and thereafter kept imprisoned. Henry thereby secured control of Normandy, which he held at the cost of a struggle with the French king Louis VI. He was called Beauclerc, or "The Scholar," in allusion to his learning, which entitled him to some distinction in his day. The death of his only son, William, in 1120 is said to have permanently darkened the king's life.

Henry II (1133-1189), king of England, grandson of Henry I. In 1154, he was crowned with his queen, Eleanor, who was Countess of Poitou and Duchess of Aquitaine. These territories of France, together with others inherited by Henry from his father, were thus brought under the crown of England.

The chief obstacle to Henry's authority was the Church. In the hope of rendering it subject to the civil power, he appointed his trusted chancellor, Thomas á Becket, to the see of Canterbury. Becket refused, however, to be subservient to the king and a long struggle between the two was terminated only by the murder of Becket, for which Henry could not entirely escape blame. The king did penance for the crime, but, for the future, enjoyed a power unchallenged by the Church. Henry's later years were clouded by a rebellion on the part of his three sons.

Henry III (1207-1272), king of England, grandson of Henry II, and eldest son of King John. He came to the throne in 1261 when a minor, and, in the course of a long reign, provoked much hostility by his fondness for foreign favorites and by his submission to papal exactions. This discontent culminated in the Baron's War, 1262-65, in which he was defeated and compelled to submit to the control of the government by De Montfort and his friends. De Montfort summoned, in 1265, the first Parliament to which representatives from both towns and counties were called. De Montfort was later defeated by Henry's son Edward, who continued to control the government. Westminster Abbey was almost entirely rebuilt in Henry's reign.

Henry III (1551-1589), king of France, third son of Henry II and Catherine de' Medici. In 1569, he gained victories over the Protestants at Jarnac and Moncontour, and he took an active share in the massacre of Saint Bartholomew. In 1574, he succeeded his brother Charles IX on the French throne.

Henry showed fickleness and want of courage in his public conduct; his private life was spent in an alternation of dissolute excesses and wild outbreaks of religious fanaticism. His reign was a period of almost incessant civil war between Hugenots and Catholics, the Duke of Guise having formed the Holy League to assert the supremacy of Catholicism and secure the reversion of the throne to the Guises. In 1588, the assassination of the Duke of Guise roused the Catholics to the utmost pitch of exasperation; Henry threw himself into the arms of Henry of Navarre, and the two marched upon Paris at the head of a Huguenot army. But, in August 1589, Henry was stabbed by a fanatical Dominican named Jacques Clement; he died, the last of the house of Valois, on the following day, nominating Henry of Navarre as his successor.

Henry IV (1050-1106), emperor of the Holy Roman Empire, was born at Goslar, Prussia, son of Henry III. He was crowned emperor in 1084 by Pope Clement III. His reign was notable for the struggle with Pope Gregory VII, with whom he began the investiture disputes. During this celebrated controversy, Henry was excommunicated and was obliged to submit. Gaining absolution from the pope at Canossa, he recovered his power by the defeat of Rudolph of Swabia and other enemies in Germany and invaded Italy. He took Rome and deposed Gregory. He was dethroned by his son Henry in 1105. See *Canossa*.

Henry IV (1367-1413), king of England, the first of the house of Lancaster, was surnamed Bolingbroke from his birthplace. Before his accession, he won considerable fame by his military prowess. He led an expedition that compelled the ruling monarch, Richard II, to dismiss his foreign favorites, and he fought in Lithuania and in the Holy Land. He was later banished by Richard II, but, taking advantage of Richard's absence in Ireland, he landed and was acclaimed ruler by Parliament in 1399. Richard, finding himself deserted, was compelled to abdicate.

Henry's reign was marked by wars, finally successful, with Owen Glendower of Wales, with James I of Scotland, and with Hotspur, leader of the Percy family in England.

Another unhappy feature of his time was the campaign of persecution against the Lollards.

Henry IV (1553-1610), king of France. He was founder of the Bourbon dynasty, succeeding Henry III in 1589. His marriage with Marguerite de Valois, in 1572, was the occasion for the massacre of Saint Bartholomew. In 1576, he quitted the court and became leader of the Huguenots and opponent of the Holy League, being the rival of the Guises for the succession. He defeated them at Arques and Ivry, but was unable to conquer Paris without becoming a Roman Catholic. He accordingly changed his faith in 1593 and was accepted as king by the city. He concluded peace with Philip II at Vervins and, in 1598, issued the edict of Nantes, allowing the Protestants liberty of conscience. The rest of his reign was occupied by domestic reforms. He was assassinated by Ravaillac.

Henry V (1387-1422), king of England, was born at Monmouth, the eldest son of Henry IV. He won considerable celebrity in the wars against Owen Glendower and Hotspur before his father's death, but, on his accession, took steps to conciliate his father's enemies. The persecutions of the Lollards, however, continued throughout his reign.

Henry V began the Hundred Years' War against France, claiming the French crown through his great-grandfather Edward III. He invaded France in 1415 with 30,000 men; took Harfleur; defeated the French at Agincourt; and, by 1418, reduced Normandy to subserviency. He was recognized as regent and "heir of France" in 1420; but hostilities were renewed in 1421, and he died before bringing his enemies into final submission.

Henry VII (1457-1509), king of England, the first of the Tudor dynasty. He became head of the Lancaster house and, by his defeat of the Yorkist Richard III at Bosworth in 1485 and by his subsequent marriage with the Yorkist princess Elizabeth, he brought to a close the Wars of the Roses. He was crowned by Parliament in 1485.

Yorkist risings in Scotland led Henry to arrange a marriage alliance between his daughter and the king of Scotland, the result of which, a century later, was the union of England and Scotland under one ruler. Disturbances in Ireland led to the passing of Poyning's law, by which acts of the English Parliament were applicable also to Ireland. Henry crushed the power of the nobles by a secret court called the Star Chamber. Parliament was subservient to his wish, and the royal power notably increased during his reign.

Henry VIII (1491-1547), king of England, succeeded Henry VII on the throne at the age of 18. Being handsome and generous, he was popular with all classes and exercised, through his ministers, an almost unlimited power over the kingdom. Europe was at this time divided between the hostile camps of Francis I of France and the emperor Charles V. Henry took some part in this struggle, usually favoring Charles, and he defeated the French at Guinegate, Therouanne, and Tournay. James IV of Scotland invaded England, but was defeated and killed at Flodden.

Henry had married, at 19, his brother's widow, Catherine of Aragon. Failing to obtain a son by her and being fascinated by a court maid, Anne Boleyn, he requested the pope to declare his marriage void. His minister Wolsey, who was charged with obtaining the papal decision, failed and was dismissed. Henry took a new minister, Cranmer, who advised Henry to abrogate the papal power in England and have the sovereign recognized as head of the Church in the kingdom. Henry brought about this change through Parliament and then married Anne Boleyn. Each succeeding sovereign, except Mary, has been the head of the Church of England. The Bible was translated into English and was introduced into the churches. Henry deviated little from the orthodox doctrine, but it was made a treasonable act to deny his supremacy as head of the Church in England. The property of many monasteries was seized and was used to enrich the national treasury.

Anne Boleyn was charged with infidelity in 1536 and was executed. Henry's next wife was Jane Seymour, who died in 1537 and was succeeded by Anne of Cleves. He divorced her shortly and married Catherine Howard, who was beheaded for alleged infidelity. His last wife, Catherine Parr, survived his death.

Henry, Joseph (1797-1878), American physicist, was born in Albany, N. Y.; was appointed professor of natural philosophy in the College of New Jersey at Princeton, 1832; and, in 1846, was called to the office of director of the Smithsonian Institution at Washington, to the organization and wide reputation of which he had greatly contributed.

Henry made important discoveries in electromagnetism and disputed with Morse the invention of the electric telegraph. He originated the principle and Morse perfected the method of using the electromagnet for commercial telegraphy. His most notable contribution to electrical science was his discovery of the method of producing induced currents, 1829–30. This is the underlying principle governing the construction of dynamos and transformers. In 1842, he discovered that the discharge of a Leyden jar would induce discharges in other circuits at a distance. This anticipated the essentials of modern wireless telegraphy. Later he became interested in meteorology and suggested using the telegraph to collect and distribute weather information. He was an original member and president of the National Academy of Sciences. He was elected to the American Hall of Fame, 1915.

Henry, Patrick (1736-1799), American orator and statesman, was born in Virginia. After receiving a common school education and spending some time in trade and agriculture, he commenced the practice of law with only six weeks of preparatory study. After several years of poverty, he rose to distinction in managing the popular cause in a controversy between the legislature and the clergy touching the stipend which was claimed by the latter.

In 1765, he was elected a member of the Virginia house of burgesses on the issue of opposition to the British Stamp Act. In this assembly, he obtained the honor of being the first to commence that opposition to the measures of the British government which terminated in the Revolution. He was one of the delegates sent by Virginia to the First Continental Congress of the colonies, in 1774, and, in that body, he distinguished himself by his boldness and eloquence. In 1776, he was appointed the first governor of the commonwealth, and to this office he was repeatedly re-elected. In 1786, he was appointed by the legislature one of the deputies to the convention held at Philadelphia for the purpose of revising the Federal Constitution. In 1788, he was a member of the convention which met in Virginia to consider the Constitution of the United States, and he exerted himself strenuously against its adoption. He retired from the bar in 1794.

Without extensive information upon legal or political topics, he was a natural orator of the highest order, possessing great powers of imagination, sarcasm, and humor. He was elected to the American Hall of Fame in 1920.

Henry the Navigator (1394-1460), son of John I, king of Portugal. He distinguished himself at the capture of Ceuta in 1415; took up his residence at Sagres, in Algarve; and devoted himself to extending geographical discovery. He erected an observatory and a school for navigation and dispatched some of his pupils on voyages that resulted in the discovery of the Madeira Islands in 1420. Henry's thoughts were now directed toward the gold producing coasts of Guinea. In 1434, one of his mariners touched Cape Bojador; in 1441, Cape Blanco was reached; Cape Verde was doubled in 1445; and, in 1455, Cadamosto sailed to the mouth of the Gambia. This enterprise continued for a half century after Henry's death and resulted in the rounding of the Cape of Good Hope and the founding of Portuguese empires in India and Brazil.

Hepburn, James Curtis (1815-1911), American medical missionary and scholar, was born at Milton, Pa. He was graduated at Princeton College and at the University of Pennsylvania medical department. He went to China as a medical missionary in 1840; returned to New York, 1846; went to Japan, 1859, residing in Yokohama until 1892; and returned to the United States, 1893, and retired. He compiled the first English dictionary of the Japanese language and translated the Bible into the Japanese language.

Hepburn, Katharine (1909-), actress, was born in Hartford, Connecticut. After she was graduated from Bryn Mawr College, she began her stage career in 1928. Commencing in 1932, she appeared in many motion pictures, including *A Bill of Divorcement*, *Little Women*, *The Little Minister*, *Quality Street*, *The Philadelphia Story*, and *The African Queen*. One of her more recent successful stage appearances was in *As You Like It*.

Hepburn, Mitchell (1897-1953), Canadian politician, was born on a farm in western Ontario. Attracting attention by his successful management of a large farm and as county secretary of the United Farmers of Ontario, he was elected to the Dominion Parliament in 1926. He accepted an invitation in 1930 to lead the Liberal party in Ontario and became provincial premier in 1935.

As premier, he exhibited a marked degree of initiative, cancelling a contract which the Province's hydroelectric system had made for purchase of power at a price he believed too high. He took measures to reduce the number of those on relief. Hepburn was re-elected in 1937 but resigned in 1942.

Heppelwhite, George (?-1786), English cabinetmaker, worked in London in the 18th century. He exerted a profound influence over furniture design and lent his name to a style. The date of his birth is unknown. The Heppelwhite style is distinguished by slender elegance, and embellishment by carved and inlaid decorations, such as sheaves of wheat and ostrich plumes. While noted mostly for his tables and chairs, especially his famed winged easy chair, Heppelwhite also inspired a school

which produced tea caddies, knife boxes, and other small objects which are much prized by collectors today. He was a craftsman whose work reflected a changing of civilization; rejecting the heaviness of 17th century design, he created new airy and graceful forms.

Heraclius (*hĕr-ā-klī'ŭs*) **(c. 575-641),** Byzantine emperor, was born in Cappadocia. In 1610, he headed a revolt against Phocas, slew him, and mounted his throne. At this time, the Avars threatened the Empire on the northwest, and the Persians invaded it. Chosroes II of Persia (Iran) captured Damascus in 613 and Jerusalem in 614; then all Syria, Egypt, and Asia Minor were conquered. At length Heraclius, having, in 620, concluded a treaty with the Avars, took the field against the Persians in 622, routed them in a series of brilliant campaigns, won back his lost provinces, and shut up Chosroes in Ctesiphon, 628. But the followers of Mohammed won from Heraclius nearly all he had gained from the Persians, he meanwhile spending his time in self-indulgence and theological disputes.

Herbart (*hĕr'bärt*), **Johann Friedrich (1776-1841),** German philosopher and educationist, was born at Oldenburg. He studied at Jena, became the pupil of Fichte, and received his philosophy with enthusiasm; but, after reflection, he found himself obliged to reject much of Fichte's system and formed one of his own. In 1805, he was appointed professor at Göttingen and, in 1809, obtained the chair of philosophy at Konigsberg. In 1833, he returned to Göttingen.

Herbart's system exercised a great influence in philosophy and in education. He taught that character, the moral end of life, is the aim of education and that it has its beginning in knowledge and its end in action. His principles of interest, correlation, apperception, method of the recitation, and moral education, introduced into the United States under the leadership of Charles DeGarmo and C. A. McMurry, have been widely adopted in colleges of education and elementary schools. See *Educational Reformers.*

Herbert, Victor(1859-1924), composer and conductor, was born in Dublin, Ireland. He studied music in Germany and gained his first position of prominence as principal violoncello player in court orchestra, Stuttgart. He came to the United States as solo violoncellist in the Metropolitan Orchestra, New York, 1886. Subsequently he was connected with Theodore Thomas's, Seidl's, and other orchestral organizations as soloist and conductor. He founded and was conductor of the Pittsburgh Symphony Orchestra, 1898–1904, and became conductor of his own New York orchestra, 1904. Among his compositions are the comic operas *Prince Ananias, The Wizard of the Nile, The Serenade, Cyrano de Bergerac, The Ameer, The Viceroy, The Idol's Eye, The Fortune Teller, Babette, Babes in Toyland, It Happened in Nordland,* and *Hearts of Erin.* He also wrote the oratorio *The Captive;* and the operas *Natoma* and *Madeleine.* One of his many operettas, *Naughty Marietta,* became very popular as a motion picture and gave wide currency to the song "Ah, Sweet Mystery of Life."

Herder (*hĕr'dĕr*), **Johann Gottfried von (1744-1803),** German critic and poet, was born at Mohrungen in East Prussia. He studied at Königsberg and there became acquainted with Kant. In 1764, he became a teacher in a school and assistant pastor of a church at Riga. Between 1766 and 1769, he wrote two works, in which he maintained that the truest poetry is the poetry of the people. In 1769, he made the acquaintance of Goethe at Strasbourg; in 1771, was appointed court preacher at Buckeburg; and, in 1776, was made first preacher in Weimar. In 1802, he was ennobled by the elector of Bavaria. Herder's notable work in æsthetics, philosophy, philology, and literature exercised a profound influence on German thought. Among his many important works are *Fragments of the More Modern German Literature, Origin of Language, The Oldest Record of the Human Race, Folk-Songs, Voices of the Nations in Songs,* and *Letters for the Advancement of Humanity.*

Hergesheimer, Joseph (1880-1954), American author, was born at Philadelphia. He was educated at a Quaker school in Philadelphia and in the Pennsylvania Academy of Fine Arts. His numerous popular novels and short stories include *Java Head, The Lay Anthony, Gold and Iron, Steel, Cytherea, Swords and Roses,* and *The Foolscap Rose.*

Herkimer (*hûr'kĭ-mĕr*), **Nicholas (c.1715-1777),** American general, was born in New York. In 1758, he was appointed a lieutenant of militia, and he commanded Fort Herkimer at the time the French and Indians attacked German Flats. In 1776, he was made brigadier general. In the next year, when Colonel Saint Leger, sent out by General Burgoyne, was besieging Fort Stanwix, Herkimer, with 800 militia, marched to its relief. In this movement, he fell into an ambuscade at Oriskany in August 1777, but drove back his assailants. He himself was fatally wounded.

Herne (*hĕrn*), **James A. (1840-1901)** American actor and dramatist, was born at Troy, N. Y. He appeared mainly in his own plays, the chief of which are *Hearts of Oak, Margaret Fleming, The Rev. Griffith Davenport,* and *Sag Harbor.* His rural comedy *Shore Acres,* one of the most successful dramas of the American stage, was played almost continuously for six years.

Herodotus (c. 484 B. C.-c. 424 B.C.), Greek historian, was born in Halicarnassus, a Doric colony of Asia Minor. His father, Lyxes, belonged to a prominent family there. The epic poet Panyasis was his uncle, from whom probably Herodotus acquired the familiarity with Greek poetry that he showed later in his writings. In 457 B. C., Panyasis was put to death for conspiring against Lygdamis, the tyrant of Halicarnassus, and Herodotus went into exile, taking up his abode temporarily in the island of Samos. He later resided in Athens.

The work on which rests the fame of Herodotus is called *Histories.* It is an account of the wars waged by the Persians against the Greeks from 500 B. C. to 479 B. C. These wars, however, are regarded by the author merely as the culmination of a long struggle between the East and the West that arose as early as the period of the Trojan War. In the *Histories,* Herodotus undertakes to describe this struggle and thereby has occasion to narrate the whole history of the world as then discoverable. Writing of a period in which accurate records were conspicuously lacking, he was obliged to rely much on traditions, regarding which he adopted a critical attitude. His work is a rich storehouse of fascinating stories and interesting facts.

In order to describe adequately the peoples and places mentioned in his *Histories,* he traveled over the greater part of the known world, including what is now southern Russia, the Balkan countries, Turkey, and Egypt. His shrewd geographical and anthropological observations add a scientific value to a work otherwise distinguished by a singular charm of narrative. Herodotus was the first writer who so unified the record of facts as to raise historical narrative to the level of literature. On these grounds, he merits the title first given him by Cicero, "the father of history."

Herodotus is said to have read his composition amid marked approbation at the Olympic games and to have received 10 talents from Athens in recognition of his literary services to Greece. In 444 B. C., he joined an Athenian colony then being founded at Thurii, Italy, where he died.

Herrick, Robert (1591-1674), English poet, was born in Cheapside, London. He was educated at Cambridge. After taking orders as a clergyman of the Church of England, he was presented by Charles I to the vicarage of Dean Prior. After about 20 years' residence, his living was sequestered in the Civil War, and he went to reside in Westminster. After the Restoration, he was replaced in his vicarage. In 1648, he published *Hesperides,* a collection of lyric poems. His poems, which include some of the best-known lyrics in the language, are distinguished for their freshness, sweetness, and melody.

Herrick, Robert (1868-1938), American educator and novelist, was born at Cambridge, Mass. He was graduated at Harvard, 1890; taught at Massachusetts Institute of Technology, 1890-93; and was instructor in rhetoric and English at the University of Chicago, 1893 to 1905, and professor of English until 1923. In 1935, he was named government secretary of the Virgin Islands. His fiction presents broad pictures of American life, discussing the conflict of commercialism and idealism, and problems of sex discord, somewhat in the manner of Ibsen and Sudermann. His first novel of note was *The Gospel of Freedom,* 1898. His other works include *Love's Dilemmas, The Web of Life, Their Child, and Chimes.*

Herriot (*ĕr'ê-ō'*), **Edouard (1872-),** French statesman, was born at Troyes. He taught school at Lyons and won a reputation there as a scholar, lecturer, and journalist. In 1905 he was elected mayor and held that post continuously for about 30 years. He became a senator in 1912 and was chosen as a member of Briand's cabinet in 1916-17. In 1919, he was elected to the Chamber of Deputies, where he led the Radical party. He was prime minister in 1924-25 and again in 1932. Herriot's influence was exerted consistently in the interests of peaceful co-operation with other nations. His government was defeated in December 1932 on its policy of meeting the war debt installment due by France to the United States. He became president of the Chamber of Deputies in 1936. In 1942 he was arrested, sent to Germany, and later reported dead. He returned to France in 1945, was elected mayor of Lyons, and sent to the constituent assemblies. He was named to the French Academy in 1946, and the next year was chosen president of the National Assembly.

Herschel (*hûr'shĕl*), **Caroline Lucretia (1750-1848),** sister of the astronomer Sir William Herschel, was born in Hanover, Germany. When William was appointed astronomer to George III, she acted as his assistant, living with him during his entire career, and in that character received a small salary from the king. She discovered seven comets, for five of which she has the credit of priority of discovery.

Several remarkable nebulæ and clusters of stars included in her brother's catalogues were described from her original observations. In 1798, she published, with an introduction by her brother, *A Catalogue of Stars Taken from Mr. Flamsteed's Observations*. This valuable work was published at the expense of the Royal Society and contained 561 stars omitted in the British catalogue. She was made an honorary member of the Royal Society.

Herschel, Sir John Frederick William (1792-1871), English astronomer, son of Sir William Herschel. About 1825, he began his observations in sidereal astronomy, to which he chiefly devoted himself. His greatest enterprise was an expedition, in 1833, to the Cape of Good Hope to take observations of the southern firmament. In 1847 appeared his *Results of Astronomical Observations at the Cape of Good Hope*, one of the most valuable works of the time. His residence at the Cape brought contributions not only to astronomy but also to meteorology. His observations on the milky way, on the brightness and the color of stars, on variable stars, on the sun's rays, on the atmospheric air, and on the Magellanic clouds are all very important.

Herschel conducted researches also in light, sound, and celestial physics. In chemistry, he discovered the solvent power of sodium hyposulphite upon the salts of silver, which was the prelude to its use in photography; and he was the first to apply the now universally known term "positive" and "negative" to photographic images. His best-known work is *Outlines of Astronomy*.

Herschel, Sir William (1738-1822), astronomer, was born in Hanover. He was educated as a professional musician. In 1757, he went to England, where he became a teacher of music in the town of Leeds, from which he went to Halifax as organist and subsequently in the same capacity to Bath. Here he turned his attention to astronomy. Wanting a telescope and unable to afford a reflector, he made one for himself. In 1781, he discovered the planet Uranus, which discovery resulted in his appointment as private astronomer to George III with a salary of £200 a year. This was the first discovery of a planet in modern times. He was knighted and was made a D. C. L. by the University of Oxford. He added greatly to our knowledge of the solar system; discovered four satellites of Uranus and two satellites of Saturn; detected the rotation of Saturn's rings, the period of rotation of Saturn itself, and the existence of the motion of binary stars—the first revelation of systems besides our own. He contributed to our knowledge of the Milky Way and the constitution of nebulæ. He was, in fact, the first to give the human mind a proper conception of the immensity of the universe. He erected a monster telescope, as it was then considered, of 40 feet focal length. It was begun in 1785, finished in 1789.

Hersey, John (1914-), American novelist and war correspondent, was born in China. After studying at Cambridge, England, and being graduated from Yale, he was employed as secretary to Sinclair Lewis, the novelist. Next, Hersey became a writer for *Time* magazine, advancing to senior editor, and later to senior editor of *Life* magazine. He spent much time in the Pacific theater during World War II, and drew on his experiences to write *Men on Bataan* and *Into the Valley*. His first popular success, *A Bell for Adano*, is a novel set in Italy during the Allied invasion, and won the Pulitzer prize in 1945. Hersey is most famous for his brilliant report, *Hiroshima*, which told the terrible effects of the dropping of the first atomic bomb. The late Harold Ross, then editor of *The New Yorker*, caused a sensation by printing the long *Hiroshima* in its entirety, to the exclusion of all other editorial matter. Hersey has also written *The Wall*, a novel of a Warsaw ghetto during the Nazi persecutions. He contributes frequently to *The New Yorker*.

Herter, Christian Archibald (1895-), American public official, was born at Paris, France, of American parents. He was graduated from Harvard in 1915, and the following year went to Berlin, Germany, as attache at the American embassy. He was with the State Department in 1917-18, and attended the Paris Peace Conference. From 1919 to 1924 he was assistant to Secretary of Commerce Herbert Hoover. He was editor of *The Independent* (1924-28), and associate editor of *The Sportsman* (1927-36). A Republican in politics, he was a member of the Massachusetts House of Representatives from 1931 to 1943, serving as speaker the last four years. From 1943 to 1953 he was a member of Congress (78th-82nd). He became governor of Massachusetts in 1953, and Under Secretary of State in the Eisenhower administration in 1957.

Hertz, Heinrich (1857-1894), German physicist, was born in Hamburg. He was educated at the University of Berlin, receiving his final training under Helmholtz. While professor of physics at the Technical High School at Karlsruhe, 1885-89, he detected the electromagnetic waves now known as Hertzian waves. After proving the existence of electric waves propagated through space, he proved also that they could be reflected, refracted, polarized, and diffracted just as light is, and that they travel at the same speed as light. Radio is the direct practical outcome of this momentous discovery. Investigation stimulated by this discovery completely revolutionized the scientific world's conception of matter, energy, and electricity. In 1889, Hertz succeeded Clausius as professor of physics at Bonn. He died at Bonn. See *Hertzian Waves*.

Hertz, Henrik (1798-1870), Danish poet and dramatist, of Jewish descent, was born in Copenhagen. He was educated at the University of Copenhagen, traveled abroad, and returned as a professor of the university. His first important work was *Letters of a Ghost*, a rimed satirical poem. His subsequent works include *Amor's Strokes of Genius, Love and Policy*, and *The Youngest*. Hertz ranks among the foremost Danish lyric poets, and his romantic dramas, *Svend Dyring's House* and *King René's Daughter*, have become classics of the Danish theater.

Hervieu (*ĕr'vyû'*), **Paul Ernest (1857-1915),** French author and dramatist, was born at Neuilly sur Seine. He was educated for the law and began practice, but soon devoted himself to literature. He wrote several novels, but his most notable achievements were in the drama. In 1895, he published *The Nippers*, a powerful play, which established his reputation. His dramas are problem plays which treat of phases of life that need correcting, and are developed with notable directness and sincerity. His dramatic works include *Words Remain, The Law of Man, The Passing of the Torch, Modesty*, and *Know Thyself*. He was elected to the French Academy, 1900.

Hesiod (*hē'sĭ-ŏd*), Greek poet, lived probably in the 8th century B. C. Of the works ascribed to him, the principal are the *Works and Days*, the *Theogony*, and the *Shield of Hercules*. His poems treat of the quiet pursuits of agricultural life, the origin of the world, and the genealogy of the gods and heroes. They are pervaded by a certain pessimism and a sense of the hardness of the human lot.

Hewitt, Peter Cooper (1861-1921), American inventor and capitalist, was born in New York City. He was educated at Stevens Institute and at Columbia College. After entering his father's business, he invented improvements in the manufacture of glue. Turning his attention to electricity, he invented the Cooper Hewitt lamp, which consists of a glass tube filled with mercury vapor with suitable electrodes at each end. Upon passing a direct current through the tube, the vapor becomes incandescent, giving off a brilliant greenish light which is of great value as an artificial illuminant in photography.

Heyne (*hī'nĕ*), **Christian Gottlob (1729-1812),** German classical scholar, was born in Chemnitz. He was educated at the University of Leipzig. In 1753, he became underclerk in the Brühl Library at Dresden. While there he prepared his edition of *Tribullus*, which appeared in 1755. In 1756, unfortunately for Heyne, the Seven Years' War broke out. Frederick the Great marched against Dresden, and among other things burned the Brühl Library, but not before Heyne had edited, from a *codex* there, the *Encheiridion* of Epictetus. In 1763, following the death of Gesner, professor of rhetoric at Göttingen, Heyne was appointed his successor. Among his other works were editions of Virgil, Pindar, Apollodorus, and Homer's *Iliad*.

Heyse (*hī'zĕ*), **Paul Johann (1830-1914),** German poet, dramatist, and novelist, was born in Berlin. He was educated at Berlin and Bonn, settled at Munich in 1854, and devoted himself to literature, becoming a dominant figure among German men of letters. His short stories, of which he wrote over 150, are miniature masterpieces of fiction. *Das Buch der Freundschaft* is the best single volume of these stories and the widely admired *L'Arrabbiata* is the most noted single example. His poetic works include narrative poems, such as *Urica*, epics such as *Die Braut von Cypern* and *Thekla*, and many lyrics. He wrote also some 60 dramas, the most noteworthy of which are *Die Sabinerinnen, Maria von Magdala, Der Heligie*, and *Die Tochter der Semiramis*. Among his successful novels are *Kinder der Welt, Im Paradiese, Merlin*, and *Ueber Allen Gipfeln*. He received the Nobel prize for literature, 1910.

Heyward, DuBose (1885-1940), American novelist and poet, was born at Charleston, S. C. Educated in the public schools, he devoted his spare time at first to poetry, and organized the Poetry Society of South Carolina. He turned later to novels of Negro life, in which he won speedy recognition by *Porgy* in 1925, followed by *Mamba's Daughters* in 1929. These novels were dramatized with the aid of the author's wife, Dorothy Hartzell Kuhns, and proved highly successful on the stage. They are characterized by an uncompromising realism in their delineation of Negro life. Heyward wrote also *Skylines and Horizons, Peter Ashley, Lost Morning*, and *Star Spangled Virgin*.

Hibben, John Grier (1861-1933), American educator, was born at Peoria, Ill. He was graduated from Princeton University in 1882, studied at the University of Berlin, 1882–83, and at Princeton Theological Seminary, 1883–86. Ordained to the Presbyterian ministry, he was pastor at

Chambersburg, Pa., from 1887 to 1891. Returning to Princeton University, he was successively instructor, assistant professor, and professor of logic from 1891 to 1912, when he was made president of the university, succeeding Woodrow Wilson. He retired in 1932. His works include *Inductive Logic, Problems of Philosophy, The Philosophy of the Enlightenment, A Defense of Prejudice,* and *The Higher Patriotism.* He also edited *Epochs of Philosophy.* He was killed in an automobile accident.

Hichens (*hĭch'ĕnz*), **Robert Smythe** (**1864-1950**), English novelist, was born at Speldhurst in Kent. He received his education at Clifton College, the Royal College of Music, and the London School of Journalism. In 1894, he published anonymously *The Green Carnation,* satirizing the decadents. It was attributed to Oscar Wilde and produced a great sensation.

The list of Hichens' works includes *The Slave, The Garden of Allah* (later elaborately presented as a drama), *Bella Donna* (also dramatized), *The Daughters of Babylon* (with Wilson Barrett), *The Spirit of the Time,* and *The Way Up.* Among his volumes of short stories are *Tongues of Conscience* and *The Black Spaniel and Other Stories.* He wrote also the plays entitled *The Real Woman,* adapted from a French drama, and *The Voice from the Minaret.*

Hicks, Elias (**1748-1830**), American minister of the Society of Friends, was born at Hempstead, L. I. At 27, he was a well-known and influential Quaker preacher, and for many years traveled through the United States and Canada. He exercised great influence among his coreligionists until his Unitarianism brought him into disfavor with orthodox Friends. He defended his views with perseverance, and, at 80, he still preached. The result was a schism of the society into two divisions, known as the Orthodox and the Hicksite Friends.

Higginson, Henry Lee (**1834-1919**), American banker, was born in New York. He entered Harvard in 1851, but did not complete his course. He became an employee in the countinghouse of S. and E. Austin, Boston; then went to Vienna; studied music; served in the United States volunteers in the Civil War, becoming major. In 1868, he entered the firm of Lee, Higginson and Company, bankers, Boston, and later became an officer and director in many important corporations. In 1881, he founded the Symphony Orchestra and, for a long period, he contributed to its support. His patronage of music, extensive donations to Harvard University, liberal benefactions to charities, and prominence in civic affairs caused him to be styled "Boston's first citizen."

Higginson, Thomas Wentworth (**1823-1911**), American writer, was born in Cambridge, Mass. He was graduated at Harvard in 1841. After several years in the ministry he entered keenly into the movement against slavery. He took part in the Civil War first as captain of volunteers and later as colonel of colored troops. After the war he devoted himself to literature, education, and the political rights of women. He was a clear, graceful, vigorous writer and his books reflect his generous ideals and the power and courage of his convictions.

Among Higginson's numerous works are *Outdoor Papers, Army Life in a Black Regiment, Oldport Days, Young Folks' History of the United States, Common Sense About Women, Larger History of the United States, Women and Men, Concerning All of Us, A Reader's History of American Literature,* and *Part of a Man's Life* (autobiographical). In 1908, he was elected member of the American Academy of Arts and Letters.

Hildebrand, Saint. See *Gregory VII.*

Hill, Ambrose Powell (**1825-1865**), American soldier, was born in Virginia. He was graduated at West Point in 1847, served in the Mexican War, and, in 1861, entered the Confederate army as colonel. He served in Johnston's command at the first battle of Bull Run, commanded a brigade at Williamsburg, and, in 1862, became a major general. He took part in the seven days' battle around Richmond and in the second battle of Bull Run. At Fredericksburg, he commanded the right wing of Jackson's corps. In 1863, he was promoted to lieutenant general and commanded a corps at Gettysburg. In 1864, he temporarily repelled the attack on Weldon railroad. While reconnoitering, he was killed near Petersburg, Va.

Hill, David Jayne (**1850-1932**), American diplomat and historian, was born in Plainfield, N. J. In 1874 he was graduated at Bucknell University, Pa., of which he was president in 1879–88. After eight years' service as president of Rochester University, 1888–96, he studied international law at Berlin and at Paris. Following his return to the United States, he was assistant secretary of state, 1898–1903; minister to Switzerland, 1903–05; minister to the Netherlands, 1905–08; and ambassador to Germany, 1908–11.

Hill's greatest literary work was a three-volume *History of Diplomacy in the International Development of Europe.* He wrote also *Elements of Psychology, A Primer of Finance, The Life and Work of Hugo Grotius, World Organization as Affected by the Nature of the Modern State, The People's Government,* and *The Problem of a World Court.*

Hill, James Jerome (**1838-1916**), American railway promotor and capitalist, was born near Guelph, Ont. He was educated at Rockwood Academy; left his father's farm for business life in Minnesota; engaged in a general fuel and transportation business, becoming head of Hill, Griggs and Company. He established in 1870 the Red River Transportation Company, which was the first to maintain communication between Saint Paul and Winnipeg. In 1878, he secured control of the Saint Paul and Pacific Railroad from the Dutch owners of the securities. He reorganized the system as the Saint Paul, Minneapolis, and Manitoba Railway Company, and managed it until 1890, when this railway became part of the Great Northern system.

Hill then interested himself in building the Great Northern Railway, completing, 1888–93, the main line from Lake Superior to Puget Sound, with northern and southern branches and a direct steamship connection with China and Japan. He became president of the entire Great Northern system, 1889, and was chief promoter and president of the Northern Securities Company, Edward H. Harriman's attempt to buy control of which led to the panic of 1901. He gave $500,000 toward establishing the Roman Catholic Theological Seminary at Saint Paul, Minn., was interested in many philanthropies, and made notable art collections.

Hill, Sir Rowlands (**1795-1879**), English administrator originator of penny postage, was born at Kidderminster From an early age to 1833 he was a teacher. He was one of the founders of the society for the diffusion of useful knowledge, 1826; interested himself in the socialistic schemes of Robert Owen; and took an active share in the colonization of South Australia. Realizing the urgent need for reducing the high rates of postage, he published in 1837 a pamphlet, *Post-office Reform,* in which he advocated an adhesive postage stamp and a low and uniform rate between all places in the British isles.

In 1839, Hill was attached to the treasury department for the purpose of putting his projected reforms into execution, and, in the year 1840, a uniform penny rate came into force. In 1841, the Conservative government, which had opposed the reduction, came into office, and, in 1842, Hill was dismissed. Four years later a sum of £13,000, raised by public subscription, was presented to him. The Liberals, returning to power, made Hill secretary to the postmaster general, and, in 1854, secretary to the post office. In 1864 he resigned, owing to ill health, and was awarded a pension of £2000 for life, together with a parliamentary grant of £20,000. He was buried in Westminster Abbey.

Hillary, Sir Edmond (**1919-**), beekeeper and mountaineer, was born in New Zealand, where he was educated at the Auckland Grammar School. He has been an apiarist since 1936, except during World War II, when he served with the New Zealand air force in the South Pacific. Becoming an enthusiastic mountaineer in his youth, he participated in climbing expeditions to the Himalayas in 1951 and 1952. In the British expedition led by Sir John Hunt the following year, he succeeded, in company with the Nepalese mountaineer Tensing Norkay, in reaching the summit of Mount Everest, the world's highest peak. In recognition of his achievement in climbing Everest for the first time, he was knighted by Queen Elizabeth.

Hillel (*hĭl'ĕl*) (**c.60 B.C.-10 A.D.**), surnamed Hababli. "the Babylonian," and Hazaken, "the Elder," one of the greatest doctors of the Jewish law, was born in Babylonia. He was president of the sanhedrin in Jerusalem, through appointment of Herod I, 30 B. C. to 10 A. D., and was distinguished for his humility, gentleness, and humane spirit. He founded the Talmudic Judaism and wrote extensively on law and morals.

Hillman, Sidney (**1887-1946**), American labor leader, was born at Zagare, Lithuania, and came to the United States when 20 years old. Attaining prominence through his leadership of a successful strike against Hart, Schaffner and Marx at Chicago in 1910, he rose rapidly in union ranks and was made president of the Amalgamated Clothing Workers in 1915. He was a member of the Labor Advisory Board of the National Recovery Administration, 1933–35. In the latter year he took his union from the American Federation of Labor into the Committee for Industrial Organization, in which body he became one of the most influential leaders. It was part of his method to avoid strikes as far as possible and to aid employers in organizing to prevent cut-throat competition. In 1942, after serving on the Defense Advisory Commission, the Office of Production Management, and the War Production Board, he was invited by the president to be his labor adviser. In 1944 he organized the Political Action Committee to bring out the labor vote for President Roosevelt.

Hillquit, Morris (**1869-1933**), American socialist, was born at Riga, Russia. He was educated in the schools of his

native city, 1881–86. In 1886, his parents brought him to the United States. He was graduated at the New York University Law School in 1893. He joined the socialists in 1888 and rose to prominence in the organization through his ability as a writer, speaker, and debater. He served as a member of the national committee, and was a delegate to several international socialist congresses. His writings on socialism include *History of Socialism in the United States*, *Socialism in Theory and Practice*, *Socialism Summed Up*, and *From Marx to Lenin*.

Himmler, Heinrich (1900-1945), German police official, was born at Munich. He studied agriculture at the University of Munich. After World War I, he joined Hitler in his early efforts to organize the Nazi party, providing a bodyguard for him and assisting in guerrilla fighting when necessary. He formed the private army of Black Shirts which contributed substantially to Hitler's final success. He was rewarded by being placed in charge of the German secret police force, popularly known as the "Gestapo." With ruthless efficiency, he succeeded in extirpating all opposition to Hitler even before it found expression and became one of the most feared persons in the nation. He left Berlin before its fall, but was captured and committed suicide.

Hindemith (*hĭn'dĕ-mĭt*), **Paul (1895-)**, German composer, was born at Hanau. His family disapproving of his musical bent, he left home at an early age, supporting himself by playing in theaters and dance halls. He later studied at the Hoch Conservatory in Frankfort-on-the-Main and became conductor of the Opera House Orchestra in Frankfort. Here he began composing symphonies and songs whose unusual effects won him the appellation of the ultramodern. Performance of his symphony *Mathis der Maler* by the Berlin Symphony Orchestra brought a ban on all his works from the German government. He subsequently took up his residence in New York. His other compositions include *Cardillac* and *Neues vom Tage* and the song cycles *Melancholie* and *Die junge Magd*.

Hindus, Maurice (1891-), American writer, was born at Bolshoye Bikovo, Russia. Brought by his mother to the United States in 1905, he was educated at Colgate and Harvard universities. He commenced writing for periodicals in 1917 and, in 1923, began annual trips to his native land to report objectively on changes produced by the Russian Revolution. These trips bore fruit in *Broken Earth*, *Humanity Uprooted*, *Red Bread*, and *Moscow Skies*, a series of books which were among the most revealing documents of the times on what occurred to individual lives in this great social upheaval. In *We Shall Live Again* and *To Sing with the Angels*, he turned his pen to fiction, his narratives being set against the background of the seething revolutionary movements of Europe.

Hindenburg (*hĭn'dĕn-bo͝orĸ*), **Paul von (1847-1934)**, German soldier, was born in Posen. He was educated in the cadet corps and became a subaltern. In 1866, he served in the Austrian War and in the Franco-Prussian War, 1870–71, winning his first iron cross. In 1875 he entered the general staff and, in 1888, became head of a bureau of the war department. He retired from active service in 1911 with the rank of lieutenant general.

At the outbreak of World War I, in 1914, he was recalled and made commander in chief of the campaign in East Prussia against Russia. At Tannenberg, he won one of the greatest German victories against Russia. He was again decorated with the iron cross and made field marshal. In 1915, he commanded the campaign against Russia in Poland with notable success; in 1916, he was made chief of the imperial general staff, succeeding von Falkenhayn, and was intrusted with the direction of all armies of the empire with Ludendorff as his chief adviser. The German armies were defeated, and he retired in 1919.

Hindenburg's character, temperate in victory and steadfastly courageous in defeat, was a source of moral strength to the German people, by whom he was elected president of the republic in 1925. He defeated Hitler in the presidential election of 1932 but, by consenting to make Hitler chancellor in 1933, Hindenburg took a step which extinguished the republic. See *World War*.

Hinkle, Beatrice Moses (1874-1953), American psychiatrist, was born at San Francisco, Cal. Educated by private tutors, she was graduated from Cooper Medical College (Stanford University) in 1899. Earlier in that year had occurred the death of her husband, Walter S. Hinkle, whom she married in 1892. She was city physician of San Francisco for the next six years, the first woman to hold a public health position. In 1905, she went to New York and specialized in psychoanalysis. At Cornell Medical College, New York City, she opened in 1908 the first psychiatric clinic in America. She wrote *The Re-creating of the Individual*.

Hipparchus (*hĭ-pär'kŭs*), Greek astronomer, flourished between 160 and 125 B. C. He was born at Nicæa in Bithynia. His astronomical observations were made at Rhodes. He discovered the precession of the equinoxes and the eccentricity of the sun's path, determined the length of the solar year, and estimated the distances of the sun and the moon from the earth. He invented the astrolabe, founded the science of trigonometry, drew up a catalogue of 1080 stars, and fixed the position of places on the earth by giving their latitude and longitude.

Hippocrates (*hĭ-pŏk'rà-tēz*), **(c. 460 B. C.-c. 377 B. C.)**, Greek physician, the most celebrated of antiquity, was born in the island of Cos. After traveling through different parts of Greece he began practice at Cos. Seventy-two works bear his name. His writings were first printed in a Latin translation in 1525. The first Greek impression appeared in 1526. He seems to have gathered up all that was sound in the history of medicine; was good in diagnosis and prognosis; and believed that the four fluids or humors of the body—blood, phlegm, yellow bile, and black bile—are the primary seats of disease. He was a man of great nobility of character and possessed high ideals of medical ethics. These have been perpetuated to the present time in the world-wide reverence of physicians for the "Hippocratic oath."

Hirohito (*hē-rô-hē-tô*), **(1901-)**, emperor of Japan, was born at Tokyo. He acted as regent from 1921 to 1926, during which time his father, Yoshihito, the reigning emperor, was incapacitated. After the latter's death in 1926, Hirohito ascended the imperial throne. Under his rule, Japan entered on a career of expansion, beginning with the seizure of Manchuria in 1931 and culminating in Japan's entry into World War II in 1941. Following the surrender of Japan in 1945, he renounced war and his own divinity and promulgated a new constitution for Japan which became effective in 1947.

Hiroshige (*hē-rô-shē-gĕ*), **Ando (1797-1858)**, Japanese landscape artist, was born of a Samurai family at Tokyo. At the age of 10, he attracted attention by his lifelike painting. At 15, he sought instruction from Toyokuni, who refused him; but he was received as a pupil by Toyohiro, upon whose death in 1828 he began an independent career. With his pictures of the Tokaido, the celebrated highway between Tokyo and Kyoto, he sprang into great fame, and his style was widely imitated.

In contrast with the designs of the Chinese, Hiroshige's method shows European influences, though his technique is Japanese throughout. His chief distinction is in rendering the mood of the landscape before him. Notable color prints illustrating his work are on exhibition in the Metropolitan Museum, New York.

Hitchcock, Alfred (1899-), motion picture and television director, was born in England. He studied art and engineering, and his talent in these fields is evident in the long list of suspenseful, technically excellent films that he has directed and written.

Hitchcock began his career in England. His first movie, *The Lodger*, based on the Jack the Ripper story by Mrs. Belloc Lowndes, established him as a brilliant director in 1926. Among the pictures that followed were *The Lady Vanishes*, the classic *The Thirty-Nine Steps* which starred Madeleine Carroll and Robert Donat, and *The Woman Alone* which was suggested by Joseph Conrad's novel *The Secret Agent*.

Alfred Hitchcock came to Hollywood in 1938 and has worked there since. He began his American career with *Rebecca*, which starred Joan Fontaine and Laurence Olivier and won an Academy Award in 1939. Despite the meticulous planning and preparation that he demands, Hitchcock's rate of production is high. Up until 1956, he had made forty-six films. Among the outstanding titles made during his American period have been *Foreign Correspondent*, *Spellbound*, and *Stage Fright*. Recently he began to produce a striking television dramatic series, *Alfred Hitchcock Presents*, which displays the same ingenious plotting and the same throat-catching surprises that distinguish his motion pictures.

Hitchcock, Edward (1793-1864), American geologist, was born at Deerfield, Mass. He was educated at Yale and, in 1821, was ordained to the Congregational ministry. He was pastor of the Congregational Church, Conway, Mass., 1821–25. From 1825 to 1845, he was professor of chemistry and natural history in Amherst College. From 1845 to 1854, he was president of Amherst College and professor of natural theology and geology. Subsequently he held the chair of geology until his death. In 1824, he published *The Geology of the Connecticut Valley*. In 1830, he was appointed state geologist, and as such made a thorough survey of the geology and mineralogical resources. This included also the botany and zoology of Massachusetts, of part of New York, and of Vermont. In 1850, he was appointed agricultural commissioner for his native state. He was the first to identify and study fossil footprints left in the Triassic sandstones by prehistoric animals.

Hitchcock, Lambert (1795-1852), American chairmaker, was born at Cheshire, Conn., where he learned the cabinetmaking trade. At the age of 23, he moved to a village in the township of Barkhampsted, Conn., and began to

manufacture the chairs which have immortalized his name. The Hitchcock chair superseded the Windsor chair in popularity and remained the favorite American chair for many years. It is a straight chair with a rush or cane seat, or even a wooden one. The front legs and front rung are turned, the others are plain. The back legs extend above the seat to form the uprights of the back. These are joined by a turned top rail and by a wide curved horizontal back slat on which the principal decoration of the chair is centered. The chairs were generally painted black and the decorating was done with stencils in gold, silver, or bronze. Horns of plenty, baskets of fruit or flowers, and clusters of grapes were favorite designs. Hitchcock also made Boston rockers. Yankee peddlers sold thousands of Lambert Hitchcock's chairs. The old factory which he built more than a century ago at Hitchcocksville (now Riverton), Conn., is still standing.

Hitler, Adolf (1889-1945), dictator of Germany and leader of an international totalitarian revolution to supplant democratic governments, was born at Braunau, Austria. An early ambition to be an artist was frustrated first by his father's violent opposition and later by the unfavorable judgment of an art school to which he sought admission. After the death of his father in 1903 and of his mother, to whom he was deeply attached, in 1907, he worked as a common laborer, his jobs including carpentry, house painting, and paper hanging. During this period ideas and attitudes took shape in his mind which were destined to alter profoundly the course of modern history. They included a hatred of the Jews, of the financial interests, of international socialism, and of non-German admixture with the German race. In their positive aspect, these ideas were fused into a conviction of the superiority of the German people. In this period also he learned to utilize facts and arguments gleaned from an avid reading of literature to support the ideas which he wished to propagate.

In World War I, 1914–18, Hitler served in the German army as a private and later as corporal. His subsequent career falls into four parts—early abortive attempts to overthrow the German republic, his rise to power, his reorganization of Germany into a totalitarian state, and the period of conquests.

Early Career. In 1919 Hitler became one of the first members of a political organization which developed into the National Socialist (Nazi) party, of which he was made leader and chief propagandist. He joined forces with Ludendorff in an attempted revolution in 1923, the so-called "beer-hall putsch," but was captured and, being convicted of treason, served a prison term of 13 months. While in prison, he wrote *Mein Kampf* ("*My Struggle*"), a book which later became the bible of the Nazi revolutionary movement. Steeped in hatred for the Jews, capitalism, and Communism, this book, partly autobiographical in character, pictures a Germany reorganized as a "classless" society in which national efforts are focussed on acquisition of world power. With uncanny insight, the book analyzes the weaknesses of Germany's future foes and forecasts broadly the course which events later took.

Rise to Power. On his release from prison, Hitler devoted himself to building up the Nazi party, forming for the purpose semi-military organizations, such as the Brown Shirts, the Elite Guard, and Hitler Youth. He copied also the "cell" methods developed by the Communist party in Russia, the purpose of which is to restrict acquaintanceship of party members to those in one "cell," so that no one is in a position to betray any considerable number of members. By dint of his passionate, magnetic oratory and the enthusiastic following which he inspired, the party grew rapidly, electing 12 members to the Reichstag in 1928 and 230 in 1932. One of the new members was Hitler, who had become eligible through naturalization. President Hindenburg made him Chancellor on January 30, 1933. Four weeks later the Reichstag building was destroyed by fire, an event which Hitler seized upon as an occasion to arrest Communist deputies and suppress opposition parties. Elections held on March 5 gave the party an absolute majority, by means of which Hitler's cabinet was voted full legislative power for four years. The Reconstruction Act of 1934, giving the cabinet power to create new constitutional law, completed the edifice of his dictatorship. An incipient revolt against Hitler within the party in July 1934 was scotched by the assassination of 67 leading members.

Reorganization of Germany. With autocratic power at his disposal, Hitler proceeded to remake Germany after the fashion of his earlier dreams. His program included: inculcation of the view that Germans are a superior race; development of national power in keeping with such racial superiority; preservation of racial purity by forbidding intermarriage with Jews and imposing on Jews measures calculated to drive them from the country; breaking down all institutions which clashed with these purposes and building up new ones which fostered them. Organizations of youth were formed to teach "strength through joy," in which essential elements were "blood" (racial purity) and "earth" (closeness to nature). Although capitalism was tolerated, it was subject to strict regulation and heavy taxation. Through close party control, industry became a partnership between leaders (employers) and followers (employees). Religion, press, and education were fashioned into instruments to instil the ideal of national greatness. Hitler built for himself at Berchtesgaden, Obersalzberg, an impregnable retreat.

Period of Conquest. Hitler's first object in foreign relations was to erase the effects of the Treaty of Versailles. To this end he diverted a large proportion of the national income to building up armaments. He made an alliance with the totalitarian governments of Italy and Japan, ostensibly aimed against Communism. By assisting in the overthrow of Spain's democratic regime he secured a friendly totalitarian government there.

Before embarking on his larger conquests, Hitler prepared the way by a campaign of "propaganda" of unexampled thoroughness. Advantage was taken of internal conflicts of interest in foreign countries and parties with totalitarian aims were founded in nearly all nations. In this way he annexed Austria and Czechoslovakia in 1938. One of the most powerful propaganda weapons used was stirring up fear of Communism. Yet in 1939 Hitler negotiated a passive alliance with Russia, the chief Communist power. The stage was now prepared for World War II.

Poland was divided with Russia in 1939; Denmark and Norway were occupied in 1940. Belgium and the Netherlands were occupied in a few days and for the first time the fury of Hitler's war machine was let loose in an assault against the French and British armies. In ten weeks France had capitulated and the British army had withdrawn. An unprecedented aerial assault on England failed as preparation for an invasion. Turning south, Hitler's armies overran Yugoslavia and Greece in early 1941. In June, he declared war on Russia. After initial successes, the Germans were driven from Russia and the Balkans, and in 1944 Allied armies reconquered France and attacked the Reich itself. Disaffection appeared, especially in the army, and a plot to murder Hitler narrowly failed. He insisted on holding out to the last in Berlin, where he committed suicide as the Russians entered the city, April 30, 1945.

Hittorf (*hĭt'ôrf*), **Johann Wilhelm (1824-1919),** German physicist, was born at Bonn. In 1852, he was called to the chair of chemistry and physics at Munster, which he filled with distinction for 50 years. His first important researches were in electrolysis, and his method of determining the mobility of ions was of the highest importance to physical chemistry. In 1869, while studying the passage of electricity through tubes containing a rarefied gas, he noticed the fluorescence produced by the cathode rays, and found that those rays could be deflected by a magnet, thus anticipating Crookes, who published his celebrated researches with vacuum tubes and, in 1878, gave to the rays so produced the name of radiant matter.

Hobbema (*hŏb'ĕ-mă*), **Meindert (1638-1709),** Dutch landscape painter, was born at Amsterdam. He was the friend and pupil of Ruysdael, and, until his marriage at the age of 30, after which he discontinued painting to become a city official, they often worked together. In his brief artistic career, devoted entirely to scenic painting, he produced some of the most highly prized landscapes of his century. He ranks second only to the more versatile Ruysdael among the great landscape artists of the Dutch school.

Hobbes (*hŏbz*), **John Oliver (1867-1906),** is the pen name of Mrs. Pearl Mary Teresa Craigie, née Richards, English novelist, born at Boston, Mass. She removed to England when very young; was educated at University College, London, and in Paris. In 1887, she married R. W. Craigie, from whom she secured a divorce in 1895. She published her first novel, *Some Emotions and a Moral*, in 1891 and won success by her brilliant, epigrammatic, and somewhat cynical style. She wrote the novels *A Study in Temptations*, *The School for Saints*, and *The Flute of Pan*. She wrote also the plays *Journeys End in Lovers' Meeting*, *The Ambassador*, and *A Repentance*.

Hobbes, Thomas (1588-1679), English philosopher, was born at Malmesbury. He was graduated at Oxford. In 1610 he went abroad with the Earl of Devonshire as his pupil and made a tour of France and Italy. Meantime he was occupied with classical, political, and philosophical studies, and prepared for publication his first work, a translation of Thucydides, which appeared in 1628. His first original work, *De Cive*, was printed in Paris in 1642. He published soon afterward two small treatises entitled *Humane Nature* and *De Corpore Politico*. After meeting of the Long Parliament, he lived in Paris for a time on account of his dread of the civil troubles. Then followed his *Leviathan*, embodying the famous "social compact" theory, and also his work entitled *Liberty and Necessity*.

Hobbes advanced the view that man originally lived in a state of anarchy, from which he emerged when individuals, through a "social compact," gave up their personal freedom to form the state. The state, usually

personified by a monarch, he held to be entitled to complete obedience. His influence on political thought was deep and lasting.

Hobby, Oveta Culp (1905-), director of the Women's Army Corps in World War II, was born in Killeen, Texas. She was educated in the public schools and by private tutors. From 1925 to 1931 she was parliamentarian of the Texas House of Representatives, and again from 1939 to 1941. In 1931 she married William P. Hobby, former governor of Texas and publisher of the *Houston Post*, and has since been associated with her husband in the publication of the paper. She joined the public relations bureau of the War Department in 1941. From 1942 to 1945 she was director and commander of WAC, with the rank of colonel, and was awarded the distinguished service medal. In 1953 Mrs. Hobby was appointed Federal Security Administrator, and later that same year was made Secretary of the newly created Department of Health, Education, and Welfare. She resigned in 1955.

Hoe, Richard March (1812-1886), American inventor, was born in New York. He was the son of Robert Hoe (1784–1833), and, in 1827, began the practical study of of making printing presses. In 1833, he became the senior partner in the Hoe firm. He invented many improvements in the presses and also produced a steel saw of excellent quality. In company with his brothers, he took over, in 1841, the entire management of the business.

Hoe's first great invention, a rotary press, widely known as Hoe's lightning press, was brought out in 1846 and was extensively adopted by newspapers. Later he invented the web perfecting press, printing on both sides of the sheet, with an intricate apparatus for folding and cutting. These two great mechanical achievements revolutionized newspaper printing. Improvements were constantly added and the business developed by him and carried on by his sons and nephews grew to vast proportions.

Hoe, Robert (1784-1833), American inventor, was born in Leicestershire, England. He was apprenticed to a joiner; came to the United States in 1803; and worked for a time at his trade and later in partnership with his brothers-in-law in the manufacture of a hand printing press. In 1823, he became exclusive owner of the business, and constructed and introduced the original Hoe press. Hoe is considered the first American machinist to make use of the steam engine for motive power in his factory. The business founded by him was carried on with notable success by his sons and their descendents.

Hoe, Robert (1839-1909), American manufacturer and inventor, was born in New York. He was educated in the public schools and entered the printing press factory of R. Hoe and Company, founded by his grandfather, Robert. During his association with the firm, he developed the printing press from the "Hoe cylinder" of the 1846 patent to the later double-sextuple Hoe and invented presses of a greatly improved type for printing in colors. He engaged also in the manufacture of circular saws and saw bits, with large factories in New York and London. He was one of the founders of the Metropolitan Museum of Art and made collections of rare books, manuscripts, silverwork, and other objects of art, valued at several million dollars.

Hofer (*hō'fĕr*), **Andreas (1767-1810),** Tyrolese patriot, was born at Saint Leonard. Tyrol having been transferred by the Treaty of Pressburg in 1805 from Austria to Bavaria, Hofer went secretly with other Tyrolese in 1808 to Vienna, where a plan of insurrection was drawn up. Under Hofer's leadership the plan was successful, and the Bavarians were driven out in 1809.

The Austrian emperor, however, in an armistice the same year, surrendered Tyrol to Bavaria, which, with the aid of Napoleon, sent armies to occupy the country. Hofer defeated these armies and ruled Tyrol for several months in the name of the Austrian emperor. The emperor however, again surrendered Tyrol to Bavaria. The French and Bavarians once more poured into the country, and, after a brief struggle, Hofer was obliged to take refuge in concealment. After a lapse of two months, he was betrayed into the hands of the French, conveyed to Mantua, tried, condemned, and shot.

Hoff, Jacobus Henrik van't See *Van't Hoff.*

Hoffman, Malvina Cornell (1887-), American sculptor, was born in New York, N. Y. She was a pupil of Herbert Adams, Gutzon Borglum, and Auguste Rodin. Her sculpture, which depicts chiefly human figures, is remarkable for the powerful simplicity of its lines, yet without the sacrifice of carefully executed details. Among her works are "Modern Crusader," in the Metropolitan Museum, New York; "The Sacrifice," in the Cathedral of St. John the Divine, New York; "Pavlowa Gavotte," in the Stockholm Museum; "Bill," in the Luxembourg Gallery, Paris. In 1931–33, she made a trip around the world and executed 100 bronze statues representing the different racial types of mankind for the Field Museum, Chicago. She married S. B. Grimson in 1924. She wrote *Heads and Tales* and *Sculpture Inside and Out.*

Hoffman, Paul Gray (1891-), American business man, was born in Chicago, and attended the University of Chicago, leaving in 1909. In 1911 he entered the sales force of the Studebaker Corporation, of which he was vice president, 1928–33. He carried it through a receivership, and became its president in 1935. Meantime he engaged in various outside activities, including service in the artillery in World War I, and the chairmanship of the Committee for Economic Development. In 1948 President Truman appointed him administrator of the European Recovery Program from which he resigned in 1950 to become head of the Ford Foundation.

Hoffmann, Ernst Theodor Wilhelm (1776-1822), German writer, composer, critic, and caricaturist, was born in Königsberg. He entered the Prussian civil service, but his love of caricature interfered with his advancement and forced him into literature and music to eke out a living until the last years of his life. He was the high priest of German romanticism, with a sarcastic wit and an inexhaustible, but wild, imagination. His works include, besides several volumes of short stories, *Die Elixiere des Teufels* and *Lebensansichten des Katers Murr,* the latter partly autobiographical.

Hofmann, August Wilhelm von (1818-1892), German chemist, was born at Giessen. He became assistant to Liebig at Giessen, and when the Royal College of Chemistry was established in London in 1845, Hofmann was made superintendent. From 1856 to 1865, he was chemist to the British royal mint. In 1865, he went to Berlin as professor of chemistry. He was ennobled in 1888. His contributions to the scientific journals were mainly on organic chemistry. In the course of his researches, he obtained aniline from coal-tar products and made further discoveries which revolutionized the art of dyeing. He devoted much labor to the theory of chemical types. His *Introduction to Modern Chemistry* led to great reforms in the teaching of chemistry. He wrote *The Life-work of Liebig, Handbook of Organic Analysis,* and *Chemische Erinnerungen.*

Hofmann, Heinrich (1824-1902), German historical painter, was born in Darmstadt. After studying in Düsseldorf and at the Antwerp Academy, he resided in Italy, 1854–58. He finally settled, 1862, in Dresden, where he became professor of art in the Academy. Hofmann is most widely known by his idealized scenes from the life of Christ, especially his "Christ in the Temple," painted in 1882, and widely reproduced in engravings.

Hofmann, Josef Casimir (1876-1957), pianist, was born in Krakow, Poland. His father, a Kapellmeister and composer, began teaching him the piano in infancy and, at the age of 7, his talent attracted the attention of Rubinstein. At the age of 10, he came to the United States for a concert tour. Upon returning to Europe, he studied under Urban, Moszkowski, and Rubinstein, achieving marked distinction as a musical artist. He made many successful concert tours in America and Europe before locating in New York, where he wrote extensively on musical topics and composed a number of musical works. He was director in chief of the Curtis Institute of Music, Philadelphia, from 1927 to 1938, after which time he devoted himself chiefly to concert work.

Hogarth (*hō'gärth*), **William (1697-1764),** English painter, engraver, and pictorial satirist, was born at London. He served an apprenticeship to a silversmith; about 1720, began business for himself, first being employed in engraving coats of arms and designing plates for booksellers; and, in 1724, entered the art school of Sir James Thornhill. He made the illustrations for Gray's edition of Butler's *Hudibras.* He secretly married the daughter of Sir James Thornhill in 1729. In 1730, he began the painting of satirical pictures which made him famous, among them being "The Harlot's Progress," "A Midnight Modern Conversation," "A Rake's Progress," "The Distressed Poet," and his masterpiece, the famous "Marriage á la Mode." See *Painting.*

Hogben, Lancelot (1895-), English zoologist, was born at Southsea. Graduating at Cambridge University, he lectured in zoology at the Imperial College of Science, 1919–23, and then went to the University of Edinburgh to direct and lecture on animal breeding and experimental physiology. His brilliance as a popularizer of scientific knowledge combined with the freshness of his attack on biological problems brought him invitations from a number of universities. He taught at McGill University, Montreal, in 1925–27, at Cape Town University in 1927–30, and at the University of London in 1930–37. In the latter year he was made regius professor of natural history at Aberdeen University. In 1947 he became professor of medical statistics at the University of Birmingham. He was in Norway in 1940 when the Germans occupied the country, but he succeeded in escaping through Russia and Japan to the United States. His observations were published under the title *Author in Transit.* Other works include *Mathe-*

matics for the Million, *Nature and Nurture*, and *Science for the Citizen*. His more technical publications include *The Comparative Physiology of Internal Secretion* and medical memoirs.

Hokusai (*hō-kōō-sī*), **(1760-1849),** Japanese artist, was born at Tokyo and began his art career as a wood engraver. He then became a pupil of the famous designer Shunsho, who had no sympathy with Hokusai's pursuit of originality and gave him the unhappy dispatch. But Hokusai went on to become the top-ranking artist of the popular school (ukijoye). He became a book illustrator and at length an artist and teacher with a splendid reputation. His output was enormous. He is credited with producing no less than 30,000 pictures, mostly simple works of the contemporary life and scenes with which he was familiar. Perhaps the most famous are his *Magwa* or *Ten Thousand Sketches* in fifteen volumes, and his *Hundred Views of Mount Fuji*. Hokusai had great influence on Western art, and his pictures are highly prized by collectors of Japanese prints.

Holbein (*hōl'bīn*), **Hans** or **Johann (1497-1543)**, called "the Younger," German painter, was born at Augsburg. He went to Basel with his brother Ambrosius, also a painter. About 1526, he contracted an intimacy with Erasmus, whose portrait he painted, and afterward visited England, where he spent most of his remaining years. Henry VIII made him court painter.

Holbein is distinguished as a historical and portrait painter and an engraver on wood. As an engraver, he is known chiefly by the celebrated series of woodcuts entitled "Dance of Death." Among his most important paintings are "Madonna of the Burgomaster Meyer," "The Ambassadors," "The Last Supper," "The Dead Christ," "The Nativity," and "The Adoration of the Magi." In portrait painting, he ranks among the world's greatest artists. His portraits are not only truthful and charming in workmanship, but they are also expressive records of character. With Albrecht Dürer, Holbein stands at the head of early German artists.

Holberg (*hōl'bĕrĸ*), **Ludvig, Baron (1684-1754),** Danish writer, was born at Bergen in Norway. He studied at the University of Copenhagen; became professor of metaphysics at Copenhagen in 1718; and maintained his connection with the university throughout the remainder of his life. During these years he wrote in many fields and with such distinction that he became known as the creator of Danish literature.

His first notable works were satirical poems, among them *Peder Paars*, in which he ridicules the pedantic stiffness and stupidity of contemporary life and thought. In 1721, the first Danish theater was opened at Copenhagen, and Holberg began to write comedies for it with great success. After 1724, he turned to history and wrote, among other books, a *History of Denmark*, *History of the Jews*, and *Comparative Biographies of Great Men and Women*. In 1741, he produced another classic, the romance *Niels Klim's Subterranean Journey*. He also published the serious reflective works *Moral Thoughts* and *Epistles* and his own *Autobiography*. See *Danish Literature*.

Holinshed (*hōl'ĭnz-hĕd*; *hōl'ĭn-shĕd*) **Raphael (d. 1580),** English chronicler, was born probably in Cheshire. He is noted as the author of a history of England, Scotland, and Ireland, which furnished Elizabethan dramatists with historical material for their plays. *Raphael Hollingeshed's Cronycle*, which was the completion of a work originally begun by Wolfe, was issued in 1577. From this work Shakespeare obtained much of the data for his great series of historical plays, and portions of *Macbeth*, *King Lear*, and *Cymbeline* can be traced to it.

Holland, John Philip (1844-1914), inventor, was born at Liscannor, Ireland, and was educated at Limerick. After teaching 10 years, he came to America and joined the Fenian movement. Seeking means of destroying the British navy, he turned his attention to the construction of submarines. In 1877, he built a clumsy wooden vessel which demonstrated his principles of submersibility and control. Following 20 years of ridicule and failure, he finally constructed, 1898, the successful submarine *Holland*. This was purchased by the United States, 1900, and became the type for many subsequent underwater craft. Although not the originator of the idea, Holland is justly regarded as the father of the modern submarine.

Holley, Alexander Lyman (1832-1882), American engineer, was born in Lakeville, Conn. He was graduated at Brown University, 1853 and, in 1856, became editor of *Railroad Advocate*, the name of which he changed to *The American Engineer*. In 1865, he introduced the Bessemer steel making process into the United States, erecting at Troy, N. Y., the first Bessemer steel plant in the country. In 1879, he became a lecturer at Columbia University on the manufacture of iron and steel. He secured numerous patents for improvements in the manufacture of steel, chiefly connected with the Bessemer process, the most important of which was for a detached converter shell.

Holmes, John Haynes (1879-), American preacher, was born in Philadelphia, Pa. Educated at Harvard University, he accepted the pastorate of a Unitarian Church in Dorchester, Mass., in 1904, and, in 1907, the Church of the Messiah, later called the Community Church of New York. In 1919, he and his pastorate severed their connection with Unitarianism.

By his sermons, broadcast by radio, Holmes became a leader of liberal religious opinion, opposing war and religious intolerance and supporting the cause of labor and civil liberties. His publications include *The Revolutionary Function of the Modern Church*, *Is Violence the Way Out?*, and *Rethinking Religion*.

Holmes, Oliver Wendell (1809-1894), American author, was born in Cambridge, Mass. He was graduated at Harvard in 1829; studied law for a period, but subsequently devoted himself to medicine and, after attendance in the hospitals of Europe for several years, received his degree in medicine in 1836. In 1838, he became professor of anatomy and physiology in Dartmouth College and, from 1847 to 1882, held the same chair at Harvard. He gained some reputation as an anatomist and was, besides, an able microscopist and a skillful auscultator; but his widest fame is as a poet, a wit, and a man of letters.

Holmes's wit and humor are transcendent; his poetry is the perfection of conception and finish; and all his literary efforts are of rare originality and excellence. He was also a fascinating and instructive lecturer, while his admirable social qualities endeared him to a large and intellectual circle.

At 21, he wrote the well-known, vigorous verses "Old Ironsides." Then followed his Phi Beta Kappa poems *Poetry*, *Terpsichore*, *Urania*, and *Astræa*, all of which added to his reputation. In 1857–58, he contributed to the *Atlantic Monthly* his *Autocrat of the Breakfast Table*, a connected series of prose essays, *The Professor at the Breakfast Table*, *The Poet at the Breakfast Table*, and *Over the Teacups*. This brilliant series, which was in his happiest vein, was interspersed with poems and was fraught with humor, pathos, and practical wisdom.

Holmes's after-dinner poems and other short lyrics are not surpassed by any productions of their kind in the language. His various medical addresses, papers, and pamphlets are a part of our scientific literature. He established the fact that puerperal fever is contagious. His other writings include *Currents and Counter-Currents in Medical Science*; *Elsie Venner*, a romance; *Songs in Many Keys*; *Soundings from the Atlantic*; *The Guardian Angel*; and *Mechanism in Thought and Morals*. He was elected to the American Hall of Fame in 1910.

Holmes, Oliver Wendell (1841-1935), American jurist, son of Dr. O. W. Holmes, was born in Boston, Mass. He was graduated from Harvard, 1861, and from Harvard Law School, 1866. He served three years during the Civil War; was wounded at Ball's Bluff, 1861; at Antietam, 1862; and at Marye's Hill, Fredericksburg, 1863. After the war, he engaged in practice at Boston and was editor of the *American Law Review*, 1870–73. In 1882, he was made professor of law at Harvard and was made justice of the Massachusetts Supreme Court, becoming chief justice in 1899. In 1902, he was appointed associate justice of the United States Supreme Court, from which he resigned in 1932. His published works include an edition of Kent's *Commentaries*, his own valuable lectures entitled *The Common Law*, and a volume of *Speeches*. He willed one-half of his estate to the U. S. Government.

Holyoake (*hōl'yōk*; *hōl'ĭ-ōk*), **George Jacob (1817-1906),** English reformer, was born at Birmingham. He taught mathematics for several years at the Mechanics' Institution in Birmingham; lectured on Robert Owen's socialist system; was secretary to Garibaldi's British contingent; edited the *Reasoner*; and promoted the parliamentary bill legalizing secular affirmations. He is known as the founder of secularism, or the doctrine that all forms of religion should be abandoned. Holyoake was the last person imprisoned in England on a charge of atheism. He wrote *The Rochdale Pioneers*, *History of Coöperation in England*, *Self-help a Hundred Years Ago*, *The Limits of Atheism*, and *Bygones Worth Remembering*.

Homer, Greek epic poet, is believed to have flourished about 900 B. C. Smyrna, Chios, Argos, Athens, Salamis, and other places claimed the honor of being his birthplace. Nothing is known of his life. The accounts representing him as a blind bard who begged his daily bread are purely legendary.

The chief works attributed to Homer are the *Iliad* and the *Odyssey*. These two epics are the first works of extant European literature, and they still rank with the greatest.

The *Iliad* deals mainly with the consequences of the wrath of Achilles at the siege of Troy. This chief hero of the Greeks, wronged by Agamemnon, the Greek commander, withdrew from the fight. He refused to return in spite of the reverses suffered by the Greek army, until,

finally, his dearest friend Patroclus was slain by the Trojans. Then, eager for vengeance, he entered the battle and eventually succeeded in slaying Hector, the leader of the Trojans.

The *Odyssey* relates the adventures of the Greek hero Odysseus during a ten-year period of wandering homeward from Troy to Ithaca. The construction of the plot is perhaps superior to that of any other long poem in existence. For simplicity of thought, rapidity of action, and sustained nobility of tone, these two poems of Homer are unique in literature. His depiction of character is convincing, and his versification shows a rare mastery of the epic verse form.

The poems of Homer exerted an enormous influence over Greek education, literature, and culture. They were regarded as a basis of morality, a source book of knowledge, a textbook for oratory, and a standard of literary taste. They provided, also, an element of cultural unity among the numerous independent states of Greece. In modern times, these poems have served to throw much light on the earliest Ægean civilization.

It has been argued that Homer did not exist as an individual, but that each of the Homeric poems is a compilation of many isolated episodes composed by different and unknown poets. Their uniform excellence of style, however, and their unity of plot, particularly as exemplified in the *Odyssey*, imply a master artist second to none among the writers of epic poetry. See *Trojan War*.

Homer, Louise Dilworth (c.1872-1947), nee Beatty, American dramatic contralto, was born in Pittsburgh, Pa. She began musical study in Philadelphia. In 1894, she continued the study of singing with Wm. L. Whitney in Boston and of harmony with Sidney Homer, the composer, whom she married in 1895. She then studied two years with Madame Koenig in Paris and made her debut at Vichy as Leonora in *La Favorita* in 1898. In 1899, she appeared as Amneris in *Aïda* at Covent Garden, London. In 1900, she appeared with great success at the Metropolitan Opera House, New York. She continued as a regular member of the company for many successive seasons and appeared also in Chicago, San Francisco, and Los Angeles opera companies. Her roles include Ortrud in *Lohengrin*, and Delila in *Samson and Delila*.

Homer, Winslow (1836-1910), American marine painter, was born at Boston. While young he worked at lithography in Boston and, in 1859, went to New York and became a student of art at the Academy of Design. In 1861, he went to the front as war artist for *Harper's Weekly*. He was elected to the National Academy in 1865 and exhibited several oil paintings with success. In 1867, he visited Europe; studied in Paris; and, upon returning, continued to illustrate for *Harper's* until 1875. In 1880, he turned his attention to marine painting and, in 1884, began his notable career as leading American painter of the ocean and of seafaring folk.

His paintings include "The Life Line," in the Elkins collection, Philadelphia; "The Fog Warning," "Lookout—All's Well," both in the Boston Museum; "The Maine Coast," "Northeaster," "Cannon Rock," in the Metropolitan Museum, New York; "On a Lee Shore," Providence Museum; and "Undertow," "Eight Bells," "The West Wind," and "A Summer Night," in the Luxembourgh, Paris. Homer is among the most characteristically national of American painters, excelling in composition, color, and fidelity to nature. He was elected a member of the American Academy of Arts and Letters in 1905.

Hood, John Bell (1831-1879), American general, was born in Owingsville, Ky. He was graduated from the United States Military Academy in 1853 and was appointed lieutenant of infantry in the same year. He was actively engaged on frontier duty until 1861, when he entered the Confederate army. He served in every position from that of first lieutenant to that of division commander with the rank of lieutenant general. He took a conspicuous part in the second battle of Bull Run, Antietam, Gettysburg, and Chickamauga, where he lost a leg. In 1864, he succeeded Johnston in command of the army resisting Sherman's invasion of Georgia. He was repulsed by the Federal forces in battle at Franklin, Tenn., 1864, and was decisively defeated at Nashville, December 15–16. After the war, he engaged in business in New Orleans.

Hood, Thomas (1799-1845), English poet and humorist, was born in London. In 1821, he was offered a post on the editorial staff of the *London Magazine*; he at once entered upon its duties and acquired an extensive literary acquaintance. His first separate publication was entitled *Odes and Addresses on Great People*. In 1826, he published *Whims and Oddities*, of which a second and third series appeared during the following two years. In 1830, he began the *Comic Annual* and continued it for nine years. He edited the *Gem* for one year, contributing to its pages his striking poem entitled "Eugene Aram's Dream." In 1834, he wrote the novel *Tylney Hall*. In 1838, he commenced the publication of *Hood's Own*, to which his portrait was attached. In 1844, he began *Hood's Magazine* and contributed to its pages until within a month of his death. His "Song of the Shirt" and "Bridge of Sighs" are among the most perfect poems of their kind in the English language.

Hooker, Joseph (1814-1879), American general, was born in Hadley, Mass. He was graduated at West Point in 1837, and fought in the Florida and Mexican wars. In 1853, he resigned and became a farmer in California.

When the Civil War began, he entered the Union army and soon became a major general. He fought under McClellan on the peninsula and afterward in northern Virginia and Maryland, receiving a wound at the battle of Antietam. His bravery in action brought him the nickname "Fighting Joe Hooker." In January 1863, he was made commander of the army of the Potomac, and, in May, he fought and lost the bloody battle of Chancellorsville. On account of growing dissatisfaction with his generalship, he resigned as ranking general, June 28, 1863, just before the battle of Gettysburg. He still served as major general and fought with great distinction under Grant at Chattanooga and under Sherman at Atlanta.

Hooker, Sir Joseph Dalton (1817-1911), English botanist, was born at Halesworth, Suffolk. He was graduated in medicine, but devoted his attention chiefly to botany. In 1839, he joined as botanist the antarctic expedition of the *Erebus* and *Terror*, commanded by Sir James Ross. When he returned, in 1843, he brought with him over 5000 species of plants, which were described and published under the title of *Flora Antarctica*. His *Himalayan Journals* and the *Rhododendrons of the Sikkim-Himalaya* were important additions to our knowledge of botany.

In 1871, he made an expedition to Morocco; ascended the Great Atlas, the summit of which had never before been reached by a European; and secured a valuable collection of plants. He was appointed assistant director at Kew Gardens in 1855 and, on the death of his father in 1865, succeeded him as director.

His greatest work, which he undertook in conjunction with George Bentham, is the *Genera Plantarum* and entitles him to rank among the greatest English botanists. He was an intimate friend of Darwin, whom he influenced to publish his paper on natural selection in 1858.

Hooker, Richard (c. 1553-1600), English theologian and writer, was born near Exeter. He was graduated from Oxford in 1574 and became a fellow of Corpus Christi College and deputy professor of Hebrew. The Archbishop of York promoted him to the mastership of the Temple in London, 1585. Here he entered into a controversy with Walter Travers, a Calvinist preacher who also officiated at the Temple.

Out of this controversy arose Hooker's *Laws of Ecclesiastical Polity*, a defense of the Anglican Church but on grounds so broad that the principles of natural and manmade law which he formulated underlay much of the political thought of later generations in England. In 1591, Hooker became rector of Boscombe, Wiltshire. From 1595 he was rector of Bishopsbourne, Kent.

Hooker, Thomas (c. 1586-1647), English clergyman and American colonist, was born at Markfield, Leicester. He became a fellow of Emmanuel College, Cambridge, and was for three years a Puritan lecturer at Chelmsford. In 1630, he retired to Holland; in 1633, he sailed for Massachusetts and received a charge at Cambridge. In 1636, he removed with his congregation to Connecticut and founded Hartford. He published many sermons and books, including the *Survey of the Summe of Church Discipline*, an influential work in the development of Congregationalism.

Hooton, Earnest Albert (1887-1954), anthropologist, was born in Clemansville, Wisc., the son of a Methodist minister. From 1930 to 1954 he was professor of anthropology at Harvard University. He began his anthropological studies as a Rhodes Scholar at Oxford University, continued as an instructor at Harvard and made numerous field investigations, one of the most important being the study of skeletal remains at the ruined pueblos of Pecos, New Mexico. Much of his research was in "social anthropology." In studying the biological inferiority of criminals and the insane he made observations and measurements of 17,000 persons from 10 states. Publications resulting from this study are *Crime and the Man* and *The American Criminal*. For several years he was editor of the *Harvard African Studies*. His principal books are *Apes, Men and Morons*; *Twilight of Man*; and *Why Men Behave Like Apes, and Vice Versa*.

Hoover, Herbert Clark (1874-), American mining engineer and statesman, was born at West Branch, Iowa. Graduating in mining engineering at Stanford University in 1895, he engaged in the practice of his profession in various parts of the United States, Australia, and China, taking part in the defense of Tientsin during the Boxer disturbances. In 1902, he located in London, where he became identified with several mine-operating companies.

With his wife, Lou Henry Hoover, he co-operated in translating Agricola's *De Re Metallica*.

On the outbreak of World War I, he was made chairman of the American Relief Commission in London. He was also made chairman of the Commission for Relief in Belgium, directing the work with marked efficiency. In 1917, he was appointed food administrator for the United States, and, after the Armistice, his services were extended to the destitute populations of different European countries. In March 1921, he became secretary of commerce. He expanded the work of the department, extending the helpfulness of its statistical service and co-operating in the elimination of waste through unnecessary diversity in manufactured articles. He directed relief operations on the occasion of the disastrous Mississippi flood in 1927.

In 1928, Hoover received the Republican nomination for the presidency. He was elected and took office in March 1929. Among his first acts was an order forbidding the lease of Federal oil lands. He supported the move for limitation of armaments. A special session of Congress was summoned by him in April 1929 for the purpose of enacting legislation in aid of agriculture. Its principal work, however, was to raise the tariff by passage of the Hawley-Smoot Act. Later the same year came a stock market panic and the beginning of the severest economic depression in American history. The organization of the Reconstruction Finance Corporation failed to reach the source of the trouble, and distress increased. Hoover was defeated for re-election by Franklin D. Roosevelt in 1932. In 1946 he was called upon by President Truman to inspect and report upon the measures being taken for the relief of world-wide famine conditions. He was chairman, 1947–49, of the commission on the organization of the executive branch of the government. In 1942 he wrote, with Hugh Gibson, *The Problems of Lasting Peace*, and in 1951 began the publication of his *Memoirs*.

Hoover, Herbert, Jr. (1903-), American petroleum expert and diplomat, was born in London. He followed the mining engineering career of his father, who was 31st president of the United States, and was educated at Stanford University and at Harvard. Until he became United States Under Secretary of State in 1954, Herbert Hoover, Jr., advised many South American countries on oil production, served on the faculties of the Harvard School of Business Administration and California Institute of Technology, and acted as consultant to the Secretary of State on worldwide oil problems. In 1956 he was chosen to receive the Hoover Medal for distinguished public service, an award named for his father and one of the engineering profession's most distinguished honors.

Hoover, John Edgar (1895-), American lawyer and criminologist, was born at Washington, D. C. Educated at George Washington University, he was employed by the Department of Justice in 1917 and two years later became special assistant to the attorney general. In 1921 he was assigned to the Federal Bureau of Investigation, which he directed from 1924.

Hoover's directorship spanned the time when Congress first authorized the Federal investigation of crimes of violence involving movements across state lines. By the application of a carefully thought out and vigorously applied system of detection, the crime of kidnapping was practically suppressed. The detection of espionage after the outbreak of World War II in 1939 afforded Hoover's bureau a still wider field. His trained staff of detectives inspired everywhere the respect of the underworld, winning the designation of "G Men" (Government Men).

Hope, Anthony. See *Hawkins, Sir Anthony Hope*.

Hopkins, Esek (1718-1802), first commodore of the American navy, was born at Scituate, R. I. At the age of twenty, he went to sea and, during the Seven Years' War between Great Britain and France, made a brilliant record as captain of a privateer. In 1775, he was chosen commander in chief of the navy by the Continental Congress. When he stepped on the deck of his flagship, the *Alfred*, early in January 1776, Lieutenant John Paul Jones ran up a yellow silk flag bearing the device of a pine tree and a rattlesnake together with the motto "Don't Tread on Me." This was the first flag raised on an American man-of-war. Soon afterward, Hopkins captured the British naval station in the Bahama Islands, obtaining nearly 100 cannon. In April 1776, his little fleet attacked the British war vessel *Glasgow*, but after an indecisive battle the *Glasgow* escaped. Hopkins was severely criticized and, in 1777, was relieved of his command.

Hopkins, Gerard Manley (1844-1889), English poet and priest, lived a full and varied intellectual life. Born in Essex, he was educated at Balliol College, Oxford, and by the Society of Jesus. Hopkins was a convert to Catholicism, one of the many who joined Newman in the High Church movement of his time. While Hopkins was a busy practicing priest, serving London, Liverpool, and elsewhere, he was also a remarkably original poet. He entrusted his works to his friend, the poet Robert Bridges, who had them published for the first time in 1918. Hopkins's intricate rhythms, his depth of feeling, and the rich imagery of his language caused a sensation in literary circles. His genius lives, not only in his own poetry, but also in the influence he exerted over such twentieth century poets as W. H. Auden and Cecil Day Lewis. Hopkins's most famous works are *The Wreck of the Deutschland* and *The Terrible Sonnets*. He has been the subject of many biographies.

Hopkins, Harry Lloyd (1890-1946), American social worker and government administrator, was born at Sioux City, Iowa. Graduating at Grinnell College, he was supervisor or director of various organizations for relieving distress, including the Association for Improving Condition of Poor, the Child Welfare Board, and, in 1933–41, New York Temporary Emergency Relief Administration. In the latter year President Roosevelt selected him to direct the relief activities of the Federal government, in which post he supervised the spending of more than 10 billion dollars, chiefly as payment for small-scale local projects. He was secretary of commerce, 1939-40, resigning to act as special adviser to President Roosevelt. In 1941 he was placed at the head of the lend-lease program.

Hopkins, Mark (1802-1887), American educator, was born at Stockbridge, Mass. He was graduated in 1824 from Williams College, where he became professor of moral philosophy in 1830. He held this chair throughout the remainder of his life. From 1836 to 1872 he was also president of the college, which he made well known throughout America. In 1857, he became president of the American Board of Commissioners for Foreign Missions.

Hopkins was one of the greatest American educators of his time and possessed remarkable ability to inspire and develop the best powers of the individual student. His reputation is attested by the widely current definition of a college: "a student at one end of a log and Mark Hopkins at the other." He is the author of *Evidences of Christianity, Law of Love and Love as a Law*, and *An Outline of Study of Man*. He was elected to the American Hall of Fame in 1915.

Hopkinson, Francis (1737-1791), American politician and author, was born in Philadelphia, Pa. He was a delegate to the Continental Congress from New Jersey and was one of the signers of the Declaration of Independence. He wrote *The Battle of the Kegs, The Pretty Story, The Political Catechism*, and other works in prose and verse. His son Joseph, judge of the United States district court, wrote "Hail Columbia." See *Battle of the Kegs*.

Horace, or **Quintus Horatius Flaccus (65 B. C.-8 B. C.)**, Roman poet, was born at Venusia, Italy. Athens was at this time one of the chief educational centers of the world, and thither Horace repaired in his 19th year to complete his education by a course of philosophy and science under Greek masters. But the civil wars which followed the death of Julius Cæsar, in 44, interrupted him in his studies. The arrival of Brutus at Athens roused the patriotic feelings of the youthful Romans, and, along with others, Horace ardently embraced the cause of the republic. Though entirely inexperienced in war, he was promoted to the rank of military tribune, with the command of a legion, and in this character shared in the defeat at Philippi, 42 B. C.

After the Battle of Philippi, Horace returned to Rome, and, by acting as clerk in the quæstor's office, he contrived to live until he found means of making himself known to the poets Varius and Virgil. Virgil recommended him to the patronage of Mæcenas, the prime minister of the emperor Augustus. Horace was soon on terms of familiarity with Augustus and enjoyed his friendship and patronage during the remainder of his life. But the friendship of Mæcenas, who gave him an estate in the Sabine territory about 34 miles from Rome, made him financially independent.

Horace added Roman urbanity, a refined critical faculty, and a temperate philosophy to an unsurpassed gift for lyric poetry, and he ranks next to Virgil among the great Latin masters of verse. His works consist of two books of *Satires*, a book of *Epodes*, four books of *Odes*, two books of *Epistles*, and a treatise on the *Art of Poetry*.

Hornaday (*hôr'nà-dā*), **William Temple (1854-1937)**, American naturalist, was born in Plainfield, Ind. He was educated at Iowa Agricultural College; studied zoology and museology in America and Europe; and, as collecting zoologist, visited Cuba, Florida, the West Indies, South America, India, Ceylon, and Malaysia, 1875-79. He was chief taxidermist of the United States National Museum, 1882-90, thereafter entering the real estate business in Buffalo, N. Y. He was director of the New York Zoological Park, 1896-1926, during which time he led in movements to preserve vanishing wild life, more particularly the bison. His *American Natural History* is a leading work in its field. He wrote also *Two Years in the Jungle, The Man Who Became a Savage, Camp-Fires in Canadian Rockies*,

Our Vanishing Wild Life, Wild Animal Interviews, and *Old-fashioned Verses.*

Horthy (*hôr'tē*) **de Nagybanya, Nicholas (1868-),** Hungarian statesman, was born at Kenderes, Szolnok County. A member of the nobility, he entered the Austro-Hungarian navy and, by reason of his distinguished conduct, rose to command of the fleet during World War I. When Bela Kun set up a communist government, Horthy led the counter revolutionary party, which triumphed with French and Rumanian aid. The communist party was exterminated.

In 1920, Horthy was elected regent of Hungary. The ex-king Charles tried twice to recover the throne, but Horthy prevented his success. Thereafter Charles was deposed and Horthy occupied the anomalous position of regent of a country having no king. In October 1944, attempting to make peace with the Allies, he was forced to resign and was taken as a prisoner to Germany. He was released in January 1946.

Horwich, Frances Rappaport (Mrs. Harvey L. Horwich) (1908-), American educator, was born at Ottawa, Ohio. She was educated at the University of Chicago, Columbia, and Northwestern. She has had a varied and distinguished career in the educational field, and has been the recipient of numerous awards and citations for her appearances since 1952 as Miss Frances on Ding Dong School, the NBC-TV Nursery School of the Air. She is the author of the series of *Ding Dong School Books, Miss Frances' All-Day-Long Book,* and *Have Fun with Your Children.*

Hosmer (*hŏz'mĕr*), **Harriet (1830-1908),** American sculptor, was born in Watertown, Mass. She early showed a talent for sculpture by modeling figures in clay. To prepare herself for her chosen career, she studied anatomy at the Medical School at Saint Louis. In 1852, she went to Rome, where she studied seven years with the English sculptor John Gibson. In his studio, she executed her "Daphne," "Œnone," "Beatrice Cenci," and "Medusa." Her most ambitious work is a colossal statue of "Zenobia in Chains." "The Sleeping Faun," exhibited at Paris in 1867, is one of her best works. Among her other works are a fountain in Central Park, New York, a statue of Queen Isabella in San Francisco, and "The Queen of Naples."

She was the first American woman to attain prominence as a sculptor. Like her teacher, Gibson, she was a classicist. Hawthorne describes her in his *Italian Notes* and refers to her again in his *Marble Faun.*

Houdini, Harry (1874-1926), is the stage name of Erich Weiss, American entertainer and magician, who was born at Appleton, Wis. He left home to earn his living at 12 years of age. At 16 he began formal stage exhibitions as a magician adopting the name Houdini from the French magician Robert Houdin. Not only was he one of the most spectacular of all magicians, specializing in escapes from handcuffs, strait jackets, and sealed chests under water, but probably the only one who, to a degree, explained the secret of some of his tricks, thereby incurring the hostility of many competitors. He made known also fraud which he discovered in the work of a number of spiritualistic mediums. His own feats of illusion, he declared, were due to the art of distracting attention and to his great physical strength. He left his unequalled collection of books on magic to the Library of Congress.

Houdon (*ōō'dôN'*), **Jean Antoine (c.1741-1828),** French sculptor, was born at Versailles and studied in Paris and Rome. He executed, among other works, numerous busts and statues of prominent persons, which placed him in the front rank of French sculptors. In 1785, he accompanied Franklin to the United States to prepare the model for the statue of Washington ordered by the state of Virginia and now in the Capitol at Richmond. He worked with great facility and skill in both marble and bronze, and produced a series of more than 200 portrait busts, which form a notable contribution to French sculpture. Among the best-known of these are busts of Diderot, Gluck, Rousseau, Molière, and Benjamin Franklin. His celebrated portrait statue of Voltaire in the Théâtre Français is one of the finest in modern art. See *Sculpture: French Realism.*

House, Edward Mandell (1858-1938), American politician, was born at Houston, Texas. He was educated in the schools of New Haven, Conn., and at Cornell University, graduating in 1881. He never sought office, but, as a trusted adviser, he became influential in Democratic politics and often acted as a personal representative of President Wilson. In 1919, he was one of the American delegates to the Peace Conference at Versailles. House later visited Europe as a correspondent of the Philadelphia *Public Ledger.* He was coauthor with Charles Seymour of *What Really Happened at Paris.*

Housman, Alfred Edward (1859-1936), English scholar and poet, was educated at Oxford; and, from 1882 to 1892, was higher division clerk in the patent office, London. He became professor of Latin at London University in 1892 and, in 1911, resigned to accept a similar chair at Cambridge University. His keen scholarship was matched by a trenchant style in controversy which he exercised in the interests of common-sense views. He edited *Manlius, Juvenal,* and *Lucan.*

As a poet, Housman was equally celebrated and in a wider circle. A striking series of lyrics from his pen entitled *A Shropshire Lad* grew steadily in popularity. They are characterized by a romanticism in subject, finish and simplicity in style, melodiousness in language, and a haunting pessimism in thought. His volume *Last Poems* met with unexampled popularity.

Houston, Sam (1793-1863), American soldier, was born in Virginia. He enlisted in the War of 1812, was chosen ensign, and fought under Jackson with a courage that won his lasting friendship. In 1823, he became a member of Congress and, in 1827, governor of Tennessee. In 1829, he married the daughter of ex-Governor Allen. In the following April, he abandoned civilization; was adopted as a son by the chief of the Cherokee nation; and was formally admitted as a chief.

In 1832, Houston went to Washington and procured the removal of several United States Indian agents on charges of fraud. The Texan war offered a new field to his ambition, and he was made commander in chief. He fought the remarkable and decisive battle of San Jacinto, 1836, in which, at one blow, he annihilated the Mexican army and achieved the independence of Texas. The "hero of San Jacinto" was elected first president of Texas. He was re-elected in 1841 and, on the annexation of Texas to the United States in 1845, was sent to the United States Senate, where he remained until 1859, being then elected governor of Texas. He opposed secession; refused to take the oath to support the Confederacy; was deposed from the governorship in 1861; and retired to private life.

Hovenden (*hō'vĕn-dĕn*), **Thomas (1840-1895),** painter, was born in Dunmanway, Ireland. He studied art first in Cork. Coming to America in 1863, he studied in the National School of Design, New York, and was later a pupil of Cabanel in Paris for six years. While in France, he painted many pictures of life in Brittany and, after returning to America, made excellent studies of Negro life. His "Jerusalem the Golden" and "Last Moments of John Brown" are in the Metropolitan Museum, New York. His widely admired "Breaking Home Ties" portrays a country boy leaving home. He lost his life attempting to rescue a child from death by a moving train.

Howard, Bronson (1842-1908), American dramatist, was born at Detroit. He prepared to enter Yale University but took up journalism instead, devoting five years, 1867-72, to newspaper work in New York. In 1870, Augustin Daly produced Howard's first important play, *Saratoga. Aristocracy,* satirizing Anglomania in American society, the war drama *Shenandoah,* and the sentimental comedy *Old Love Letters* are considered his best plays. Among other well-known plays are *The Banker's Daughter, Young Mrs. Winthrop, One of Our Girls,* and *The Henrietta.* Howard was the only American dramatist of eminence previous to 1890. He was a member of the American Academy of Arts and Letters.

Howard, John (1726-1790), English philanthropist, was born near London. In 1756, after the Lisbon earthquake, he sailed for that city to relieve the sufferers and, on his voyage, was captured by a French privateer and imprisoned. When he was sheriff of Bedford in 1773, his attention was called to the condition of the prisons of the county. The sufferings of the prisoners aroused his sympathies, and he made inquiries into the treatment of prisoners over the whole kingdom, bringing to light an amount of misery and degradation of which previously his countrymen had had no conception. In 1774, he was questioned before a committee of the House of Commons, and many reforms were the result.

In 1775, Howard set out on an extended tour through France, the Netherlands, and Germany with the view of acquainting himself with the state of continental prisons. The philanthropic work thus entered upon engaged him wholly for the rest of his life, during which he traveled more than 50,000 miles and expended £30,000 of his own fortune.

Howard, Oliver Otis (1830-1909), American soldier, was born at Leeds, Me. He was graduated at Bowdoin College, 1850, and at West Point, 1854. He served in the Florida war and in many actions of the Civil War, losing an arm at the battle of Fair Oaks, 1862. He took a prominent part in the battle of Antietam and was engaged in the battle of Fredericksburg; commanded a corps at Chancellorsville and Gettysburg; fought under Grant in the battle of Chattanooga; and accompanied Sherman on his march to the sea. He was made brigadier general in the regular army, 1864. At the close of the Civil War he was placed at the head of the freedmen's bureau.

From 1869 to 1873, Howard was president of Howard University; was superintendent of West Point Military

Academy, 1881-82; and became commander of the Department of the East, 1888, retiring in 1894. In 1895, he founded Lincoln Memorial University, Cumberland Gap, Tenn. His publications include *Donald's School Days, Life of Zachary Taylor, Isabella of Castile, Fighting for Humanity, Our Wild Indians,* and *Autobiography.*

Howard, Roy Wilson (1883-), American newspaper editor and publisher, was born at Gano, Hamilton County, Ohio. After leaving high school at Indianapolis, he became a reporter and later an editor for various newspapers in Indianapolis, Saint Louis, and Cincinnati. He entered the employ of the United Press Association and became president in 1912. In 1921, he was made business director of all the Scripps-McRae, later Scripps-Howard, newspapers, of which he assumed the editorial direction along with Robert P. Scripps in 1925. Howard and Scripps acquired over 25 newspapers, which they fused into a chain under vigorous management. Howard organized the New York *World-Telegram* by a merger of properties in 1931 and assumed the editorship. Since 1953 he has been Chairman of the Executive Committee and Director of the Scripps-Howard chain of newspapers.

Howe, Elias (1819-1867), American inventor, was born at Spencer, Mass. He worked at Lowell and Boston as a mechanic. At the latter place, he developed, constructed, and, in 1846, patented the lock-stitch sewing machine. He made an unsuccessful visit to England to introduce his invention and, returning, in 1849 to Boston, found his patent had been infringed. Harassed by poverty, he then entered on a five years' war of litigation to protect his rights and was ultimately successful, in 1854. By his royalties, he in time obtained $200,000 per annum and amassed a fortune of $2,000,000. During the Civil War, he served as a private. He was elected to the American Hall of Fame in 1915. See *Sewing Machines.*

Howe, Julia Ward (1819-1910), American author, was born in New York. She received a private education and, in 1843, married the philanthropist Dr. Samuel Gridley Howe. With him she conducted the Boston *Commonwealth,* an antislavery paper, prior to the Civil War. After the slavery question was settled, she became active in woman suffrage, prison reform, and the cause of peace. She was a Unitarian preacher, lecturer, and writer. Her best-known poem, the "Battle Hymn of the Republic," was written in 1861. Her writings also include *Passion Flowers, A Trip to Cuba, The World's Own, Sex and Education, Memoir of S. G. Howe, Is Polite Society Polite? From Sunset Ridge,* and *Reminiscences.* She was the first woman to be elected a member of the American Academy of Arts and Letters.

Howe, Mark Anthony De Wolfe (1864-), American biographer, was born at Bristol, R. I. After graduation at Lehigh and Harvard Universities, Howe entered literary work and served as editor of various magazines, including the *Atlantic Monthly.* Of his various biographies, chiefly of New England characters, that of Barrett Wendell was awarded a Pulitzer prize. Other works from his pen include *Causes and Their Champions, Songs of September,* and *Holmes of the Breakfast Table.* His ripe and fruitful scholarship was rewarded by his election to the American Academy of Arts and Letters in 1935.

Howe, Richard Howe, Earl (1726-1799), British admiral, left Eaton at 14 and went to the South Seas in the squadron under Anson. In 1755, during the Seven Years' War, his ship, the *Dunkirk,* captured the *Alcide.* He next served under Sir E. Hawke in the expedition against Rochefort. He was commodore of the squadron which sailed in 1758 for Saint Malo. In the same year, he took Cherbourg and also succeeded to the Irish title of viscount. He took part in the defeat of the fleet under Marquis de Conflans, capturing the *Hero.*

In 1776, he commanded an English fleet on the American coast and, in 1778, defended the American coast against a superior French naval force under D'Estaing. He then resigned in disagreement with British policies for prosecution of the war. He was made first lord of the admiralty in 1783 and received an earldom in 1788. When war with France broke out in 1793, he took the command of the channel fleet and gained a signal victory off Ushant.

Howe, Samuel Gridley (1801-1876), American philanthropist, was born in Boston. He was graduated from Brown University, 1821, and from Harvard Medical College, 1824. He organized the medical staff of the Greek army, 1824-27; returned to America to raise contributions; and, going back with supplies, formed a colony on the isthmus of Corinth. In 1831, he went to Paris to study the methods of educating the blind, and, becoming involved in the Polish insurrection, he was compelled to spend five weeks in a Prussian prison. On his return to Boston, he established schools for the blind and for idiots, and was the teacher of the famous Laura Bridgman, who was blind, deaf, and dumb. In 1851-53, he edited the antislavery *Commonwealth,* assisted by his wife, Julia Ward Howe. In 1867, he revisited Greece with supplies for the Cretans. He was the originator and served as chairman of the Massachusetts State Board of Charities, 1865-74.

Howe, Sir William (1729-1814), English general, served at Quebec under Wolfe and succeeded General Gage in command of the royal troops during the American Revolution. In 1775, he was made commander in chief of the English army in North America and had command at the battles of Bunker Hill, Long Island, White Plains, and Brandywine. Failing to crush the rebellion, he was superseded by Sir Henry Clinton in 1778.

Howells, William Dean (1837-1920), American novelist, was born at Martins Ferry, Ohio. His early education was gained largely in newspaper offices. In 1860, he published his first volume, *Poems of Two Friends.* He was United States consul at Venice, 1861-65, and wrote *Venetian Life,* a book of genuine charm, followed by *Italian Journeys.* From 1866 to 1881, he was editorially connected with the *Atlantic Monthly.* He contributed to *Harper's Magazine,* 1886-91, and became the writer of "Editor's Easy Chair" for *Harper's.* Besides much editorial and critical work and many poems, he published about 40 volumes of novels, essays, and sketches.

By his sincerity, his graceful, flexible style, and his high literary ideals, he became a leader of the realistic school and the foremost figure in contemporary American literature. Among his representative works are *The Rise of Silas Lapham, A Hazard of New Fortunes, A Modern Instance, The Quality of Mercy, Criticism and Fiction, My Literary Passions,* and *Years of My Youth,* an autobiography. His first novel, *Their Wedding Journey,* appeared in 1871, and he completed *The Leatherwood God* in his 80th year. He was elected the first member and became president of the American Academy of Arts and Letters.

Hoxie, Vinnie Ream (1847-1914), American sculptor, was born in Madison, Wis. She displayed precocious talent and studied under Bonnat in Paris and under Majoli at Rome. While she was still in her teens, she won in open competition a $30,000 commission for a life-size statue of Lincoln, now in the rotunda of the Capitol at Washington. Congress later employed her to execute the heroic statue of Farragut, now in Farragut Square, Washington. Her works include the ideal statues of "Miriam," "The West," "Sappho," and portrait busts of Lincoln and other distinguished Americans and Europeans. In 1911, she was selected sculptor for the statue of Sequoyah, to represent Oklahoma in Statuary Hall, Washington. In 1878, she married Gen. R. L. Hoxie.

Hrdlicka (*dlĭch'kä*), **Ales (1869-1943),** anthropologist, was born at Humpoletz, Bohemia. He came to New York City and studied at Eclectic College and Homeopathic College. He made special studies of the insane and accompanied anthropological expeditions in various parts of North America and in Siberia, Mongolia, Peru, Japan, China, and Hawaii. His investigations led him to advance the theory that most of the American Indians are of Asiatic origin. He was connected with the United States National museum in the years following 1903, becoming curator in 1910. His publications include *The Eskimo Brain, Ancient Man in North America, Tuberculosis among Indians,* and *The Old Americans.*

Hubbard, Bernard Rosenkranz (1888-), American explorer, was born at San Francisco, Cal. Educated at St. Ignatius College and University of Santa Clara, he became a member of the Society of Jesus and taught in various colleges in the United States and Europe. After becoming head of the department of geology in the University of Santa Clara, 1926, he led many explorations into Alaska, becoming known as the "glacier priest." Among his discoveries were the crater of Aniakchak, believed to be the largest in the world, and the sites of many stone-age villages. In pursuance of the latter researches he uncovered much evidence which he interpreted as a demonstration of the Asiatic origin of peoples inhabiting the American continents. He wrote *Cradle of the Storms* and produced the feature film "Aniakchak."

Hubbard, Elbert (1859-1915), American author, journalist, and lecturer, was born in Bloomington, Ill., and received a common-school education. He established and edited *The Philistine,* a periodical of shrewd philosophy, devoted in part to the exposition of his ideas of co-operation and social service and in part to trenchant criticism of fads and foibles. He became widely known also as a lecturer and as the originator of the Roycroft shop for artistic bookmaking and the revival of ancient handicrafts, which he conducted with notable success in accordance with his theory of work and service. Among his best-known writings are the long biographical series published as *Little Journeys, Time and Chance, Contemplations, Hollyhocks and Golden Glow, The Book of Business,* and numerous pamphlets, including the famous *Message to Garcia.* Died on the *Lusitania.*

Hubble, Edwin Powell (1889-), American astronomer, was born at Marshfield, Mo. Educated at Oxford and

Chicago universities, he began to practice law in 1913 but the next year turned to research work at Yerkes Observatory. He was appointed to the staff of Mount Wilson Observatory in 1919. There he conducted research based on observation of diffuse nebulæ which contributed substantially to a revised conception of the universe. Spiral nebulæ were shown to be star clouds similar to the Milky Way to which the sun belongs. Some of these nebulæ were found to be 500 million light years distant.

Huber (*ü'bâr'*), **François** (**1750-1831**), Swiss naturalist, was born in Geneva. He studied physics under Saussure, but began to lose his sight at the age of 15 and later became entirely blind. With ample means from his father and the devoted assistance of his wife, Marie Aimée Lullin, and his servant, François Burnens, he conducted a series of notable original researches on the life and habits of honeybees and laid the foundation of the scientific knowledge of their life history.

Among his notable discoveries were the aerial impregnation of the queen bee, the rivalry of the queens, the killing of the males by the workers, the use of antennæ, the origin of the propolis, and the ventilation of the hives. With the assistance of his son, he made researches on the origin of wax and the construction of cells. The results of his investigations were published in his *Nouvelles observations sur les abeilles*.

Huber, Hans (**1852-1921**), Swiss dramatic composer, was born at Schonewerd. He received his musical education at the Leipzig Conservatory; became a noted teacher of music; and, in 1896, was appointed director of the Music School at Basel. The number and excellence of his compositions, both instrumental and vocal, entitle him to rank as the leading composer of his day in Switzerland. His works include the operas *Gudrun*, *Weltfrühling*, and *Der Simplicius*; the beautiful orchestral works *Pandora* and *Nordseebilder*; three fine symphonies; and concertos for the violin and the piano.

Huc (*ük*; *hük*), **Evariste Régis** (**1813-1860**), Roman Catholic missionary, was born at Toulouse, France. In 1839, he joined the mission of the Lazarist fathers to China. In 1844, with Père Gabet and a single native convert, he set out for Tibet, and, in January 1846, he reached Lhasa. Scarcely had a mission been started there when an order for their expulsion was obtained by the Chinese resident, and they were conveyed back to Canton. Huc's health having broken down, he returned to France in 1852. He wrote *Souvenirs* of his great journey, *L'Empire chinois*, and *Le Christianisme en Chine*. His descriptions of the strange things encountered in Tibet were received with much incredulity, but travelers have since verified his statements.

Hucbald or **Hubaldus** (**c.840-c.930**), medieval writer of music, was born at Saint Amand near Tournai. He studied at Saint Germain d'Auxerre, where he made notable progess in the sciences and arts, especially music, and, in 872, became head master of the convent school at Saint Amand. Between 883 and 900, he visited several schools of music, including that of Reims, which he reformed and improved, returning later to Saint Amand, where he spent the remainder of his life.

Numerous musical writings of the period were attributed to him, but his authorship of the *Harmonica Institutio* is unchallenged. He was the leading theoretical writer on music of his century, and the beginnings of harmony are found in his diaphonic music, which consists of simultaneous progressions of two parts in parallel fifths, called by him the organum. The substitution of fourths for fifths by Guido d'Arezzo in the 11th century very soon resulted in the use of the other intervals, and, finally, in the development of the harmonic chord, which, together with measured rhythm, constitutes the chief advance of modern music over the purely melodic music of the Greeks and their successors in the middle ages.

Hudson, Henry (**?-1611**), English navigator, flourished in the early 17th century. In 1607, he sailed in search of a short route to China and India by way of the Northern Ocean, but was stopped by the ice off the coast of Greenland and was forced to return. In 1609, while in the service of the Dutch East India Company, he discovered the Hudson River, up which he sailed to the present site of Albany. On a fourth voyage, 1610, he discovered the strait and bay which are called Hudson after him. Finding his progress blocked by ice fields, he determined to spend the winter on the shores of the bay. Here he and his men suffered terribly from want of food, and he set out to return in 1611. The men mutinied and, getting possession of the ship, put Hudson, his son John, and seven sailors into an open boat and turned them adrift. Nothing was ever known of their fate.

Hudson, William Henry (**1841-1922**), English naturalist and writer, was born of English parents at Quilmes, Argentina, in which country he spent the early part of his life. He there acquired the knowledge and the love of nature which are admirably displayed in his *Naturalist in La Plata*, published in 1892. Other works treating of his travels and observations in South America include *The Purple Land* (Uruguay), *Idle Days in Patagonia*, an *Argentine Ornithology* (jointly with P. L. Sclater).

About 1890, he settled in London. Soon afterwards he began to study rural England with a rare and appreciative insight which is reflected in many charming books. He first became widely known to the literary world by his novel *Green Mansions*, published in 1904. While recognition of the originality of his work came late, at the time of his death he was regarded as one of the foremost of modern writers on natural history and was especially noted for the quality of his literary style. His "peculiar genius lay in setting forth nature and its minutest creatures with gentleness and understanding, not 'scientifically' and coldly." Besides the foregoing, his writings include *Birds in a Village*, *Adventures Among Birds*, *Nature in Downland*, *Hampshire Days*, *The Land's End*, *Afoot in England*, *A Shepherd's Life*, and *Far Away and Long Ago*.

Huggins (*hŭg'ĭnz*), **Sir William** (**1824-1910**), English astronomer and spectroscopist, was born in London. In 1852, he was elected a member of the British Microscopical Society, and for some years studied physiology with the microscope. But, having built an observatory near London in 1856, he began the study of the physical constitution of stars, planets, comets, and nebulæ. He introduced spectroscopic photography into astronomy; proved the existence of carbon in comets and of calcium in the chromosphere of the sun; and made many other valuable contributions to science.

Hugh Capet (*hū kā'pĕt*) (**939-996**), founder of the Capetian dynasty of French monarchs, was king of France, 987-996. As count of Paris, on the death of Louis V, last of the Carolingians, he usurped the throne and was confirmed in its possession by a confederacy of nobles.

The race of Capet has given 119 sovereigns to Europe: 36 kings to France, 22 to Portugal, 5 to Spain, 11 to Naples and Sicily, 3 to Hungary, and 3 to Navarre; 3 emperors to the Byzantine Empire; 17 dukes to Burgundy, 13 to Brittany, 2 to Lorraine, and 4 to Parma.

Hughes, Charles Evans (**1862-1948**), American lawyer and jurist, was born in Glens Falls, N. Y. He was graduated from Brown University, 1881, and from Columbia Law School with high honors in 1884. He was a teacher in Delaware Academy, Delhi, N. Y., 1881-82; was admitted to the New York bar, 1884; and practiced in New York, 1884-1906, with the exception of two years, 1891-93, when he was professor of law at Cornell University. In 1905, he was attorney for the committee appointed by the state legislature to investigate financial methods of great life insurance companies. His skill and ability in securing disclosures of these methods won him a national reputation and led to radical reforms.

Hughes was elected governor of New York in 1906 and was re-elected in 1908. After a notable contest with the legislature, he secured enactment of the direct primary, short ballot, antigambling, and other progressive laws. In 1910, he was appointed justice of the United States Supreme Court. He resigned in 1916 upon receiving the Republican nomination for president, but was defeated by Woodrow Wilson and resumed legal practice in New York. Serving as secretary of state from 1921 to 1925, he acted as chairman of the Washington Disarmament Conference in 1921-22. In 1928, he was appointed a judge in the World Court, but resigned in 1930 in order to accept appointment as chief justice of the United States Supreme Court. He presided over the Court during the administration of Roosevelt, when a series of precedents were established by the court greatly enlarging the authority of Congress. He retired in 1941.

Hughes, Langston (**1902-**), an American Negro writer who has divided his talent between the novel, poetry, and drama. He was born in Joplin, Mo., and saw the world from such vantages as merchant sailor, waiter, and dishwasher while he was learning his craft. Hughes's most powerful novels are *Not Without Laughter* (1930) and *The Ways of White Folks* (1934). He wrote an account of his life, *The Big Sea*, in 1940. A regular contributor of fiction, essays, and poems to magazines, Hughes also has to his credit the lyrics for the celebrated musical version of Elmer Rice's *Street Scene*, produced in New York in 1946, with a score by Kurt Weil. His other writings include *First Book of Rhythms* and *First Book of Jazz* (1954) and *First Book of the Caribbean* (1955).

Hughes, Sir Samuel (**1853-1921**), Canadian statesman, was born in Darlington, Ont. He was educated at Toronto University. In 1885, he purchased the Lindsay *Warder*, of which he was editor until 1897. He entered the militia at the age of 12; served in the South African War, 1899-1900; and attained the rank of major general in 1914. In 1892, Hughes was elected to the House of Commons and, in 1911, became minister of militia in the Borden cabinet. Upon the outbreak of World War I, he was active in organizing the Canadian military forces. In September-

October, 1914, he assembled and forwarded 33,000 troops to English ports. He continued the work of organization, securing a total exceeding 350,000 men previous to his resignation in November 1916.

Hughes, Thomas (1822-1896), English author, was born at Uffington. He attended Rugby under the celebrated Dr. Arnold; studied at Oxford; and was admitted to the bar in 1848. In 1857, he gave to the world *Tom Brown's School Days*. It was followed by *The Scouring of the White Horse*, *Tom Brown at Oxford*, and *Alfred the Great*.

Hughes pursued, meanwhile, the practice of law. He gained the confidence and good will of the working classes, introducing a trade union bill into Parliament in the course of his nine years, 1865-74, as member of the House of Commons. He assisted also in establishing a Workingman's College, London, and served as principal of it. He was instrumental in establishing a model colony at Rugby, Tenn., 1880.

Hughes, William Morris (1864-1952), Australian statesman and labor leader, was born in Wales. He was trained as an elementary school teacher and, in 1884, went to Australia. He affiliated himself with the Labor party and was elected to the legislature of New South Wales in 1894 and, in 1901, to the Federal legislature. He had taken a prominent part in the organization and leadership of labor unions, and, after an election favorable to his party in 1904, he was made minister of foreign affairs and later held other cabinet offices. During 1915-23, he was premier of Australia, in which capacity he became known as an enthusiastic imperialist. From 1934 he held various cabinet posts.

Hugo (*hū'gō*; F., *ü'gô'*), **Victor Marie (1802-1885),** French poet, novelist, and orator, was born at Besançon, France. As a child, he was taken in the train of his father, a French general, through the south of France and finally into Spain, where his education was begun at the Nobles' College, Madrid. Upon the advance of the English to free Spain from the French armies, he was taken to Paris. There he was taught by priests until General Lahorie undertook to tutor him in Old French and Latin. Hugo later entered the College of Louis-le-Grand, where, at 14, he wrote the tragedy *Irtamène*. In 1817, the French Academy mentioned honorably his poem "On the Advantages of Study."

Early Literary Career. Hugo married his cousin Adèle Foucher in October 1822. Soon his West Indian romance, *Bug Jargal*, appeared, followed, in 1826, by a book of *Odes and Ballads*. With the appearance of his tragedy *Cromwell* in 1827, Hugo became immediately the leader of the romantic movement in literature.

His two plays *Marion Delorme* and *Hernani* were suppressed by the censor. *Notre Dame de Paris*, written in 1831, the historical romance in which Hugo vied with Scott, was translated into many languages, and plays and operas were founded on it. *The King Takes His Pleasure* of 1832 is familiar in the opera *Rigoletto*.

In 1837, Louis Philippe made Hugo an officer of the Legion of Honor. *Ruy Blas* was acted successfully in 1838; three years later, the French Academy, having rejected Hugo several times, admitted him to membership.

Later Activities. To distract himself from the grief occasioned by the drowning of his daughter, Hugo plunged into politics. He was created a peer in 1845 and sat in the Constituent Assembly of France. When he was banished from the country by Louis Napoleon, Hugo betook himself to Brussels, London, and the Channel Islands. Meanwhile, he satirized the usurper in lampoons that were collected from 1853 to 1859 in *Castigations*. Refusing to avail himself of the amnesty of 1859, he remained in exile and soon began his greatest creations in fiction. In 1862, *Les Misérables*, the most celebrated of his novels, appeared; in 1866, *The Toilers of the Sea*; in 1869, *The Man Who Laughs*.

Upon his return to France in 1870, he again joined the Republican movement and was returned to the National Assembly. After the Commune, he fled to Brussels and Luxemburg. Poems written during the Franco-Prussian War and the siege of Paris and collected under the title *The Terrible Year* betray the long tried exile.

In 1874, his novel *Ninety-Three* pleased the public, and phases of a bounteously paternal mood appeared in his *Art of Being a Grandfather* of 1877. The same year, he published his graphic *History of a Crime*, which depicted the Republicans' side of the *coup d'état* of Louis Napoleon in 1851. The poetic romance *Torquemada*, published when Hugo was 80, proved that his pen had not lost its skill.

Rank Among Writers. Hugo's place in world literature is secure. No other author while living achieved such national popularity as his. In romance, he stood first, although George Sand and Balzac were his rivals; in lyrical poetry, also first, despite Lamartine and De Musset; in the drama, he had no close competitor among the writers then living. His range of character creation was very broad. He possessed the genius of emotion, though he was less richly endowed with the qualities that come through reflection. He gave to French rhythm a strength and variety it had never known, and he employed a prose style that was singularly effective. See *Les Misérables*, *Notre Dames de Paris*, *Quasimodo*.

Hull, Cordell (1871-1955), American politician and administrator, was born in Pickett County (then Overton County), Tenn. Having studied law at Cumberland University, he began practice in 1891. Two years later he was elected to the Tennessee legislature. After four years as a judge, 1903-07, he was sent to Congress as a Democratic representative. In 1931, he was elected United States senator, but resigned two years later to enter President Roosevelt's cabinet as Secretary of State. In this capacity he cultivated friendly relations and prosecuted vigorously a policy of exchanging tariff concessions as a basis for trade agreements. He served through most of World War II, flying to the Moscow conference in October 1943, but ill health forced his retirement in December 1944. He was awarded the Nobel peace prize for 1945.

Hull, Isaac (c. 1773-1843), American naval officer, was born in Derby, Conn. In 1812, he commanded the frigate *Constitution*, which was pursued by a British squadron for three days but escaped by skillful sailing. While cruising in the Gulf of St. Lawrence in the same year, he met the British frigate *Guerrière*, which surrendered after a bloody fight of half an hour. The *Guerrière* was so injured in the battle that she soon sank. The British ship lost 100 men; the *Constitution* lost but 14 men killed and wounded, and within an hour or so was ready for another fight. This was the first naval battle of the War of 1812, and Congress gave Captain Hull a gold medal.

Humboldt, Friedrich Heinrich Alexander, Baron von (1769-1859), German geographer and traveler, was born in Berlin. After studying at Frankfort on the Oder, Göttingen, and Freiberg, he became director general of the mines of Bayreuth and Anspach in 1792, which office he held for about four years. He had already made a considerable reputation as a writer on science when, in 1799, he set out with Bonpland for South America and occupied four years in the exploration of that continent and about a year more in investigating the natural history of Mexico. After his return to Europe in 1804, he passed a period of 20 years in Paris, publishing a monumental work of his travels.

In 1829, Humboldt made a scientific exploration of Central Asia and, during the 18 years following, was engaged in diplomatic affairs in behalf of the Prussian government. His chief works include *Journey to the Equinoctial Regions of the New Continent*, *General Physics and Geology*, *On the Geographical Distribution of Plants According to the Temperature and Altitude*, *Aspects of Nature*, and his masterpiece, *Kosmos—Essay of a Physical Description of the Universe*, begun in his 74th year.

Humboldt's influence upon modern science has been profound and far-reaching. He founded the modern science of physical geography and made contributions to geology and chemistry and magnetism.

Hume, David (1711-1776), Scotch philosopher and historian, was born in Edinburgh, Scotland. Law and commerce, to which he first turned, both proved uncongenial, and he ultimately devoted himself to a life of study and the cultivation of literature and philosophy.

The years 1734-37 he spent at La Flèche, France. Here Hume studied, and wrote *A Treatise of Human Nature*, which was published in Great Britain in 1739. It was a work of demolition. He separated ideas, or the impressions created by an external world, from the absolute existence of that world itself. He argued that the fact of self-consciousness is not more amenable to demonstration than our belief in the existence of an outer world. He contended it was not possible for man to prove the validity of these beliefs. He thus threw down a challenge to philosophers either to refute what he had said or seriously to fill up the blanks which he had discovered. To this impetus are due both Scotch and German schools of metaphysicians.

Hume now turned, for a time, to literary fields which brought him greater financial recompense. In 1741-42 appeared two volumes of *Essays*, whose enlightened treatment of morals and politics caused Hume to be called the father of the liberal and rational policy. In 1746, he became secretary to General Saint Clair, with whom he went to France and later to Turin and Vienna. He wrote his *Enquiry Concerning the Principles of Morals*, his *Political Discourses*, and his *Dialogues on Natural Religion*.

After an unsuccessful attempt to obtain the chair of logic at the University of Glasgow, Hume settled at Edinburgh and, in 1752, was elected librarian to the faculty of advocates. This post encouraged him to write the *History of England*, 1754-61, which long held its ground as the chief authority on the subject despite its strong partisan spirit of Toryism. In 1757, Hume brought out his *Natural History of Religion*, which was assailed by theologians.

As secretary and, later, as *chargé d'affaires* to the British embassy at Paris, 1763-66, Hume became familiar with the wits and *savants* of the Parisian circle. From 1767 to 1769, he held the office of British undersecretary of state. He then returned to Edinburgh, where he wrote his autobiography, *My Own Life*. Hume's great distinction is attributable to the fact that, by his acute investigation into the nature of man from the point of view of Locke's system, he gave to philosophical skepticism a strength and logical consistency which it never had before.

Humperdinck (*hŏŏm'pĕr-dĭngk*), **Engelbert (1854-1921)**, German composer, was born in Siegburg, near Bonn. While studying at Cologne in preparation for the profession of architect, he became acquainted with Hiller, who induced him to study music instead. He studied at the Cologne Conservatory in 1874-76 and in Munich, 1876-79. He then went to Italy, where he formed an intimate friendship with Wagner, who made him practically a member of his family and employed him in preparing *Parsifal*. Upon the death of Wagner, he taught in the Conservatory at Barcelona, 1885-86. After spending some years in Cologne, he became an instructor in the Hoch Conservatory in Frankfort, and, in 1900, he was made director of the Meisterschule there.

Humperdinck's fame as a composer rests upon the success of his fairy operas *Hänsel und Gretel*, 1893, and *Die Königskinder*, written in 1896 but first produced at the Metropolitan Opera House in New York in 1910. He composed also ballads and choruses and other operas.

Humphrey, George Magoffin (1890-), American lawyer and administrator, was born at Cheboygan, Michigan. He received a law degree from the University of Michigan in 1912, and practiced law at Saginaw until 1917, when he was appointed general counsel of the steel manufacturing firm of M. A. Hanna Company at Cleveland. He was president of the company from 1929 to 1952. President Eisenhower made him Secretary of the Treasury in 1953.

Huneker (*hŭn'ĕ-kĕr*), **James Gibbons (1860-1921)**, American writer and musical critic, was born in Philadelphia, Pa. He studied music in Paris, 1878-80. Returning to the United States, he was associated for 10 years with Rafael Joseffy as teacher of piano at the National Conservatory, New York. He began writing musical criticisms for New York newspapers in 1891. He later became musical editor and, in 1902, dramatic editor of the New York *Sun*, achieving distinction for his advocacy of his artistic ideals. His writings include *Mezzo-tints in Modern Music, Chopin—The Man and His Music, Melomaniacs, Visionaries, Egoists—A Book of Supermen, Franz Liszt, The Pathos of Distance, Ivory Apes and Peacocks*, and many magazine articles.

Hunt, Helen. See *Jackson, Helen Hunt.*

Hunt, Herold Christian (1902-), school superintendent, was born in Northville, Michigan. He was graduated from the University of Michigan in 1923, and later received his doctorate in education from Teachers College, Columbia University. After several years' experience as a teacher, he became superintendent of schools successively in St. John's, Michigan, Kalamazoo, Michigan, New Rochelle, New York, and Kansas City, Missouri. Since then he has been professor of education in the School of Graduate Education at Harvard University. He was general superintendent of schools in Chicago, 1947-53. In 1956, President Eisenhower appointed him Under Secretary of Health, Education, and Welfare.

Hunt, James Henry Leigh (1784-1859), English poet and essayist, was born at Southgate, near London. He was educated at Christ's Hospital, where he was a schoolfellow of Coleridge and Charles Lamb. In 1813, as editor of the *Examiner*, he wrote some articles severely criticizing the prince regent, afterward George IV, and for these he was prosecuted by order of the government and sentenced to two years' imprisonment in the Surrey jail. While in jail, he wrote *The Descent of Liberty, a Masque, The Story of Rimini*, and *The Feast of the Poets*.

In 1819, Hunt began a small periodical, called the *Indicator*, in which many of his essays appeared. In 1828, he published *Lord Byron and Some of His Contemporaries*, in which, having quarreled with his former friend Byron during a visit to Italy, he indulged in some severe animadversions upon the character of that poet. All his life was devoted to literature, and all his writings have a fascination of their own. Among his last works was his *Autobiography*.

Hunt, Richard Morris (1828-1895), American architect, brother of William Morris Hunt, the painter, was born at Brattleboro, Vt. He began to study architecture at the age of 15 in Geneva, Switzerland. At 20, he entered the Ecole des Beaux-Arts, Paris, the first American student there. After a period of travel in Europe, Egypt, and Asia, he became inspector of works on the Louvre. In 1855, he returned to America; was employed on the extension of the Capitol at Washington; and founded in New York the pioneer American studio of architecture.

Hunt designed the Lenox Library, the Tribune Building, and the original building for the Metropolitan Museum of Art, New York; The Naval Observatory at Washington; the Administration Building at the Columbian Exposition, Chicago; the Divinity Building at Yale; the pedestal of the statue of Liberty in New York harbor; the Yorktown monument; and many noted private houses, including the Vanderbilt country house at Biltmore, N. C. His influence, both personal and artistic, upon the development of architecture in the United States was very great.

Hunt, William Holman (1827-1910), English religious painter, was born in London. In 1845, he was admitted as a student to the Royal Academy, and he exhibited his "Flight of Madeline and Porphyro" in 1848. He shared a studio with D. G. Rossetti, and the two, along with Millais and a few others, inaugurated the "Pre-Raphaelite brotherhood," which aimed at detailed and uncompromising truth to nature. Among the first of his Pre-Raphaelite works was "Rienzi," in 1849. It was followed by "Valentine Rescuing Sylvia," "The Hireling Shepherd," "Claudio and Isabella," and "Strayed Sheep."

The result of several visits to Palestine appeared in "The Scapegoat"; "The Finding of Christ in the Temple," now in the Birmingham Art Gallery, for which he received £5000; "The Shadow of Death," in the corporation gallery, Manchester, for which he was paid £10,000; and "The Triumph of the Innocents." Among his latest works were "Isabella and the Pot of Basil" and "May Morning in Magdalen Tower." The most widely known of his paintings is "The Light of the World," now at Kebel College, Oxford.

Hunt, William Morris (1824-1879), American genre and portrait painter, was born in Brattleboro, Vt. He studied in Düsseldorf and under Couture in Paris, and became a friend and follower of J. F. Millet, but made the technique of the French school subsidiary to his own original ideas. He established and conducted a large art school in Boston and exerted a powerful influence by his high artistic standards and the admirable quality of his own work. His sayings in the studio were collected by his pupil Helen Knowlton and published under the title *Talks on Art*.

Among his important figure paintings are "The Farmers' Return," "Sheep Shearing at Barbizon," "The Fortune Teller," "The Bugle-Call," and "The Prodigal Son." In the Boston Museum are several of his canvases, including "Girl Reading," "Peasant Girl at Barbizon," "Marguerite," and "Hurdy-Gurdy Boy." Among seven of his works in the Metropolitan Museum, New York, are an excellent "Landscape," "Girl at a Fountain," and "The Bathers." He also painted portraits of many celebrated persons as well as "The Flight of Night" and other decorations in the State Capitol at Albany, N. Y. See *Painting*.

Hunter, John (1728-1793), British surgeon, anatomist, and physiologist, was born at Glasgow, Scotland. He spent five years at the University of Edinburgh and, deciding to adopt the profession of medicine, went to London and studied at Chelsea Hospital. His progress in anatomy and surgery was so rapid that, in the second session, he was able to undertake the directing of the pupils in their dissections. After 10 years in the dissecting room, his health gave way.

In 1759, he applied for an appointment in the British army; he was immediately made staff surgeon and served in the Seven Years' War until the conclusion of peace in 1763. He then settled in London, where, in 1785, he built a museum. This museum became the place of meeting of the *lyceum medicum*, a society established by Hunter and Fordyce.

His famous operation for the cure of aneurism, that of simply tying the artery at a distance from the tumor and between it and the heart, led to important advances in surgery. He was an indefatigable student, made innumerable dissections and experiments, and was the greatest anatomist and the best operative surgeon of his day. He wrote *Natural History of the Human Teeth* and *Treatise on the Blood, Inflammation, and Gunshot Wounds*. In 1859, his remains were interred in Westminster Abbey.

Huntington, Anna Hyatt. See *Hyatt, Anna Vaughn.*

Huntington, Henry Edwards (1850-1927), American capitalist and art collector, was born at Oneonta, N. Y. He entered the hardware business in Oneonta and later removed to New York. He was a lumberman at Saint Albans, W. Va., from 1874 to 1880. Through opportunities offered by his uncle, Collis P. Huntington, builder and promoter of railroads, he entered railway work as superintendent of construction for the Chesapeake, Ohio & Southwestern railway, of which he became superintendent in 1884 and general manager in 1886. He later became engaged in numerous navigation, transportation, and other development enterprises on the Pacific Coast, particularly in southern California.

He made one of the finest collections of rare books and pictures in existence, housing it in Pasadena, to which city, in 1922, he gave his estate there to be used as a public park. His other gifts include $8,000,000 to endow research in American and English history. He purchased Gainsborough's "Blue Boy" at a great price and brought it to America.

Hunyadi (*hōōn'yŏd-ĭ*), **Janos** (**c. 1387-1456**), Hungarian national hero, was born in Hunyad, Transylvania. As governor of Transylvania in 1442, he distinguished himself against the Turks, who at that time were the terror of the whole of Christendom. During the period of his rule, he was the shield of Hungary, not only against the Turks but also against other European powers. His support came from the peasants rather than from the nobles, who were hostile to him, partly because of his policy of maintaining a paid standing army. During the minority of Ladislaus V, he was elected regent of Hungary. Among his more notable deeds was the relief of Belgrade in 1456. The nobles deserted him but the monk John Capistran inspired and led a force of peasants to assist Hunyadi's professional army. Complete victory over the defending Turks brought that fortress again into the possession of the Hungarians.

Huss, or **Hus** (*hŭs*; G., *hōōs*), **John** (**c. 1370-1415**), Bohemian religious reformer, was born at Husinetz, Germany. He studied at the University of Prague and was appointed dean of the philosophical faculty in 1401 and rector of the university in 1402. As a preacher, he was greatly esteemed both by the common people and by the students, while, as confessor to Queen Sophia, he obtained access to the court. At this time, he became acquainted with the writings of Wiclif, which influenced him deeply.

The works of Wiclif had recently been condemned by the pope, and Huss, accused of being a Wiclifite, was excommunicated. He denounced the indulgences granted by the pope, who desired by such means to make an effective crusade against Ladislaus, the excommunicated king of Naples. Huss was supported in his attack on indulgences by his friend Jerome.

The pope issued an interdict against Huss in 1412, but Huss appealed to a general council and to Christ, and wrote his *On the Church* as a reply to the pope. He went to a general council at Constance in 1414 under a safe-conduct from the king. His enemies secured his imprisonment as a heretic and, despite the guarantee of safe-conduct, he was burned at the stake. The popular indignation aroused by his death resulted in the so-called Hussite war.

Hutchins, Robert Maynard (**1899-**), American educator, was born at Brooklyn, N. Y. Graduating at Yale University in 1921, he taught for two years at Lake Placid School and was made secretary of Yale University in 1923, lecturer in the Yale Law School in 1925, and professor of law and dean of the Law School in 1927. In 1929, he was chosen president of the University of Chicago. He proceeded immediately to carry out there a new plan for informal study, which aimed at making the university an association of scholars and students rather than an institution for formal lecturing. He was chancellor from 1945 to 1951. Since then he has been associate director of the Ford Foundation. He wrote *Higher Learning in America*.

Hutchinson (*hŭch'ĭn-sŭn*), **Anne** (**c.1590-1643**), American religious leader, emigrated from Lincolnshire, England, to Boston, Mass., 1634. Living in a community prone to religious excitement, she claimed to be a medium of divine revelations and conducted meetings for women in which she expressed such antinomian doctrines as that the conscious judgment of each believer was a paramount authority in religion.

Great controversies arose, and a synod was called, in which her teachings were condemned and she was banished from the colony. She and her friends obtained from the chief of the Narragansetts liberty to reside in Rhode Island, where they set up a community on the principle that no one was to be "accounted a delinquent for doctrine." After the death of her husband, who shared her opinions, she removed to a Dutch settlement in the colony of New York, where, in 1643, she and her whole family of 15 persons were taken prisoners by the Indians and all but one daughter were barbarously murdered.

Hutchinson, Arthur Stuart Menteth (**1879-**), English novelist, was born at Gorakpur, India, of English parentage. He studied medicine at Saint Lawrence College, Thanet, Eng., but did not practice, devoting himself instead to literary and editorial work. His earlier novels include *The Happy Warrior* and *The Clean Heart*. By 1912, he had risen to the position of editor of the London *Daily Graphic*. After a period of active war service with the British army in France, he wrote two novels which attained great popularity—*If Winter Comes* and *This Freedom*. His later novels include *The Eighth Wonder, One Increasing Purpose, The Uncertain Trumpet, As Once You Were*, and *He Looked for a City*.

Hutchinson, Thomas (**1711-1780**), American magistrate and historian, was born in Boston. He was graduated at Harvard and began the practice of law. He was several times elected to the general court and, for three years, served as speaker. In 1760, he held at one time four offices, being judge of probate, councilor, chief justice, and lieutenant governor. In the time of the Stamp Act agitation, he favored the British government, as a result of which attitude his house was sacked and many valuable manuscripts relating to the history of Massachusetts were destroyed. In 1769, he became acting governor, serving in that capacity at the time of the Boston Massacre. His conduct further incensed the public, and he was driven from the country. In 1774, he returned to England and was pensioned by the government. He published *A Brief Statement of the Claims of the Colonies*.

Huxley, Aldous Leonard (**1894-**), English essayist and novelist, was born at Godalming. He was graduated from Oxford; was on the staff of the *Athenæum*, 1919-20, and of the *Westminster Gazette*, 1920-21; thereafter he devoted himself to authorship. His interests embraced science, psychology, literature, politics, and sociology, in each of which fields he showed a detailed knowledge, a daring penetration of thought and a gift for savage satire. Among his works are *Antic Hay, Point Counter Point, Brave New World, Eyeless in Gaza, After Many a Summer Dies the Swan*, and *Grey Eminence*.

Huxley, Julian Sorell (**1887-**), English zoologist, a grandson of Thomas Huxley and brother of Aldous Huxley. Educated at Oxford University, he taught there and, in 1912 came to the Rice Institute, Houston, Texas, where he lectured until 1916. After two years of service in World War I, he taught zoology at Oxford University and King's College, London. He was secretary of the zoological society of London, 1935-42. Chosen director general of UNESCO in 1946.

By reason of the clarity of his exposition and his interest in the light zoological study throws on human society, Huxley became one of the leading expositors of biological science in the English-speaking world. On social questions he inclined to a radical view. Among his numerous publications are *The Stream of Life, Scientific Research and Social Needs, At the Zoo*, and *Evolution Restated*.

Huxley (*hŭks'lĭ*), **Thomas Henry** (**1825-1895**), English biologist and comparative anatomist, was born at Ealing. He was graduated at London University, 1845. In 1846, he entered the medical service of the royal navy and was appointed assistant surgeon on board the *Rattlesnake*. This vessel, commanded by Capt. Owen Stanley, was commissioned to survey the eastern shores of Australia. Imbued with a passion for natural history, Huxley devoted himself with zeal and intelligence to the study of the numerous marine animals collected from time to time during the survey and made them the subject of scientific papers, which he sent home, diffident as to their value.

In 1851, papers from his pen on other branches of the same subject were printed in the *Philosophical Transactions*, and, in the same year, Huxley was elected a fellow of the Royal Society. In 1854, he was appointed professor of natural history in the Royal School of Mines, a chair which he later made one of the most distinguished in the scientific world. In 1857, in conjunction with Dr. Tyndal, he wrote *Observations on Glaciers*, and, in 1858, this was followed by his important lecture *On the Theory of the Vertebrate Skull*. In 1872, he was made lord rector of Aberdeen University, and he was president of the Royal Society, 1881-85.

Huxley possessed the gift of exposition as well as remarkable powers of research. He was a forceful and luminous speaker, always clear and accurate, and exercised an incalculable influence as a teacher and popularizer of science. He was the foremost advocate in England of Darwin's theory of evolution, and his own researches form a substantial contribution to 19th-century knowledge.

Huygens (*hī'gĕnz*; Dutch, *hoi'gĕns*), or **Huyghens, Christian** (**1629-1695**), Dutch physicist and astronomer, was born at The Hague. He devoted himself to mathematics, improved the telescope, and devised new methods for grinding and constructing lenses. He also invented the first pendulum clock and, in 1659, discovered the ring of Saturn; developed a longitudinal wave theory of light; and first demonstrated polarization. He frequently visited England and was made a fellow of the Royal Society, 1663; at the invitation of Louis XIV, he lived for a number of years in Paris.

Huysmans (*hīs'mâns*), **Cornelis** (**1648-1727**), Flemish landscape painter, was born in Antwerp. He studied in Antwerp and Brussels, and lived many years at Malines. Most of his pictures are brilliantly colored landscapes. In addition to landscapes, he painted large sacred pieces, among them "Christ on the Road to Emmaus" for the cathedral of Notre Dame of Malines. His "Italian Landscape" and "Landscape with Figures" are in the Metropolitan Museum of Art, New York.

Huysmans, Joris Karl (1848-1907), French novelist, was born in Paris. He lived an uneventful life, spending 30 years as a government employee and then lived on his pension. During the last 33 years of his life he wrote many novels which reflected his transition from extreme disillusionment to devout faith as a Catholic. One of his earlier works, *Marthe,* describes realistically the life of a prostitute. *La-bas* plumbs the depths of morbidity. In *En Route,* the author turns to religion, his later works *La Cathedrale* and *L'Oblat* evidencing his retreat to complete conversion. His other works include *En Menage, L'Art moderne,* and *A Rebours.*

Hyatt, Anna Vaughn (1876-), American sculptor, was born at Cambridge, Mass. She received her training in sculpture at the Art Students' League, New York City, and was a pupil of H. A. MacNeil and Gutzon Borglum. Her work consists chiefly of small bronze figures of animals. Among her larger sculptures is a colossal lion at Dayton, Ohio. Her equestrian statue "Joan of Arc," exhibited at the Paris Salon in 1910, stands in Riverside Park, New York. Her other works include "El Cid" in New York and Seville, Spain, and "Diana," in New Orleans and, in duplicate, in various other cities. She married Archer M. Huntington in 1923. She was elected to the American Academy of Arts and Letters in 1932. See *Sculpture.*

Hyatt, John Wesley (1837-1920), American inventor, was born at Starkey, N. Y. He was educated in the common schools with one year at Eddytown Seminary. He began his career as a printer, but subsequently devoted his attention exclusively to invention. His first important achievement was a composition billiard ball, 1865. In 1869 he discovered a means of dissolving pyroxylin under pressure and, with his brother Isaac Smith Hyatt, invented celluloid and laid the foundation for the extensive celluloid industry.

His most important contribution to science was his purifying system for treating large bodies of water, devised in 1881 and since widely adopted. In 1892, he invented a roller-bearing, and in 1900 a lock-stitch sewing machine for belting. The list of his patented devices exceeds 200.

Hyde, Douglas (1860-1949), Irish scholar and writer. Educated at Trinity College, Dublin, he taught at the University of New Brunswick, Canada, in 1891-92, thereafter returning to Ireland, where he distinguished himself in the movement for an "Irish Ireland." He helped toward the establishment of the National University of Ireland with a chair in modern Irish, which he was the first to fill. He collected Irish love songs and folklore in the original Celtic and wrote in Irish the play *Twisting of the Rope,* which was produced in 1901 with the author in the principal role. He was a senator of the Irish Free State (later Eire) from 1922 to 1925. He was president of Eire from 1938 to 1945.

Hyndman (*hĭnd'măn*), **Henry Mayers (1842-1921),** English journalist and social reformer, was born in London. He was graduated from Trinity College, Cambridge, and, in 1866, became war correspondenr for the *Pall Mall Gazette* to report the Italian war. In 1881, he founded the social democratic federation, which was the nucleus of the Socialist party in British politics. The chief labor and socialist leaders of the time worked with him, although his aristocratic manners caused frequent offense. He was one of the earliest supporters of Karl Marx's views in England. He was a vigorous opponent of the South African war, 1899-1900. Among his books are *England for All, Historical Basis of Socialism, A Commune for London, Commercial Crises of the 19th Century,* and *Marx Made Easy.*

Hypatia (*hī-pā'shĭ-ă*) **(c. 355 A.D. -c. 415 A.D.),** Greek philosopher, daughter of the Alexandrian astronomer Theon, was born in Alexandria. She was renowned for her knowledge of mathematics and of the Platonic philosophy, her teaching of which at Alexandria drew students from all the Hellenized regions of the East. She was celebrated also for both beauty and an ascetic austerity. She met a tragic fate. Being accused by the clergy of unduly influencing Orestes, prefect of Alexandria, against Saint Cyril, then archbishop there, she was attacked by a mob led by priests, dragged into a church, stripped of her clothing, and killed. This occurred when she was about 60 years of age. She is the heroine of Charles Kingsley's romance *Hypatia.*

Hyrcanus (*hĕr-kā'nŭs*), **John (?-105 B.C.),** Jewish high priest, flourished about 135 B. C. He succeeded his father, Simon Maccabæus, in the high priesthood as one of the Hasmonæan rulers of Judæa. He was at first compelled to pay tribute to Antiochus Sidetes, after whose defeat and death in 130 he re-established his independence, subdued Samaria, took several other cities from Syria, conquered the Idumæans, and formed an alliance with the Romans. He was long a Pharisee, but late in life became a Sadducee. His reign of 30 years closed the period of the later Jewish kingdom's independence.

Ibañez. See *Blasco Ibañez, Vicente.*

Iberville (*ē'bĕr'vēl'*), **Pierre le Moyne, Sieur d' (1661-1706),** French-Canadian commander, was born at Montreal, Canada, and became distinguished in the French service. In 1686, he joined the expedition of De Troye from Canada against the English forts on Hudson Bay and, in 1690, took part in the Indian and French massacre of the inhabitants of Schenectady. He captured forts Nelson and Bourbon on Hudson Bay in 1694 and 1697 respectively. In 1696, he destroyed Saint John's, Newfoundland, taking most of that province from the British, and, in 1697, defeated them in naval fights in Hudson Bay.

Sailing from Brest in 1699 with two frigates, he reached the mouth of the Mississippi with his brother Bienville. He fortified Biloxi, the first post on the Mississippi, and, in 1700, ascended the river. In 1701, on account of the unhealthful climate, he transferred the colony from Louisiana to Mobile, and began the settlement of Alabama. In 1702, he fortified Dauphin Island, in Mobile Bay; in 1706, with three ships, he captured the Isle of Nevis one of the Leeward group.

Ibrahim Pasha (*ĭb'rä-hēm' pä-shä'*) **(1789-1848),** Egyptian general, adopted son of Mehemet Ali, viceroy of Egypt, was born at Kavala, Rumelia. Mehemet Ali having conceived the design of adding Syria to his dominions, Ibrahim crossed the Egyptian border with an army in 1831, took Acre by storm, and quickly made himself master of the whole of Syria. When war broke out between Mehemet Ali and the sultan of Turkey in 1839, Ibrahim was again successful, totally routing the Turks in the great battle of Nisib. The interference of the great powers eventually compelled him to return to Egypt, suffering, during his passage through the desert, the most terrible hardships and losses, while the attempt to elevate Egypt to complete independence came to an end. In 1848, when the aged pasha had sunk into dotage, Ibrahim went to Istanbul and was installed viceroy of Egypt.

Ibsen (*ĭb'sĕn*; *ĭp'sĕn*), **Henrik (1828-1906),** Norwegian poet and dramatist, was born at Skien, Norway. He studied medicine, was a chemist's assistant at Grimstad, 1843-50, but soon devoted himself wholly to literature. His first drama, *Catilina,* was a failure; but, after a short period of study at Oslo and nearly two years of journalism, he became director of Ole Bull's Theater at Bergen, for which he wrote five romantic dramas.

In 1857, Ibsen became director of the National Theater in Oslo. His next dramas were *The Warriors in Helgeland, The Pretenders,* and *Love's Comedy.* The first two, reproducing the spirit of the old sagas, placed Ibsen in the foremost rank of Scandinavian dramatists; the last was a precursor of his satirical social dramas. In 1862, the National Theater became bankrupt, and Ibsen, enraged because Norway held aloof from the Danes in their struggle against the Germans, forsook his country. From 1864 to 1891, he lived in Rome, Dresden, and Munich. The Norwegian Parliament granted him a pension in 1866.

In 1866-67 appeared the dramatic poems *Brand* and *Peer Gynt.* There followed *Emperor* and *Galilean, The Pillars of Society, A Doll's House, Ghosts, An Enemy of the People, The Wild Duck, Rosmersholm, The Lady from the Sea, The Master Builder,* and *When We Dead Awaken.*

Ibsen's social dramas mark a new epoch in the development of dramatic art. In swiftness, certainty, and unity of action, in fascinating naturalness of dialogue, and in realistic illusion, these powerful plays are unexcelled in any literature and assure Ibsen a high place among world dramatists. See *Peer Gynt.*

Indy (*ăn'dē'*), **Paul Marie Théodore Vincentd' (1851-1931),** French composer and pianist, was born in Paris. He received his first musical instruction from his mother, and continued study under Diémer and others. After serving in the army during the Franco-Prussian War, he renewed musical study under César Franck. In 1885, he became manager of the National Music Society, of which, upon Franck's death in 1890, he was made president. With Bordes and Guilmant, he established the Schola Cantorum, which became world famous. In 1906, he made a notable tour of the United States and conducted his own works with the Boston Symphony Orchestra.

In composition he became a leader of the new school developed by the pupils of Franck and ranks with Berlioz and Franck as one of the three foremost instrumental masters of modern France. His numerous compositions include symphonic poems, orchestral suites, chamber music, choruses, and works for the piano and organ. He wrote also biographies of César Franck and Beethoven.

Inge (*ĭnj*), **William Ralph (1860-1954),** English theologian, was born at Crayke, Yorkshire. He was educated at Eaton and at King's College, Cambridge. From 1884 to 1888, he was assistant master at Eaton and, from 1889 to 1904, he was fellow and tutor of Hertford College, Oxford. He was professor of divinity at Oxford from 1907 to 1911. From 1911 to 1934 he was dean of Saint Paul's, London. His sermons attracted wide attention by reason of the

originality of thought. They were characterized also by a pessimism which won him the sobriquet of "the gloomy dean." Among his writings are *Society in Rome under the Cæsars, Studies of English Mystics, Truth and Falsehood in Religion, Types of Christian Saintliness, Outspoken Essays, The Platonic Tradition, The Church in the World,* and *Our Present Discontents.*

Ingelow (*ĭn'jĕ-lō*), **Jean** (**1820-1897**), English poet and novelist, was born at Boston, Lincolnshire. A great part of her poetry is of a devotional type, sweet and simple, and filled with beautiful thoughts. Among her noted works is the ballad *The High Tide on the Coast of Lincolnshire* and the larger poem *A Story of Doom.* Her works of fiction are *Off the Skelligs, Fated to Be Free, Sarah de Berenger, Don John, John Jerome, The Suspicious Jackdaw,* and *A Motto Changed.*

Ingersoll (*ĭng'gĕr-sōl*), **Ralph** (**1900-**), American editor and publisher, was born at New Haven, Conn. Educated at Yale and Columbia universities, he worked as a mining engineer from 1921 to 1923, when he began reporting for the New York *American.* He was managing editor of the *New Yorker,* 1925-30, and then was associated with *Time* and *Fortune,* being publisher of these publications from 1937 to 1939. In 1940, he began publication of the New York daily, *P M,* a new departure in journalism in that it carried no advertising and departmentalized all news, which, it was claimed, was thus freed from the economic influence of advertisers. It suspended publication in 1948. Since that time he has been president of the R. J. Company, newspaper investments.

Ingersoll, Robert Green (**1833-1899**), American lawyer, orator, and writer, was born at Dresden, N. Y., the son of a Congregational minister of very broad views. He began the practice of law at Peoria, Ill., in 1857; became colonel of the 11th Illinois cavalry, 1862; was captured and exchanged, after which he resigned and retired to private life. In 1866, he was made attorney general of the state. He was a successful lawyer and a well-known orator, lecturer, and religious controversialist, being best known for his attacks upon the Bible. He published *The Gods, and Other Lectures; Some Mistakes of Moses;* and *Great Speeches.* Died at Dobbs Ferry, N. Y.

Ingres (*ăN'gr'*), **Jean Auguste Dominique** (**1780-1867**), French painter, was born at Montauban. He studied under David and, after taking the *grand prix* in 1801, worked in Rome, 1806-20. At Florence, where he spent four years, he painted "The Vow of Louis XIII." To this period belong his best portraits and his "Œdipus and the Sphinx," "Venus Anadyomene," "Virgil Reading the Æneid," and "Raphael and the Fornarina." His "Apotheosis of Homer," in the Louvre, is considered his finest epic painting. He became the leader of the classicists as opposed to the growing school of the romanticists under the leadership of Delacroix. See *Painting.*

Inman, Henry (**1801-1846**), American portrait painter, was born in Utica, N. Y. Besides making portraits of Chief Justice Marshall and many other distinguished Americans, he visited England and painted portraits of Wordsworth and Macaulay. In 1845, he began a series of historical paintings for the Capitol at Washington, but before completing them he died in New York.

Inness (*ĭn'ĕs*), **George** (**1825-1894**), American painter was born at Newburgh, N. Y.; studied art in New York, France, and Italy. Because of his independent spirit, however, he was little influenced by his teachers and was practically self-taught. Inness is regarded as the foremost painter among American landscape artists, the acknowledged leader of the Hudson River group. His pictures are distinguished for their beauty of color, atmospheric charm, and poetic sentiment. He devoted a powerfully original and distinctly American mind to the creation of his paintings.

Most of Inness's paintings are privately owned, but leading galleries possess representative examples. The finest public exhibit is the Butler Collection, occupying an entire room at the Art Institute, Chicago. In this are "Catskill Mountains," "Home of the Heron," "The Storm," "Millpond," and "After a Summer Shower." The Metropolitan Museum, New York, contains several of his paintings, including "Peace and Plenty," "Autumn Oaks," and "Delaware Valley." In the National Gallery, Washington, are the well-known "Georgia Pines," "Niagara," and "September Afternoon." Inness is represented also in the art museums of Boston, Worcester, Brooklyn, Buffalo, Pittsburgh, Toledo, Saint Louis, and other cities and in many private collections. He died in Scotland.

Inness, George, Jr. (**1854-1926**), American painter of animals and landscapes, was born in Paris, France, son of the preceding. He was a pupil of his father in Rome, 1870-74; studied one year in Paris, 1875; afterward he lived in Boston and New York, where he occupied a studio with his father, 1878. He resided with his family in Montclair, N. J., after 1880, but had a studio in Paris, 1895-99, and exhibited annually at the Paris Salon. In 1913, he formed a connection with the *Century Magazine,* in which his work often appeared.

In the Metropolitan Museum, New York, are his "Shepherd and Sheep" and "First Snow at Cragsmoor." Among his animal pictures are "Surf Horse," "Mother of the Herd," and "Monarch of the Farm." His landscapes "Morning on the River" and "The Coming Storm" resemble his father's work in light and color. His writings include *Life and Letters of George Inness.*

Innocent III (**1161-1216**), pope, was born at Anagni, Italy, son of Count Trasimund, a Roman noble. He was educated at Paris, Rome, and Bologna, and was elected pope in 1198. He aimed to establish the supremacy of papal power in all European affairs; extended the territorial power of the Church; and made nearly all Christendom subject to its sway. He attempted the recovery of Palestine; promoted a crusade against the Albigenses; excommunicated Otto IV, emperor of Germany; put England under an interdict; and deposed King John.

Zealous for the purity as well as the supremacy of the Church, he countenanced every movement that contributed to enhance its influence and to fix firmly its beliefs as well as its forms of worship. He did much to reform and universalize Roman Christianity.

Inonu (*ē-nō-nōō'*), **Ismet** (**1884-**), Turkish general and statesman, was born at Izmir, Asia Minor. Entering the army at an early age, he rose rapidly and was a member of the general staff during the war with Bulgaria in 1913. During World War I he commanded an army corps against the Russians in 1915 and against the British in 1917.

He sided with Kemal when the latter revolted from the sultan, choosing to resist by arms the terms imposed by the allies in the Treaty of Sèvres. Under his leadership, the Turks defeated Greece at Inonu in 1922, and from this victory he received the name by which he was later known. He was premier of Turkey from 1923 to 1937, and was made president on Kemal's death in 1938. In World War II, he resisted all efforts to bring Turkey into the war.

Insull, Samuel (**1859-1938**), American public utility operator, was born in London, Eng., and was educated in English private schools. He came to America in 1881 as the private secretary of Thomas Edison, whose business affairs he managed for many years. In 1892, he was instrumental in organizing the Chicago Edison Company and the Commonwealth Electric Company, consolidated in 1907 as the Commonwealth Edison Company, which supplied the entire city of Chicago with its electricity. Through his rapidly expanding financial interests, Insull took a leading part in improving electric service and in modernizing electric systems through interconnection. The Chicago Opera Company was chiefly indebted to him for its financial backing. Financial difficulties in 1932 brought about the ruin of his fortunes, and he fled to Greece to escape prosecution for alleged misuse of funds. He was returned to the United States in 1934 for trial, and was acquitted.

Ireland, John (**1838-1918**), American Roman Catholic prelate, was born in Burnchurch, County Kilkenny, Ireland. He came to the United States in boyhood; was educated in the Cathedral School, Saint Paul; studied theology in France; and was ordained priest in 1861. He was chaplain of the 5th Minnesota regiment in the Civil War. Subsequently, he became rector of the Cathedral at Saint Paul and later coadjutor bishop. In 1884, he was made bishop and, in 1888, first archbishop of Saint Paul. He was especially active in establishing Roman Catholic colonies in the Northwest, in organizing total abstinence societies, and in establishing the Catholic University of America.

Irene (**c. 752-803**), Byzantine empress, once a poor orphan girl of Athens, Greece. Her beauty and talents drew the attention and the love of the emperor Leo IV, and he married her in 769. After his death, in 780, she ruled as regent during the minority of her son Constantine VI. When her son attained his majority, Irene dethroned him and deprived him of sight.

Confirmed in her title as empress in 792, she ruled in splendor for several years and is said to have aspired to a marriage between herself and Charlemagne. In 802, the patricians, upon whom she had always lavished favors, conspired against her and placed Nicephorus upon the throne. Thereupon she was banished to Lesbos, where she died in 803. Because of her zeal in restoring images and monasteries, the Greek Church counts her among its saints.

Irving, Sir Henry (**1838-1905**), is the stage name of John Henry Brodribb, English actor, born in Keinton-Mandeville, near Glastonbury. He acted at the Theater Royal, Edinburgh, 1856-59, and later for seven years at Manchester. He played in London in 1859, but attracted little notice until his appearance at Saint James's Theater in 1866. He soon established a connection with the Lyceum, of which he became manager in 1878. There he played his chief parts, in conjunction with Ellen Terry, producing

Hamlet, The Merchant of Venice, Faust, Macbeth, Henry VIII, The Bells, and other well-known plays.

Irving first came to the United States in 1883, and made his debut in New York as Mathias in *The Bells.* Subsequently, he made several tours in America. In 1895, he received the honor of knighthood, the first ever accorded an actor. He died in England, and was buried in Westminster Abbey.

Irving, Washington (1783-1859), American author, was born in New York City. He was the youngest son of William Irving, who had emigrated from Scotland and settled in New York as a merchant before the Revolution. Irving, at the age of 16, entered a law office; but he found greater profit from his father's well stocked library. In 1804, he traveled extensively in Europe; in 1806, he returned to New York and contributed a series of genial and humorous essays to a periodical called *Salmagundi.* In 1809, he wrote *A History of New York, from the Beginning of the World to the End of the Dutch Dynasty, by Diedrich Knickerbocker,* a burlesque chronicle written in so quiet a vein of humor that it has sometimes been taken for a veritable history.

Having no inclination for law, Irving engaged in commerce as a silent partner with his brothers, but devoted his time to literature. In 1813, he edited the *Analectic Magazine* in Philadelphia. In 1815, he visited England, where he was warmly welcomed by Campbell, whose biography he had formerly written, and was introduced by him to Walter Scott. In 1819, he published the *Sketch Book,* containing *The Legend of Sleepy Hollow* and *Rip Van Winkle.* He then went to Paris; in 1822, he wrote *Bracebridge Hall* and, in 1824, the *Tales of a Traveler.*

In 1826, at the invitation of Alexander H. Everett, American minister to Spain, Irving accompanied him to Madrid to translate documents connected with the life of Columbus. With these materials he wrote his *History of the Life and Voyages of Columbus, Voyages of the Companions of Columbus, The Conquest of Granada, The Alhambra,* and other works regarding Spain. He was United States minister to Spain, 1842-46.

Irving's *Life of Goldsmith* was published in 1849 and his great work, the *Life of Washington,* was published in 1855-59. The remarkable clearness and purity of his English and the genial spirit in which he handled his themes readily secured the attention of appreciative readers, and won for him a high place among early classic writers of America. He spent the last years of his life at Sunnyside, in his own "Sleepy Hollow," on the Hudson, near Tarrytown. He was elected to the American Hall of Fame, 1910. See *Rip Van Winkle.*

Irwin, Wallace (1875-), American author, was born at Oneida, N. Y. He studied at Leland Stanford University, and entered journalism. He was a special writer on the San Francisco *Examiner,* 1900; was editor of the San Francisco *News Letter,* 1901; and was editor of the *Overland Monthly,* 1902. In 1903, he was burlesque writer for the Republic Theater, San Francisco; in 1904-05, he was writer of topical verse for the New York *Globe,* and, in 1906-07, he was on the staff of *Collier's Weekly.* His numerous writings include *Chinatown Ballads, Letters of a Japanese Schoolboy, Mr. Togo—Maid of All Work, Pilgrims into Folly, Venus in the East, Suffering Husbands, Seed of the Sun, The Golden Bed,* and *Young Wife.*

Irwin, William Henry (1873-1948), best known as Will Irwin, American author and editor, was born at Oneida, New York and was graduated at Leland Stanford University in 1899. His editorial activities were connected chiefly with San Francisco and New York daily newspapers and with *McClure's Magazine* and *Collier's Weekly.* During World War I, he was a war correspondent for the London *Daily Mail* and several American newspapers. He acted on the commission for relief in Belgium and was decorated by the Belgian and the French government for his services. A few of the numerous works from his pen are *The City That Was, The Confessions of a Con Man, A Reporter in Armageddon* and *The Next War.* He edited *Letters to Kermit by Theodore Roosevelt.*

Isabella (1451-1504), queen of Castile, daughter of John II. In 1469 she married Ferdinand V, king of Aragon. On the death of her brother, Henry IV, in 1474, she took possession of the throne of Castile, to the exclusion of Joanna, the true inheritor of the crown. When a union of the kingdoms of Aragon and Castile took place, Ferdinand and Isabella together assumed the royal title of Spain. She was a woman of fine intellect and a wise, humane ruler, was always present during the transaction of state business, and her name was placed beside that of the king in state ordinances. She was a woman of piety, her devotion to the Church leading her to seek to introduce the Inquisition into Castile and to drive out the Jews. She proved also a stanch supporter of Columbus in his search for the western route to India, to finance which project she pledged her jewels.

Isidore (*ĭz'ĭ-dōr*) **of Seville, Saint (c.560-636),** Spanish ecclesiastic, was born at Cartagena, Spain. He was active in the great movement in the Western Church by which the doctrinal and moral system of Christianity was brought into harmony with the habits and institutions of those various races and nationalities which, by successive immigrations and wars, were eventually erected into the Hispano-Gothic kingdom. This kingdom exercised a powerful influence on what is called Latin Christianity.

The episcopate of Isidore, which began in 600, is notable for the half-ecclesiastical, half-civil councils of Seville in 619 and of Toledo in 633. The canons of these councils may be said to have largely formed the basis of the constitutional law of the Spanish kingdoms, both for church and for state, down to the great constitutional changes of the 15th century. Isidore wrote on science, art, history, and theology. Not the least of his accomplishments was the preservation of the remnants of Greek and Roman culture in Spain from the barbarians. A number of encyclopedic works from his pen were much quoted by later scholars and theologians.

Ismail Pasha (*ĭs'mä-ēl'pä-shä'*) **(1830-1895)** khedive of Egypt, was born at Cairo. He succeeded Said Pasha as viceroy of Egypt in 1863, promoted the Suez Canal project, and gained wealth by the cultivation of cotton during the American Civil War. The sultan settled the direct succession in his line in 1866, and his ambition afterward made him master of the upper Nile region. He rebuilt a large part of Cairo, greatly improved Alexandria, and constructed immense public works. Financial disaster coming in 1879, he abdicated in favor of his son, Mohammed Tewfik. After 1888, he lived in Istanbul, where he died.

Isocrates (*ī-sŏk'rä-tēz*) **(436 B.C.-338 B.C.),** Greek orator and teacher, was born in Athens. Among his teachers were Tisias, Gorgias, Theramenes, and Socrates. He was early attracted to the career of an orator and politician, but the possession of a weak voice induced him to abandon his ambition. He then devoted himself to speech writing and to the development of a system of rhetorical education.

He founded a school at Athens which advertised two-year and four-year courses. Its popularity is attested by the fact that it is said to have had, at one time, over 2000 students. The work avoided the more technical subjects and was designed to give the students a liberal education in political and social science. The list of his pupils contains the names of many men who later became famous. The discipline involved the writing of speeches for real or imaginary occasions. Many of Isocrates' own speeches were of this nature and may be regarded as among the earliest political pamphlets. They include the *Panegyricus, Areopagiticus,* the *Panathenaicus,* the *Archidamus,* and the *Antidosis.* His style exhibits a high degree of literary finish and a careful attention to melodious cadence.

Israëls (*ēs'rä-ĕls'*), **Josef (1824-1911),** Dutch painter, was born at Gröningen of Jewish parents. He studied at Amsterdam under Kruseman and at Paris under Picot. His pictures of humble life, particularly of seafaring and fisher folk, won him foremost place among Dutch painters of his century. Like J. F. Millet, he saw in the struggles of the poor and the humble an opportunity to express his deep human sympathy. His works are widely known throughout the world and many are now in the United States.

Among the best-known of Israels' works are "The Cradle," "Shipwrecked Mariner," "Alone in the World," "Toilers of the Sea," "A Son of God's People," "Children of the Sea," and "When One Grows Old." "Expectation," "The Frugal Meal," "The Bashful Suitor," and "Waiting for Papa," in the Metropolitan Museum, New York, are typical examples of his work.

Ito (*ē'tō*), **Hirobumo, Prince (1841-1909),** Japanese statesman, was born in the feudal state of Choshu. After Admiral Perry's visit to Japan in 1854, Ito perceived the necessity of adopting Western ways in order to compete with the West. He visited the United States in 1871 for the purpose of examining the coinage system, and on his return to Japan was successful in establishing a mint at Osaka. He was a member of the Japanese cabinet for many years and was four times premier between 1886 and 1901. He was the chief founder of the constitution of Japan which was promulgated in 1889.

The fruit of Ito's modernization efforts appeared in the abrogation of disadvantageous treaties with Western powers in 1890, the Japanese victory over China in 1895, and the treaty of alliance with England in 1902. After the Russo-Japanese war in 1905, which assured Japan's place in the Orient, Ito was chief administrative official in Korea and, in 1909, was made president of the privy council in Japan. He was assassinated in 1909.

Ivan III (*ē-vän'*; *ī'vən*), **Vasilevitch (1440-1505),** ruler of Russia and regarded as the founder of the Russian empire. He was at first only Grand Duke of Moscow, but succeeded in shaking off entirely the yoke of the Tatars and in subjecting a number of the Russian principalities to his own sway. In 1472, he married Sophia, a niece of Constantine Palæologus, assumed the title of "ruler of all

Russia," and adopted the two-headed eagle of the Byzantine empire.

Ivan IV, Vasilevitch (1530-1584), first czar of Russia, called "the Terrible." He was made Grand Duke of Muscovy on the death of his father and took the government into his hands at the age of 14. Being maltreated by nobles who acquired power, he conceived a hatred for them and favored the merchant class. Having established his ascendancy at the age of 20, he summoned Russia's first general assembly and announced that he would thereafter devote himself to the public good.

In the next ten years Ivan did much for the advancement of his country in arts and commerce as well as for its extension by arms. He subdued Kazan and Astrakhan, and annexed Siberia. He concluded a commercial treaty with Queen Elizabeth of England after the English had discovered the way to Archangel by sea.

In 1560, upset by the loss of his wife and son and of the loyalty of a trusted adviser, Ivan isolated his court from the rest of the country for the purpose of pursuing his own pleasures. On unsupported accusations of disloyalty he destroyed Novgorod and massacred its citizens. In 1581, in a fit of ungovernable rage, he killed his oldest surviving son. Remorse at the enormity of the deed hastened his own death.

Ives (*īvz*), **Frederick Eugene (1856-1937)**, American inventor, was born at Litchfield, Conn. He was educated in the public schools at Litchfield, Norfolk, and Newtown, Conn. While in charge of the photographic laboratory, Cornell University, 1874-78, he worked out the first practically successful process of orthochromatic photography. In 1886, he invented the process of half-tone photoengraving now universally employed. His experiments in color photography culminated in the three-color printing process, now the basis of an important industry.

His more recent inventions include glass sealed spectroscope gratings, the diffraction chromoscope, the universal colorimeter, and a process for producing motion pictures in natural colors.

Ives, Herbert Eugene (1882-), American inventor, son of Frederick E. Ives, was born at Philadelphia. Educated at the University of Pennsylvania and Johns Hopkins University, he was appointed to the United States Bureau of Standards as a physicist in 1908. Turning to the investigation of light, vision, and the measuring of lighting effects, he was employed by electric interests and, beginning in 1919, by the Bell Telephone Laboratories, New York. Here he worked on problems of television and gave, in 1927, the first public demonstration of a scene electrically reproduced for the eye over wire and radio. Besides apparatus for television, he invented an artificial daylight lamp and a process of electrical photoengraving.

Ixtlilxochitl (*ēsh'tlēl-shō'chēt'l*), **Fernando de Alva (c. 1568-1648)**, Mexican antiquary. He was a descendant of the kings of Tezcuco, was interpreter of the native languages to several viceroys of Mexico, and a laborious collector of the ancient manuscripts and traditions of his country. Both Prescott and Lord Kingsborough made use of his writings in the compilations of their histories. Many of his valuable manuscripts are in the archives of Mexico.

Jacks, Lawrence Pearsall (1860-1955), English author and theologian, was born in Nottingham. He was educated at the University of London, Manchester College, Göttingen, and Harvard. He entered the Unitarian ministry and, in 1887, became assistant to Stopford A. Brooke, whose daughter he married in 1889. He became the editor of the *Hibbert Journal* at the time of its founding in 1902. From 1903 to 1931 he was professor of philosophy at Manchester College, Oxford, of which he was also principal, 1915-31. In addition to much editorial work, he has written brilliant articles and sketches, among which are *Mad Shepherds and Other Human Studies*, *The Alchemy of Thought*, *Among the Idolmakers*, *All Men Are Ghosts*, and *The Revolt against Mechanism*. He published *Confessions of an Octogenarian* in 1942.

Jackson, Andrew (1767-1845), seventh president of the United States, was born in Waxhaw settlement, S. C., two years after his father had emigrated from northern Ireland. At the outbreak of the American Revolution, he and his brothers were summoned to the field. Though but 13 years old, he fought under Sumpter and remained with the army until the end of the war.

In 1784, he began the study of law and, in 1788, was appointed solicitor for the western district of North Carolina, now the state of Tennessee. In 1796, he was a member of the convention which modeled the constitution and organized the state of Tennessee, and was elected respectively representative, United States senator, judge of the State Supreme Court, and major general of state militia.

In 1813, at an outbreak of hostilities with the Creek Indians, he raised a volunteer force of 300 men and defeated them. Jackson's final victory on March 27, 1814, broke the power of the Indian race in North America. He was appointed general in the United States army and defended New Orleans against the attack of the British under General Pakenham, January 8, 1815. The result of this action gave General Jackson a great and enduring popularity. After Spain had ceded Florida to the United States, he was made governor of the territory.

Jackson was elected president of the United States by the Democratic party, 1828, and was re-elected by a still larger majority, 1832. His administration was marked by singular firmness against the rising power of the moneyed interests and in favor of the frontiersman and middleclass. He vetoed important measures against large majorities, destroyed the bank of the United States, and took the first steps toward a specie currency and an independent treasury. He retired with undiminished popularity after witnessing the election of his favorite, Martin Van Buren. His administration began the spoils system in American politics. He was elected to the American Hall of Fame in 1910. See *Spoils System*, *Jacksonian Democracy*.

Jackson, Charles Thomas (1805-1880), American scientist, was born at Plymouth, Mass. He was graduated from Harvard Medical College in 1829 and practiced in Boston. He claimed to have indicated as early as 1832 the applicability of electricity to telegraphic communication. He was associated also with the discovery of the anesthetic effects of ether about 1842. After an investigation, the French Academy of Sciences awarded Dr. Jackson 2500 francs for the discovery of the anesthetic effects of ether and Dr. W. T. G. Morton a like amount for the application of ether as an anesthetic in surgical operations. These awards were made, however, as were the conflicting claims of both Jackson and Morton, in ignorance of the actually successful though unpublished use of ether in surgery by Dr. C. W. Long of Georgia in 1842. Dr. Jackson published in 1861 a *Manual of Etherization, with a History of Its Discovery*.

Jackson, Helen Fiske Hunt (1831-1885), American author, was born in Amherst, Mass. Her maiden name was Helen Maria Fiske. She studied at Ipswich Female Seminary, and, in 1852, she married Major E. B. Hunt, who was accidentally killed in 1863. She afterwards married William S. Jackson and lived most of the latter part of her life at Colorado Springs. About 1870, she began to write verses over the signature "H. H.," which soon became familiar to magazine readers. She had always been interested in the welfare of the Indians, and her book *A Century of Dishonor* made her their champion. In 1883, Mrs. Jackson was made a commissioner by the government to look into the condition of the Mission Indians in California. Her last book, *Ramona*, which deals with Indian life, had a wide circulation. She died at San Francisco. See *Ramona*.

Jackson, Robert Houghwout (1892-1954), American lawyer, was born at Spring Creek, Pa. Graduating from Union University, Albany, N. Y., he began practice at Jamestown, N. Y. Because of his ability as counsel, he was made an officer of local transportation companies, a bank, and a telephone company. In 1934, he began the second stage of his career, which lay with the Federal government. General counsel first for the Bureau of Internal Revenue, he was assistant to the attorney general, 1936-38, solicitor-general, 1938-39, and attorney general, 1940-41. In 1940, he was appointed Associate Justice of the United States Supreme Court. In 1945 he was appointed American prosecutor before the Nuremburg war crimes court.

Jackson, Sheldon (1834-1909), American missionary and educator, was born at Minaville, N. Y. He was graduated from Union College in 1855 and from Princeton Theological Seminary in 1858. He engaged in missionary work among the Indians, 1858-64, and organized mission schools in the Northwest from 1869 to 1877. He then began organizing educational work in Alaska, where he was general superintendent of schools until 1900.

Jackson conceived and carried out with government aid the plan of introducing Siberian reindeer for the use of the Eskimo in Alaska. A small herd with Lapp attendants was landed in northern Alaska in 1889. These with their increase and later additions amounted to 5000 in 1903. Stations were established, where the deer were bred and the Eskimos were trained in their care and use so that in 1940 there were over 600,000 reindeer in Alaska. Among Jackson's publications are the *First Annual Report on Education in Alaska* and *Alaska and Missions on the North Pacific Coast*.

Jackson, Thomas Jonathan (1824-1863), better known as "Stonewall Jackson," American general, was born at Clarksburg, W. Va. He was graduated at West Point Academy in 1846, and, after serving with distinction in the Mexican War, he became a professor in the Military Institute at Lexington, Va.

At the outbreak of the Civil War, he was appointed brigadier general in the Confederate service. At the battle of Bull Run, July 1861, his command "stood like a stone

wall"; hence the sobriquet. In September, he received the rank of major general; defeated General Banks at Front Royal, 1862; fought an indecisive battle with Frémont at Cross Keys; commanded a corps in the battles of Gaines's Mill and Malvern Hill; again defeated General Banks, at Cedar mountain; captured Harpers Ferry with 11,000 Federal prisoners; commanded a corps at Antietam; and was made lieutenant general for his services in contributing to the Federal defeat at Fredericksburg. In 1863, by a clever flank movement, he defeated the 11th corps of General Hooker's army at Chancellorsville. On the evening of his victory, he was fired on and fatally wounded by a patrol party of his own men, who mistook him and his staff for a detachment of Union cavalry. He was elected to the American Hall of Fame in 1955.

Jacobi (*jä-kō'bi*; Ger., *yä-kō'bē*), **Abraham (1830-1919)**, physician, was born at Hartum, Germany. He studied at the universities of Greifswald, Göttingen, and Bonn. He became identified with the German revolutionary movement and was held in detention at Berlin and Cologne, 1851-53, on a charge of high treason. He later settled in practice in New York and was professor of diseases of children at New York Medical College, 1860-65, and at New York University, 1865-70. He held a similar chair at the college of physicians and surgeons, Columbia University, for many years. In 1873, he married Mary Putnam, who was a distinguished physician and a pioneer in the movement for the medical education of women in America. He was an editor of *American Journal of Obstetrics and Diseases of Women and Children*, 1868-71, and wrote *Dentition and Its Derangements, The Raising and Education of Abandoned Children in Europe, Infant Diet, Diphtheria*, and, *Intestinal Diseases*.

Jacquard (*zhä'kär'*), **Joseph Marie (1752-1834)**, French inventor, was born at Lyons. He attempted to establish a manufactory for weaving figured fabrics; planned several ingenious improvements in machinery; and brought to perfection the so-called Jacquard loom, an apparatus for figured weaving. Jacquard also invented a machine for weaving nets. For this invention, he received a gold medal in 1804 from the inspectors of Paris. He resided for many years at Lyons, where, for some time, he encountered much opposition from a prejudice against machinery. He received the cross of the Legion of Honor. In 1840, a statue was erected to his memory at Lyons.

Jacque (*zhäk*), **Charles Emile (1813-1894)**, French painter and etcher, was born in Paris. He studied engraving in Antwerp and in London, where he made wood engravings illustrating Shakespeare's works. Upon his return to France, he became a member of the Barbizon group and won great distinction as a sheep painter, paralleling Troyon's success as a cattle painter. His pictures, though small, display fine power of conception, strong, conscientious execution, and marked mastery of sky effects. He became an intimate friend of Millet, under whose influence his work showed continuous improvement. Among his many paintings in the Louvre is his well-known "Flock of Sheep." His work is represented by numerous examples in the Metropolitan Museum, New York, and in other American collections.

Jahn (*yän*), **Friedrich Ludwig (1778-1852)**, known as the "father of gymnastics," was born at Lanz, Germany. In 1811, he started the first gymnasium in Berlin. His system, which was designed to revive patriotism, attracted the Prussian youth, and the training and inspiration thus obtained contributed in no small degree to the subsequent victories of Germany over the Napoleonic armies. In this struggle, Jahn received the command of a volunteer corps. After the peace of 1815, he resumed his teaching and published *Die Deutsche Turnkunst*.

But the gymnasiums began to witness political gatherings too liberal to please the Prussian government, and they were closed in 1818. Jahn was arrested in 1819 and suffered five years' imprisonment. He was elected to the Frankfort National Assembly in 1848.

James, Frank Cyril (1903-), Anglo-American economist and educator, was born in London, England. A graduate of the London School of Economics, he was a clerk in Barclay's Bank, London, until 1923, when he came to the United States and began to teach at the University of Pennsylvania, becoming professor of economics there in 1935. In 1939, he was made professor of political economy at McGill University and the next year was appointed principal of the University. He had acted as economic adviser to the First National Bank, Chicago, and to a number of other banks or associations. Among his published works are *The Economics of Money, Credit and Banking*; *The Road to Revival*; *The Growth of Chicago Banks*; and, in collaboration, *Economic Problems in a Changing World*.

James, Henry (1843-1916), American author, brother of William James, the psychologist, was born in New York. He was educated in France and Switzerland and at Harvard Law School. He began his literary career as a contributor to periodicals in 1866. European society held a fascination for him, which induced him to take up his permanent residence in England. Nearly all his novels have their settings in England or the continent. His characters are typically people of leisure interested in problems of conduct, and James's conscientious and objective delineation of the psychology of such people made him a novelists' novelist rather than a popular writer.

His writings include *A Passionate Pilgrim, Roderick Hudson, The American, The Europeans, Daisy Miller, An International Episode, Diary of a Man of Fifty, The Portrait of a Lady, Tales of Three Cities, The Bostonians, The Aspern Papers, A London Life, The Tragic Muse, The Two Magics, The Soft Side, The Lesson of Balzac, Julia Bride, Finer Grain*, and *Small Boys and Others*. He was a member of the American Academy of Arts and Letters.

James, Marquis (1891-1955), American biographer, was born at Springfield, Mo. He attended Phillips University for a year. From the age of 18, he worked as reporter or editor on a number of mid-western newspapers until 1916, when he became rewrite man for the New York *Tribune*. After World War I, in which he served, he directed publicity for the American Legion and edited its journal until 1932. In 1929, he wrote *The Raven, A Biography of Sam Houston*, which marked him as a biographer combining scholarship with forceful writing. Both this book and *Andrew Jackson—Portrait of a President*, written in 1937, received Pulitzer prize awards as the best biographies of the year. His other works include *A History of the American Legion* and *They Had Their Hour*. Between 1942 and 1954 he wrote several corporation histories in which he used the biographical methods to trace the evolution and interpret the character of some large business organizations. The first of these, *Biography of a Business* (Insurance), was followed by *The Metropolitan Life Insurance Company, The Texas Story* (Oil), and *Biography of a Bank*.

James, William (1842-1910), American psychologist and philosopher, was born in New York. He was educated privately and at Lawrence Scientific School and Harvard Medical School. He was appointed to the faculty of Harvard University as an instructor in comparative anatomy and physiology in 1872, but most of his many years of teaching there were spent as professor of philosophy. Upon the publication of his *Principles of Psychology* in 1890, he became the most influential American psychologist. With this work, psychology became a laboratory science rather than a mental philosophy.

Turning his attention to religion, James brought to the subject a new method; an investigation of religious experiences to discover what could be learned from them as an aid to living.

In philosophy, James made pragmatism a subject of world-wide discussion. Philosophers of every school were obliged to define their attitude to this theory which, taking its origin from a formulation of the logic of science, held that the truth or falsity of any proposition is to be determined by the success or failure of action based upon it.

His writings include *The Will to Believe, and Other Essays in Popular Philosophy*; *Talks to Teachers on Psychology, and to Students on Some of Life's Ideals*; *The Varieties of Religious Experience*; *Pragmatism*; *A Pluralistic Universe*; *The Meaning of Truth*; *Some Problems of Philosophy*; and *Essays on Radical Empiricism*.

James I of England and **VI of Scotland (1566-1625)**, the only son of Mary Queen of Scots and Henry Stuart, Lord Darnley, was born in Edinburgh. When his mother was forced to resign the crown, James was proclaimed king of Scotland, 1567. The training of his childhood was under the care of the Earl of Mar. His tutor was the scholar George Buchanan. In 1578, the Earl of Morton, then regent, was driven from power, and James assumed full control. The new government was unpopular, and Morton was once more made regent, but was at length condemned and executed as one of the murderers of Lord Darnley.

In the winter of 1589, James went to Denmark, where he married Princess Anne, daughter of Frederick II, king of that country. By the death of Elizabeth in 1603, James succeeded to the throne of England. He governed through his favorites Carr and Buckingham, both of them unpopular; and England's prestige as a power, which had been gained under Elizabeth, went into eclipse. The anger of the Roman Catholics toward him because of his severities led to the famous gunpowder plot. One of the most noteworthy achievements in his reign was the production of the so-called King James version of the Bible. The king's learning contrasted with his weakness of character later prompted the application to him of the celebrated descriptive phrase "the wisest fool in Christendom."

James II of England and **VII of Scotland (1633-1701)**, son of Charles I and Henrietta Maria. In 1648, during the Civil war, he made his escape to France. For some time, he served in the French army under Turenne; but, when peace was made with Cromwell, he was obliged

to leave both the army and the territory of Louis XIV. He then entered the military service of Spain. At the Restoration, he was made lord high admiral of England. On the death of Charles II, 1685, James succeeded to the crown without opposition.

On becoming king, he promised to maintain the Church of England and to respect the liberties of the people. Nevertheless, his government was arbitrary and tyrannical; he persecuted the covenanters; subordinated English interests to French; permitted the "bloody assize"; suspended the Test Act; violated the rights of the universities; gave Church offices to Roman Catholics; and, by these and many other acts of despotism, aroused his subjects to attempt his deposition. Leading statesmen invited William of Orange to assume the throne, and James fled to France; his invasion of Ireland in 1689 ended in his defeat by William at the battle of the Boyne, 1690. He again retired to France, and lived at Saint Germain until his death.

James IV of Scotland (1473-1513), son of James III and Margaret of Denmark, became king in 1488. He exhibited great energy and good sense in the management of public affairs, in vindicating the law and punishing crime, in encouraging shipbuilding, and in developing the agriculture and the manufactures of the country. In 1503, the king married Margaret, daughter of Henry VII of England, an alliance which led to the union of the two crowns just 100 years later. Henry VIII came to the English throne in 1509, and ensuing disputes led James to invade England with an army. He was met by the Earl of Surrey, and, in the battle which took place at Flodden, 1513, the king and many of his nobles were killed.

Jameson, Sir Leander Starr (1853-1917), British physician, soldier, and statesman, was born at Edinburgh. He studied medicine at Edinburgh and London, and began practice at Kimberley, South Africa, in 1878. He engaged in pioneer work with Cecil Rhodes and, in 1891, was made administrator of Rhodesia, where he won enormous popularity.

During the troubles at Johannesburg in 1895, between the Uitlanders and the Boer government, Jameson, by order of Rhodes, led a military force to support the Uitlanders. At Doornkoop, they were overpowered by a force of Boers and were compelled to surrender, January 2, 1896. Handed over to the British authorities, Jameson was in May condemned in London to 15 months' imprisonment, but was released in December. In 1900, he was elected to the legislative assembly of Cape Colony and was premier from 1904 to 1908. See *Jameson Raid*.

Jameson, (Margaret) Storm (1897-), English novelist, was born at Whitby. After being graduated from Leeds University, she began work as a writer of advertising copy, but soon devoted most of her time to critical writing and serious fiction. She married Guy Chapman. Her first novel, *The Pitiful Wife*, published in 1924, marked her as a writer of impressive power. Her later works were weighted with a sense of the social, economic, and political problems which went into the making of World War II. They include *Farewell to Youth, Women against Men, Europe to Let*, and *Cousin Honoré*. Her more recent writings include *The Green Man* (1952) and *The Hidden River* (1955).

Jansen (*jăn'sĕn*; Dan., *yăn'sĕn*), **Cornelis (1585-1630)**, sometimes known by the Latinized name of Jansenius, Dutch religious leader, was born at Acquoi, near Leerdam in the Netherlands. He studied at Utrecht, Louvain, and Paris; filled a chair at Bayonne; and, in 1630, became professor of theology at Louvain. In 1636, he was made Bishop of Ypres and shortly afterward completed his great work, the *Augustinus*, which sought to prove that the teaching of Saint Augustine on grace, free will, and predestination was directly opposed to the teaching of the Jesuit schools.

The school of Jansenism, which derived its theological doctrines from Jansen, repudiated the Catholic dogma of the freedom of the will, maintaining that divine grace is irresistible and that Christ died for all. The circulation of the *Augustinus* was prohibited by a decree of the Inquisition in 1641, and, in the following year, it was condemned by Urban VIII in the bull *In eminenti*.

Jastrow (*yăs'trō*), **Joseph (1863-1944)**, American educator, was born at Warsaw, Poland, and was brought in 1866 to the United States. He was graduated at the University of Pennsylvania and at Johns Hopkins University. He was in charge of the psychological section of the World's Columbian Exposition in 1893. In 1903, he became professor of psychology at the University of Wisconsin. He resigned in 1927 to lecture at the New School for Social Research in New York, serving until 1933. As a psychologist, he stressed applications to common life. He wrote *Fact and Fable in Psychology, The Subconscious, Character and Temperament, The Betrayal of Intelligence*, and *The Story of Human Error*.

Jaures (*zhō'rĕs'*), **Auguste Marie Joseph Jean (1859-1914)**, French socialist leader, was born at Castres. Graduating after a brilliant scholastic career at the Ecole Normale Superieure in Paris, he became lecturer at the University of Toulouse. He was elected to Parliament in 1885. An inspiring orator but affiliated with no party, he found his efforts ineffective and returned to his university position in 1886. There he attained a great reputation as lecturer and gradually formulated a socialist philosophy partly Marxian and partly French.

Returning to Parliament in 1893 as a supporter of the working class, he managed to unite the more militant branches of the Socialist party in France and was its undisputed leader during the remainder of his life. He took a leading part in the vindication of Dreyfus. Profoundly disturbed by the threat to the Socialist ideal implicit in the gathering war clouds in early 1914, he sought to create a world-wide solidarity of the working classes to avoid war. On the eve of mobilization of the French army, he was assassinated.

Jay, John (1745-1829), American statesman and jurist, was born in New York City. He was admitted to the bar in 1768. In 1774, as a member of the First Continental Congress, he formed one of the committee of three which drew up the celebrated address to the people of Great Britain. He assisted in framing the New York State constitution; in 1777, was appointed chief justice of New York; and, in the following year, became president of the provincial congress of New York. He next took part in negotiating the treaty of peace entered into at Paris, 1783, between Great Britain and the United States. On his return, he was appointed secretary for foreign affairs and, in 1789, became chief justice of the United States Supreme Court. In 1794, he went on a special mission to England, where he concluded a treaty which met with violent opposition from the Anti-federalist party. He was governor of New York State, 1795-1801.

Jeans, Sir James Hopwood (1877-1946), English mathematician and astronomer, was born in London. Educated at Cambridge University, he later taught there and at Princeton University. From 1919 to 1929, he was secretary of the Royal Society and, in 1923, was a research associate at the Mount Wilson Observatory. From 1934, he served as professor of astronomy in the Royal Institution, London.

His brilliant applications of mathematics to atomic physics and astronomy placed him in the front rank of modern mathematicians. He proved that Laplace's theory of the origin of heavenly bodies was incorrect and laid the mathematical foundation for the gaseous-tidal theory elaborated by Chamberlain and Moulton. Among his works are *Radiation and the Quantum Theory, Astronomy and Cosmogony, The Stars in Their Courses*, and *Science and Music*.

Jebb, Sir Richard Claverhouse (1841-1905), British Hellenic scholar, was born at Dundee, Scotland. He was graduated from Trinity College, Cambridge, and was elected fellow. He took a prominent part in organizing intercollegiate classical lectures and was secretary to the newly founded Cambridge Philological Society. In 1869, he became public orator of Cambridge University; in 1875, was made professor of Greek at Glasgow; and, in 1889, was appointed regius professor of Greek at Cambridge. In 1891, he was elected member of Parliament for Cambridge University. His books include *The Attic Orators, Primer of Greek Literature, Modern Greece, Richard Bentley, Introduction to Homer, Erasmus, Influence of Classical Greek Poetry*, and an edition of Bacchylides' works and of the *Character* of Theophrastus. His greatest work is his translation of Sophocles.

Jeejeebhoy (*jē'jēb-hoi'*), **Sir Jamsetjee (1783-1859)**, Indian merchant and philanthropist, was born in Bombay. At an early age, he manifested great mercantile ability, traveling extensively throughout maritime Asia and visiting Egypt, Syria, and England. At the end of his 20th year in business, he had made a vast fortune for those days and was everywhere acknowledged the leading merchant of the East.

Remembering his own early struggles with poverty, he then began a career of philanthropy throughout India, extending his benevolences to Mohammedans, Hindus, Christians, and Parsis alike. While his known benefactions exceeded $1,000,000, the amount is far less notable than the circumstances and the spirit in which it was given. His broad-minded, nonsectarian philanthropy created a new bond between the communities of India. He was the first native British subject in India to receive the honor of knighthood and a baronetcy. He also became the recognized titular head of the Parsis in India.

Jeffers, Robinson (1887-), American poet, was born in Pittsburgh, Pa. He attended school in France, Switzerland, and Germany, later being graduated from Occidental College, Los Angeles. Receiving a legacy at the age of 25, he took up his residence at Hermosa Beach, Calif., removing later to Carmel, Calif., and devoted himself to the writing of poetry. His themes generally are tragic and his poetry explores searchingly the more unusual

forms of passion. For this reason his work did not appeal to a large audience, but to many critics he appeared to be the most impressive poet whom America had produced. His first volume of verse, *Flagons and Apples*, was published in 1912. It was followed by *Californians*, *Tamar and Other Poems*, *The Women at Point Sur*, *Thurso's Landing*, *Give Your Heart to the Hawks*, and *Such Counsel You Gave Me*. Among his other works are *Media* (1946), *The Double Axe* (1948), and *Hungerfield and Other Poems* (1954).

Jefferson, Thomas (1743-1826), American statesman and third president of the United States, was born at Shadwell, Virginia. At the age of five, he was sent to an elementary school. Four years later, he commenced the study of Latin, Greek, and French, and, in 1760, entered an advanced class at William and Mary College. In 1767, he was admitted to the bar, and he continued the practice of law until the Revolution closed the Courts of Justice.

While he was a student at law, Jefferson heard, in the Virginia House of Delegates, the famous speech of Patrick Henry against the Stamp Act. Animated by the spirit of that great orator, he thereafter stood forth as a champion of independence. In 1769, he was chosen by the people of his county to represent them in the legislature of the province. In January 1772, he married Mrs. Martha Skelton. She brought him a large dowry in lands and slaves about equal in value to his own estate, which was named Monticello, but liberality and generous living left Jefferson insolvent at his death.

Declaration of Independence. In the spring of 1773, he was appointed by the House of Burgesses a member of the "committee of correspondence and inquiry for the dissemination of intelligence between the colonies," the plan of which he had aided in devising. Illness prevented Jefferson from attending the first convention of deputies, in 1774, but he was present at the second convention, in March 1775. This convention then elected delegates to the Continental Congress, where Jefferson took his seat in June. Early in June 1776, a committee to draw up a Declaration of Independence was appointed with Jefferson for its chairman. The instrument itself was written by Jefferson and was adopted, with certain amendments, on July 4, 1776. This Declaration remains his noblest monument.

Political Activities. Jefferson then devoted himself to carrying out radical changes in the laws of his native state. He took his seat in the Virginia house in October 1776, and, on June 1, 1779, he was elected by the legislature to succeed Patrick Henry as governor of Virginia. In 1782, Congress appointed him one of the commissioners to arrange the treaty of peace. He was elected a delegate to Congress in 1783, and, in the next year, he wrote notes on the establishment of a coinage for the United States.

In 1785, Jefferson succeeded Benjamin Franklin as minister at the French court, and he remained at Paris until the latter part of 1789. Soon after his return to the United States, he entered the cabinet of President Washington in March 1790 as secretary of state. Jefferson was democratic by nature and training, strongly opposed to the English political system, a friend to the Revolutionary cause in France, and an unyielding advocate of state sovereignty and decentralization. In nearly all measures he was opposed by Alexander Hamilton, then secretary of the treasury. On December 31, 1793, Jefferson resigned from the cabinet and retired to Monticello.

Presidency. In 1796, Jefferson was supported for the presidency; but John Adams received the highest number of votes, and Jefferson then became vice president. In 1800, he was again nominated for the presidency and was elected. He entered upon the duties of office March 4, 1801. His inaugural address was a lucid and forcible production, explaining his ideas on good government and tending to conciliate all parties. Majorities in both houses of the Seventh Congress enabled the president to carry through many measures not otherwise practicable, and the foreign relations of the United States were managed with consummate skill. The most important event of his administration was the purchase of Louisiana from Napoleon in 1803 for 15 million dollars.

Jefferson was re-elected president in 1804. After the expiration of his second term, March 1809, he retired to Monticello and became interested in the establishment of a system of education for Virginia. Through his instrumentality, the University of Virginia was founded in 1818 and was chartered in the following year with him as its first rector.

Influence. His whole life was consecrated to the improvement and happiness of his fellow men, and he always evinced an intense enthusiasm for knowledge and liberty. As the author of the Declaration of Independence, of the statute of religious freedom in the constitution of Virginia, and as a founder of the Democratic party, Jefferson perhaps exerted a greater influence on the institutions of the United States than any other American except Washington and Alexander Hamilton. See *Declaration of Independence, Monticello.*

Jeffreys, George, Baron (1648-1689), English judge, was born at Acton, Wales. Admitted to the bar in 1668, he rose rapidly, and became, in 1671, common sergeant of the city of London. Hitherto nominally a Puritan, he now began to intrigue for court favor, was made solicitor to the duke of York, was knighted in 1677, and became recorder of London in 1678. He was made chief justice of Chester and king's sergeant in 1680, baronet in 1681, and chief justice of King's Bench Court, 1683.

In state trials, he proved subservient to the crown, thus earning the favor of King James II, who raised him to the peerage in 1685. He was unfair in his rulings in the trial of Algernon Sidney and he condemned Sir Thomas Armstrong to death without trial. Among his earliest trials were those of Titus Oates and Richard Baxter. Later, he was sent to try the followers of Monmouth. Of these, he hanged 320, transported more than 800 to the American plantations, and maimed or fined many others in what came to be known as the "bloody assizes." On the flight of King James, Jeffreys tried to follow his example, but was caught at Wapping, disguised as a sailor, and sent to the Tower, where he died.

Jellicoe (*jĕl'ĭ-kō*), **John Rushworth, Lord (1859-1935)**, British admiral, was educated at Rottingdean and entered the navy in 1872. He served in the bombardment of Alexandria and in the battle of Telel Kebir in 1882. In 1893, as commander, he was wrecked on the ill-fated *Victoria*. From 1898 to 1901, he commanded the naval brigade in China and was seriously wounded when serving as chief of staff to Admiral Seymour in the Peking relief expedition during the Boxer rebellion. He was promoted rear admiral in 1907, commanded the Atlantic fleet, 1910-11, and in 1912 became second sea lord of the admiralty. At the outbreak of World War I, in 1914, he was made commander in chief of the home fleet, and, in 1915, he became admiral.

On May 31, 1916, Jellicoe commanded the grand fleet in the naval battle of Jutland, inflicting such damage on the German fleet that it risked no further engagements during the war. He received the thanks of Parliament together with a grant of £50,000. In 1918, he was created Viscount Jellicoe of Scapa; in 1920-24, he served as governor-general of New Zealand. See *Jutland, Battle of.*

Jelliffe (*jĕl'ĭf*), **Smith Ely (1866-1945)**, American physician, was born in New York. He was graduated at the Brooklyn Polytechnic Institute in 1886 and at the medical department of Columbia University, 1889. He then studied in Europe and, in 1903, became visiting neurologist to the City Hospital, New York. From 1907 to 1912, he was professor of mental diseases at Fordham University. From 1911 to 1917, he was adjunct professor of diseases of the mind and the nervous system at the Postgraduate Hospital and Medical School, New York.

He became widely known as a specialist in mental and nervous diseases, and wrote, translated, or edited many works on medical subjects. Among his writings are *Essentials of Vegetable Pharmacognosy, Morphology and Histology of Plants* and *Outlines of Pharmacognosy*. He revised *Butler's Materia Medica* and *Shaw on Nervous Diseases*. He translated and edited Dubois' *Psychoneuroses*, Payot's *Education of the Will*, Dejerine's *Psychoneuroses and Psychotherapy*, Rank's *Myth of the Birth of the Hero*, and also edited the sections on *Hysteria*, *Tetany*, and *Migraine* in Osler's *System of Medicine*. He was coeditor of *Diseases of the Nervous System, Technique of Psychoanalysis*, and *Modern Treatment of Nervous and Mental Diseases*.

Jenks, Jeremiah Whipple (1856-1929), American economist and educator, was born in Saint Clair, Mich. He was graduated from the University of Michigan in 1878 and, in 1885, received the degree of doctor of philosophy from the University of Halle. He studied law, was admitted to the Michigan bar, and, after teaching various subjects in Mt. Morris College, Knox College, and Indiana University, was professor of political economy, Cornell University, 1891-1912, when he was called to the chair of economics and finance, New York University. In 1917, he was made research professor of government and public administration and also director of the division of Oriental commerce and politics at New York University.

Jenks served as government expert in many investigations of trusts, industrial combinations, labor conditions, currency problems, and internal taxation. In 1912, he was appointed financial adviser to the Chinese republic. His publications include *The Trust Problem*, *Industrial Combinations in Europe*, *The Making of a Nation*, and *Business and the Government*.

Jenner (*jĕn'ĕr*), **Edward (1749-1823)**, English physician, discoverer of vaccination, was born at Berkeley in Gloucestershire. He was apprenticed to a surgeon at Sodbury, and, in 1770, went to London to study under John Hunter. In 1773, he settled at Berkeley, where he acquired a large practice. In 1775, he began to investigate the truth of the traditions respecting cowpox. As a result, he became convinced that a person who has had cowpox is immune

against smallpox. From this, he was led to hope that he would be able "to propagate cowpox from one human being to another, until he had disseminated the practice over all the globe, to the total extinction of smallpox."

Many investigations delayed the actual discovery of the prophylactic power of vaccination, and the crowning experiment was made on May 14, 1796. This experiment was followed by many others. In 1798, Jenner published his *Inquiry into the Causes and Effects of the Variolæ Vaccinæ*. The practice met with violent opposition for a year, when upward of 70 of the principal physicians and surgeons in London signed a declaration of their entire confidence in it.

Jenner's discovery was soon made known throughout the civilized world. Honors were conferred upon him, and he was elected an honorary member of nearly all the learned societies of Europe. Parliament voted him, in 1802, a grant of 10,000 pounds and, in 1807, a second grant of 20,000 pounds.

Jerome (*jĕ-rōm'*; *jĕr'ŏm*), **Saint,** or **Sophronius Eusebius Hieronymus** **(c. 340-420),** was born at Stridon, Dalmatia. He studied Greek and Latin, rhetoric, and philosophy under Ælius Donatus at Rome. He began his theological studies in Trier, but, in the year 370, he settled in Aquileia with his friend Rufinus. In 374, he retired to the desert of Chalcis, where he spent four years in penitential exercises and in study, especially of the Hebrew language.

In 379, Jerome was ordained a priest at Antioch, and, in 380-381, visited Constantinople (now Istanbul), where he formed a friendship with Saint Gregory Nazianzus. He went in 382 to Rome, where he resided until 385, in close association with Pope Damascus, and where, although already engaged in his great work of the revision of the Latin version of the Bible, he attained great popularity and influence by his sanctity, learning, and eloquence.

Many pious persons placed themselves under Jerome's spiritual direction, the most remarkable of whom were Lady Paula and her daughter Eustochium. These ladies followed Jerome to Palestine, where he permanently fixed his residence at Bethlehem in 386. Here Lady Paula founded three convents and a monastery, the latter governed by Jerome himself. The remaining 35 years of his life were spent in the Holy Land, where he engaged in study and writing and in theological controversies with Rufinus and with the Pelagians. He is universally regarded as one of the most learned and eloquent of the Latin fathers.

Jerome, Jerome Klapka **(1858-1927),** English humorist, writer and lecturer, was born at Walsall, Staffordshire. He became a clerk, a schoolmaster, and then an actor. Finally, he devoted himself to writing and entered journalism. He was editor, with Robert Barr, of the *Idler* from 1892 to 1897, and, from 1893 to 1897, was editor of *To-Day*. His numerous writings include *On the Stage and Off, Idle Thoughts of an Idle Fellow, Three Men in a Boat, Susan in Search of a Husband, Passing of the Third Floor Back,* and *All Roads Lead to Calvary.*

Jerome of Prague **(c. 1360-1416),** was born at Prague. He studied at Oxford, became a convert there to Wiclif's doctrines, and zealously taught them after his return home in 1407. The king of Poland employed him to reorganize the University of Krakow in 1410; the king of Hungary invited him to preach before him at Budapest. Jerome entered with his whole soul into the anti-papal movement carried on by his friend John Huss. When Huss was arrested at Constance, Jerome hastened to his side to defend him, but, being refused a safe-conduct, he endeavored to return to Prague. He was arrested in Hirschau in 1415 and was brought back to Constance. He recanted, but withdrew his recantation, was condemned, and burned at the stake.

Jerrold (*jĕr'ŭld*), **Douglas William** **(1803-1857),** English humorist and author, was born at London. In the main, he was self-educated. He served as a midshipman in the royal navy from 1813 to 1815 and, about 1821, produced a successful comedy. He is remembered chiefly for his contributions to *Punch*, with which he was connected from 1841 until his death. His best play is *Black-eyed Susan*, published in 1829. His novels include *St. Giles and St. James* and *The Chronicles of Clovernook*. The most popular of his works, however, is *Mrs. Caudle's Curtain Lectures*, being a collection of contributions to *Punch*. From 1852 to 1857, he edited *Lloyd's Weekly*. He was considered one of the most brilliant wits of his time.

Jessup, Philip C. **(1897-),** jurist, educator, and diplomat, was born in New York City. A graduate of Hamilton College and a student of law at Columbia and Yale, he did not enter law practice immediately, but worked as assistant bank cashier at Utica, New York. Then he became an assistant solicitor in the State Department and, by logical transition, a lecturer on international law. In 1929 he served as assistant to Elihu Root at the conference of jurists at the Permanent Court of International Justice at Geneva. He is professor of international law and diplomacy at Columbia, but since 1947 he has represented the United States on the U. N. Committee on International Law, and acted as deputy for Warren Austin of the U. N. Security Council. A more recent assignment has been that of roving ambassador for the U. S. State Department. In addition to *Elihu Root*, a biography, he has written *International Security*; *Neutrality, Its History, Economics and Law*; *The International Problem of Governing Mankind*; and *A Modern Law of Nations—An Introduction.*

Jessup, Walter Albert **(1877-1944),** American educator, was born at Richmond, Ind. He was graduated at Earlham College in 1903 and received the degree of doctor of philosophy at Columbia University in 1911. Devoting himself to teaching, he was superintendent of schools at Westville, Ind., from 1900 to 1907 and at Madison, Ind., from 1907 to 1909. In 1911, he became dean of the School of Education in the University of Indiana. He was dean of the College of Education in the State University of Iowa, 1913-1916; president of the University, 1916-1934, when he was made president of the Carnegie Foundation for the Advancement of Teaching. He served as member of the survey commissions of the Cleveland and Los Angeles public school systems and of a survey to evaluate secondary education. His writings include *Social Factors Affecting Supervision of Special Subjects* and, in collaboration, *The Supervision of Arithmetic.*

Jewett, Sarah Orne **(1849-1909),** American novelist, was born at South Berwick, Me. She was educated at Berwick Academy, devoted herself to writing, and, in 1869, became a contributor to the *Atlantic Monthly*. Her work is noteworthy for its simplicity and naturalness, and for its accurate and sympathetic portrayal of New England character. Her writings include *Deephaven, Play Days, Old Friends and New, Country By-Ways, A Country Doctor, The Life of Nancy, The Country of the Pointed Firs, The Queen's Twin,* and *The Tory Lover.*

Jimenez (*hē-mā'nāth*), **Juan Ramon** **(1881-),** Spanish poet, was born in Moguer, Huelva Province, Spain, the son of wealthy parents engaged in the wine business who later met with financial ruin. He was educated at the Jesuit school of Puerto de Santa Maria near Cadiz. He took up painting at the age of 15, but suffered a nervous breakdown, and after his recovery turned to literature. His first poems, published in 1898, were *Almas de Violeta* (*Violet Souls*) and *Ninfas* (*Nymphs*). His best-known work is *Platero y Yo* (*Silver and I*) written in 1914. It consists of a series of conversations with a donkey named Silver as they roam the roads of southern Spain.

Señor Jimenez left Spain in 1936 during the Spanish Civil War. He resided for a while in the United States, and in 1951 went to Puerto Rico as visiting professor in the College of Humanities at the University of Puerto Rico. He was living there in 1956 when he received word that he had been awarded the Nobel prize for literature. His Spanish wife, Zenobia, who was also a writer, was born in New York.

Joachim (*yō'ă-kĭm*), **Joseph** **(1831-1907),** Hungarian violinist, was born in Kittsee, near Pressburg. He manifested such talent at the age of five that his father placed him for instruction under the concert master at Budapest, where he made his first public appearance at the age of seven. He entered the Vienna Conservatory in 1841, and, in 1843, when only 12 years of age, appeared with distinction at a concert of Madame Viardot-Garcia in Leipzig. He visited England in 1844, playing with marked success.

Following the advice of Mendelssohn, Joachim then continued to study for some years at Leipzig. From 1849 to 1854, he was concert master at Weimar. He then became concert conductor at Hanover, where he married Amalie Weiss, a noted contralto. He was one of the great violinists of the 19th century and excelled especially in quartet playing. He composed much valuable music for the violin, including the widely known *Hungarian Concerto in D-minor.*

Joan of Arc (*jōn ŭv ärk'*; *jō-ăn'*), or **Jeanne d'Arc, Saint** **(1412-1431),** the maid of Orleans, French national heroine, was born of poor but devout parents, in the village of Domremy, 1412. Her religious faith was ardent almost from her cradle. During the unhappy time of national degradation in which she lived, a prophecy was current in Lorraine that the kingdom lost by a woman—Queen Isabella—should be saved by a virgin, and no doubt this, together with her visions, helped to define her mission in the brooding and enthusiastic mind of the young peasant girl.

Joan put on male dress and a suit of white armor and mounted a black charger, bearing a banner of her own device. Her sword was one that she divined would be found buried behind the altar in the church of Sainte Catherine de Fierbois. Thus equipped she put herself at the head of an army of 6000 men, dictated a letter to the English, and advanced to aid Dunois in the relief of Orleans.

Her arrival fired the fainting hearts of the French with a new enthusiasm, and, on April 29, 1429, she threw herself into the city, where, after ten days of fighting, the English were compelled to raise the siege and retreat. At once the face of the war was changed, the French spirit again awoke, and within a week the enemy were swept from the principal positions on the Loire. But all thoughts of self were lost in devotion to her mission, and now, with resistless enthusiasm, she urged on the weak-hearted Dauphin to his coronation.

On May 24, 1430, with a handful of men, Joan forced her way into Compiegne, which was then besieged by the forces of Burgundy. She was left behind by her men, taken prisoner, and, six months later, was sold to the English by John of Luxemburg. She was carried to Rouen, the headquarters of the English, confined in chains, and at length brought before the Inquisition. She was charged with witchcraft, with cutting off her hair, and with wearing men's clothes. Her trial was long and was disgraced by shameful brutality. Having been condemned to death, she was burned at the stake.

In 1909, Joan was beatified and, in 1920, she was canonized by Benedict XV. Schiller's drama *Die Jungfrau von Orleans* is the noblest of many literary tributes to her character. Among noteworthy recent lives of Saint Joan of Arc are those of Anatole France, Andrew Lang, and Samuel L. Clemens.

Joffre (*zhô'fr'*) **Joseph Jacques Césaire (1852-1931),** French general, was born at Rivesaltes, Pyrenees. He was educated at the College of Perpignan and, in 1868, began to study military engineering at the Ecole Polytechnique. He entered active service in an artillery battery in the Franco-Prussian War, at the close of which he returned to the Ecole Polytechnique. In 1874, he was made captain and assisted in planning the defenses of Pontarlier. After serving with distinction in various parts of the world, he became professor in the higher war school for France, was made brigadier general, and in 1911 was appointed chief of the general staff.

At the outbreak of World War I, in 1914, Joffre became commander in chief of the French army and soon after of the entire Allied armies in France. His first great success was the victory of the Marne, which stopped the German advance and saved Paris from investment. For this he was hailed as "the savior of France," was made field marshal, and was awarded the grand cross of the Legion of Honor.

In 1917, he yielded the command of the armies in the field to General Nivelle and was made adviser of the general staff. In April of the same year, he became a member of the French high commission to confer with the United States in regard to the conduct of the war, in connection with which he made a memorable visit to the United States. Joffre was the first French general since 1870 to be created a marshal of France. See *World War I.*

John (1167-1216), king of England, surnamed Lackland, was the youngest son of Henry II, and the successor, in 1199, of Richard I, his brother. He waged several wars against Philip II of France, who espoused the cause of Arthur, the son of Geoffrey, John's deceased elder brother and the rightful heir to the throne. In 1203, he murdered his nephew Arthur at Rouen, and imprisoned Arthur's sister Eleanor, known as the damsel of Brittany, in Bristol castle.

In 1207, Pope Innocent III appointed Stephen Langton to the archbishopric of Canterbury, but John refused to sanction the nomination; whereupon the pontiff laid England under an interdict in 1208, excommunicated John, absolved the people from their allegiance to the king in 1212, and authorized Philip of France to dethrone him. Terrified at this, John yielded to the pope, and swore that he would hold his kingdom as the pope's vassal, paying an annual tribute.

In 1215, on the demand of his barons, who were headed by Stephen Langton, now Archbishop of Canterbury, he signed the *Magna Charta.* Though John thus accepted the charter, yet he had no intention of being bound by it. He actually procured from the pope a bull annulling the charter, and introduced foreign soldiers to fight against the barons, who immediately offered the throne to Louis, son of Philip of France, an offer which was readily accepted but which led to no result. During his reign, the English lost nearly all their French possessions, even Normandy falling to the crown of France. See *Magna Charta.*

John III, Sobieski (c. 1624-1696), king of Poland. He took part in fighting against the Cossacks and against the Swedes and other invaders, and was foremost in saving the country from ruin. He received the chief command of the army in 1668. In 1672, he defeated the Turks and Tartars, and, in 1673, he again routed the Turks at Khotin. King Michael died in 1673 and Sobieski, present with a large army, was elected his successor in 1674.

In 1683, John went to the rescue of Vienna, which was besieged by an army of 275,000 Turks. The Poles, numbering about one-tenth as many, were joined by a somewhat larger body of German troops. Scarcely had they arrived before Vienna when Sobieski gave the signal for attack, and, after a short struggle, the Turks were completely routed. Sobieski, after a triumphal entry into Vienna, pursued the enemy into Hungary, which was soon restored to the emperor. The last years of his life were embittered by civil as well as by domestic troubles.

John of Austria, or **Don Juan de Austria (c 1547-1578),** natural son of the emperor Charles V, was born at Regensburg. He was early taken to Spain, and, after the death of his father, was acknowledged by his half brother Philip II. In 1570, he was sent with an army against the Moors in Granada, whom he completely expelled from the country. In 1571, with the fleets of Spain, of the Pope, and of Venice, he defeated the Turks in the great sea fight of Lepanto.

In 1573, John took Tunis, and conceived the scheme of forming a kingdom for himself. But Philip, jealous of this design, sent him to Milan, and, in 1576, made him viceroy to the Netherlands. In the Netherlands, he sought to win the favor of the people by mildness. For a time, he was hard pressed by William the Silent, but, with the help of Parma's troops, he won, in 1578, the victory of Gembloux. But Philip now feared he might make himself king of the Netherlands, and Don Juan's death at Namur was not without suspicion of poison.

John of Salisbury (c. 1118-1180), English schoolman, was born at Old Sarum. He studied at Paris and Chartres, and from 1150 lived at Canterbury, meanwhile often visiting Italy as emissary to the Pope from Thomas a Becket, whom he served as secretary. From 1164 to 1170 he took refuge at Reims along with Becket. In 1176, he became bishop of Chartres. He was highly reputed not only as a scholar, but as a poet and orator. His Latin works include over 300 letters, the *Policraticus,* and the *Metalogicus.*

Johnson, Andrew (1808-1875), 17th president of the United States, was born at Raleigh, N. C. He was self-educated, a tailor by trade, and made his entry into politics in 1840 as a presidential elector in Tennessee for Van Buren, the Democratic candidate. In 1841, he was elected to the state senate of Tennessee and, in 1843, became a member of Congress, where for ten years he supported the policy of the Democratic party. In 1853, he was elected governor of Tennessee and he was re-elected in 1855. In 1857, he was elected to the United States Senate, in which he advocated the Union policy of the Republican party.

On the occupation of Nashville by the Federals in 1862, he was appointed by President Lincoln military governor of Tennessee. In this office he gave such satisfaction to the North that in 1864 he was nominated and elected by the Republican party for the office of vice president on the ticket with President Lincoln, who was elected for a second term. On April 14, 1865, by the assassination of President Lincoln, he succeeded to the presidency. Some indiscreet and violent speeches turned the tide against him, and in the Congressional elections his opponents triumphed by increased majorities. His vetoes were generally nullified by the two-thirds vote of both houses.

In 1867, Johnson suspended Stanton, secretary of war, who was reinstated by the Senate the following year. An attempt to gain possession of the war department during this quarrel led, in 1868, to the impeachment of the president, but the two-thirds vote necessary to convict lacked one vote. The Constitutional right of the president, for which Johnson contended, was upheld by decision of the Supreme Court in 1926. Johnson's term of office expired in 1869. He was elected United States Senator in 1875 and died the same year.

Johnson, Eastman (1824-1906), American artist, was born in Lovell, Me. He studied in the Royal Academy at Düsseldorf, at The Hague, and in Paris. Among his best-known pictures are "The Savoyard," "The Card Players," "Spanish Woman," "Old Stage Coach," "Milton Dictating to His Daughters," "Old Kentucky Home" in the New York Public Library, "Corn Husking at Nantucket" in the Metropolitan Museum, New York, "Boyhood of Abraham Lincoln" in the University of Michigan, and numerous portraits of eminent Americans, including Daniel Webster, J. Q. Adams, Grover Cleveland, and Benjamin Harrison.

Johnson, Emory Richard (1864-1950), American economist and educator, was born at Waupun, Wis. He was educated at the University of Wisconsin and the University of Pennsylvania. After teaching economics in Haverford College for three years, he was made, in 1896, professor of transportation and commerce in the University of Pennsylvania. During 1919-33, he was also dean of the Wharton School of Finance and Commerce.

He was expert on transportation for the United States Industrial Commission, 1899, and was a member of the United States Isthmian Canal Commission from 1899 to 1904. In 1911, he was appointed expert by President Taft to report on Panama Canal traffic, tolls, and measurement

of vessels. In 1918-19, he was rate expert for the United States shipping board, and, in 1919-21, he was transportation expert for the United States Chamber of Commerce.

His extensive writings include *Inland Waterways* and *Government Regulation of Transportation*.

Johnson, George (1889-1944), clergyman and educator, was born at Toledo, Ohio. He studied at St. John's University, Toledo, St. Bernard's Seminary at Rochester, and the North American College at Rome. From 1919 to 1921 he was Diocesan superintendent of schools at Toledo; he then joined the faculty of the Catholic University of America. As editor of the *National Catholic Educational Review* and as a speaker before groups of students and teachers, he exerted a powerful influence on the educational thinking of his time. For several years he was director of the Department of Education of the National Catholic Welfare Conference and of the Commission on American Citizenship. He served on advisory committees under presidents Hoover and Roosevelt, and, during World War II, on the Advisory Committee on Education of the joint Army and Navy Committee on Welfare and Recreation. He was co-author, with Dr. Robert J. Slavin, of *Better Men for Better Times*. During an address to the graduates of Trinity College on June 5, 1944, he collapsed and died.

Johnson, Hiram Warren (1866-1945), American politician, was born at Sacramento, Cal. After working as a shorthand reporter, he studied law. In 1888, he was admitted to the bar. He began practice in Sacramento but, in 1902, removed to San Francisco.

In 1911, on a platform designed to free the state of undue corporate influences, Johnson was elected governor of California. During his term, he was influential in securing the adoption of more than 20 amendments to the state constitution. In 1912, he was nominated for vice president of the United States on the Progressive ticket. In 1915, he was re-elected governor, but resigned the governorship in 1917 to become a member of the United States Senate. In 1920 and 1924, he was a prominent candidate for the presidential nomination on the Republican ticket. In 1940, he was returned to the Senate on both Republican and Democratic tickets.

Johnson, Martin Elmer (1844-1937), American motion picture explorer, was born at Rockford, Ill. After a public school education, he began extensive travels and circled the earth six times. His wife, Osa Leighty, whom he married in 1910, accompanied him. In 1929, he completed a five-year project of making motion picture records of the vanishing wild life of Africa for the American Museum of Natural History. In 1929 he returned to Africa to study the pygmy life in the Belgian Congo. He later went to Borneo, returning to America in 1936. While on a lecture tour in 1937 he was killed in a plane crash near Los Angeles. His wife later wrote an account of their work in *I Married Adventure*. She died in 1953.

Johnson, Reverdy (1796-1876), American lawyer and politician, was born at Annapolis, Md. He was educated at Saint John's College, Annapolis, studied law with his father, and was admitted to the bar in 1815. He began to practice in Upper Marlboro, and, in 1817, removed to Baltimore. From 1821 until 1825 he was a state senator. From 1845 to 1849 he sat in the United States Senate as a Whig. He was attorney general in President Taylor's cabinet. In 1856, he united with the Democrats, and supported the administration of James Buchanan. He again entered the United States Senate in 1863, and, after the Civil War, argued in favor of the prompt readmission of the Southern states. In 1868-69, he was minister to Great Britain.

Johnson, Richard Mentor (1781-1850), American legislator, was born at Bryants Station, Ky. He was educated at Transylvania University, studied law, and began practice. He was elected to the state legislature in 1805 and to Congress for three terms, 1807-13. In the War of 1812, he raised two regiments of riflemen and served under General Harrison in the Canadian campaign. According to tradition, he shot and killed Tecumseh at the battle of the Thames, October 5, 1813. He re-entered the lower house of Congress in 1814, and, in 1819, he was elected to the Senate, where he served until 1829, when he again became representative, serving until 1837. He was candidate for vice president on the ticket with Van Buren and was finally chosen vice president for the term 1837-41 after the election had been thrown into the Senate.

Johnson, Robert Underwood (1853-1937), American editor and poet, was born in Washington, D. C. He was graduated from Earlham College in 1871 and joined the staff of the *Century Magazine* in 1873. He was made associate editor in 1881, and was editor, succeeding R. W. Gilder, from 1909 to 1913. Aside from his literary works, he became known for his activities in behalf of the international copyright. With C. C. Buel he edited *Battles and Leaders of the Civil War*. In 1908, he was elected member of the American Academy of Arts and Letters, of which he became permanent secretary. He published several small volumes of poems, among them *The Winter Hour and Other Poems*, *Songs of Liberty and Other Poems*, and *Saint Gaudens: An Ode*, all of which have been collected in one volume. He was ambassador to Italy in 1920-21.

Johnson, Dr. Samuel (1709-1784), English writer and lexicographer, was born at Lichfield, where his father was a bookseller. He was educated partly at Lichfield and partly at Stourbridge, and entered Pembroke College, Oxford, 1728. Here he remained for three years, but, owing to lack of money, was compelled to leave the University without a degree.

In 1731, his father died, greatly involved in debt; and, in order to earn a living, Johnson became usher in a school in Market Bosworth, Leicestershire. He was next employed in Birmingham in translating for a bookseller. Here, in 1735, he married the widow of a Birmingham mercer, 20 years his senior, who brought him a fortune of £600. Relying upon this capital, he opened a classical boarding school, but procured only three pupils, one of whom was the celebrated David Garrick.

Disappointed in this enterprise, he started in company with Garrick for London. In 1737, they reached the metropolis, where Johnson was employed by Cave, the founder and proprietor of the *Gentleman's Magazine*. In 1738, his poem *London*, an imitation of the third satire of Juvenal, was published and attracted some notice. From 1740 to 1743, he wrote the Parliamentary debates for the *Gentleman's Magazine*.

In 1747, Johnson issued the prospectus of his *English Dictionary*, for which he was to receive £1575. In 1750, he commenced his amusing periodical, *The Rambler*, and, in 1755, his great *Dictionary* appeared. On the death of his mother, in 1759, Johnson wrote the story of *Rasselas* to pay her funeral expenses. In 1762, a pension of £300 per annum was granted to him by the king, and subsequently he received the title of doctor of laws from the Universities of Dublin and Oxford. In 1781, he published *Lives of the Poets*. Boswell's *Life of Johnson*, regarded as one of the greatest of all biographies, appeared in 1791. See *Rasselas*.

Johnston, Albert Sidney (1803-1862), American general, was born in Washington, Mason County, Ky. He was graduated at West Point, 1826. In 1837, he superseded General Houston as commander in chief of the Texan army. He next became Texan war secretary, and served as a colonel of American regulars during the Mexican War. In 1857, he commanded the expedition sent against the Mormons in Utah. Upon the outbreak of the Civil War, in 1861, he was made military commander of the department of Kentucky and Tennessee by the Confederate government. After the surrender of Fort Donelson, he formed a junction with the army of General Beauregard and fell in the battle of Shiloh.

Johnston, Joseph Eggleston (1807-1891), American soldier, was born at Farmville, Va. He was graduated at West Point in the same class with Robert E. Lee, 1829. Entering the army, he served in the Black Hawk War and in the Seminole War. In the Mexican War he won promotion for distinguished conduct at Cerro Gordo and Chapultepec. On the outbreak of the Civil War, he joined the army of the Confederacy as brigadier general, and became one of its most distinguished commanders. With Beauregard he won the battle of Manassas, called also the first battle of Bull Run, in 1861. In 1862, he commanded against McClellan in the peninsular campaign and was severely wounded at Fair Oaks.

After Bragg's defeat at Chattanooga in November 1863, Johnston was made commander of the entire army of the Southwest. He skillfully opposed Sherman at Dalton, Resaca, and Kenesaw Mountain. During the defense of Atlanta he was superseded by Hood but was later selected by Lee to concentrate all available forces against Sherman. After learning of the surrender at Appomattox, he capitulated to Sherman at Durhams Station, N. C., April 26, 1865.

After the war Johnston engaged in railway, express, and insurance management, was elected to Congress in 1876, and, in 1885, was made United States Railway Commissioner by President Cleveland.

Jókai (*yō'kŏ-ē*), **Maurus (1825-1904),** Hungarian novelist, was born at Komorn, Hungary. He published his first book in 1845 and took part, as a journalist, in the revolution of 1848. In 1863, he entered the Hungarian Parliament, and during his long career there was one of the principal supporters of Koloman Tisza, 1875-90. His novels include *Timar's Two Worlds*, *Black Diamonds*, *The Romance of the Coming Century*, *Pretty Michal*, *The Lion of Janina*, *A Christian but a Roman*, *The Baron's Sons*, and *Tales from Jókai*. His works are written in brilliant style and afford an intimate view of the political and social life of Hungary during the 19th century. Many of his novels have been translated into other languages.

Joliet (*jō'lĭ-ĕt*; Fr., *zhô'lyā'*), **Louis (1645-1700),** French-Canadian explorer, was born at Quebec. He studied for the priesthood at the Jesuit College, Quebec. He abandoned

this intention, however, and spent some years as an Indian trader, thus getting a knowledge of the languages and the geography of the West. With Marquette he was selected to explore the western country and to push through to the Mississippi. They started West in May 1673, reaching the Mississippi at the mouth of the Wisconsin in June. They floated down the Mississippi, passing the mouths of the Missouri and the Ohio, and going far enough to be sure that the river flows into the Gulf of Mexico. Joliet upset his canoe on his way back, losing all his maps and papers, so that the only accurate report of the expedition was Marquette's. Joliet was given the seigniory of Anticosti Island in 1680, and, in 1697, that of Joliette.

Joliot, Frédéric (**1900-**), French physicist, was born in Paris. With his wife, Irène Curie (1897-1956), and her parents, Pierre and Marie Curie, discoverers of radium, he belonged to a group of four related persons who attained to the highest distinction in the science of radioactivity. Joliot studied at the Paris Radium Institute under Marie Curie, where he met her daughter, Irène, and married her in 1930. Working together, Joliot and his wife discovered a new and more effective way of transforming one element into others through displacement of the component parts of atoms. For this work they received jointly the Nobel prize in chemistry for 1935. A year previously Joliot had been appointed to a chair in the Sorbonne and his wife succeeded her mother, Marie Curie, as director of the radium institute.

Jolly (*yōl'lē*), **Philipp von** (**1809-1884**), German physicist, was born at Mannheim. He was educated at the Universities of Heidelberg, Vienna, and Berlin. He became an instructor at the University of Heidelberg in 1834, and was made professor in 1839. In 1854, he was called to the chair of physics in the University of Munich. He invented many valuable scientific instruments, including the air thermometer, the Jolly, or spring, balance for specific-gravity determinations, the copper eudiometer, and the mercury air pump. He investigated osmosis, the expansion of gases, and the mass and density of the earth.

Jomini (*zhô'mē'nē'*), **Henri, Baron** (**1779-1869**), soldier and military writer, was born at Payerne, Switzerland. When very young he entered the Swiss guard of Louis XVI, but, when it was disbanded, he returned to his own country and, before he was 20 years old, was made head of the war department. In 1803, he went to Paris and became aide-de-camp to Ney, who recommended him to the emperor. In 1809, he quarreled with Ney in Spain and went back to Switzerland.

In 1812, Jomini was invited by Napoleon to join the campaign against Russia and was appointed historian of the grand army. When the cause of Napoleon was almost lost, he went over to the allies in resentment at an affront. Napoleon bore him no ill-will for this course, saying, "He was not a Frenchman, and there was no love of country to retain him." The emperor of Russia made him his aide and lieutenant general, and he served in the war against Turkey. He is known chiefly by his works on military history and the art of war.

Jones, Sir Harold Spencer (**1890-**), eminent English astronomer and author of several popular books which discuss the possibility of life on other worlds, was born in Kensington, London. He was a brilliant scholar at Cambridge. Sir Harold served a distinguished career as English Astronomer Royal at the Royal Observatory at Greenwich from 1933 until his retirement in 1955. He was knighted in 1943. He is a member of an imposing list of international scientific associations and is the author of *Worlds Without End* (1935) and *Life on Other Worlds* (1940).

Jones, Henry Arthur (**1851-1929**), English dramatic author, was born at Grandborough. He attended Winslow School, but was thrown on his own resources at 13. Later he engaged in business and became a commercial traveler. Becoming interested in the drama, he produced his first play, *Only 'Round the Corner*, in 1878, and, in 1882, in collaboration with Henry Herman, the widely known melodrama *The Silver King*, which continued to be played at intervals for a quarter of a century.

His play entitled *Saints and Sinners*, which appeared in 1884, was warmly praised by Matthew Arnold. This was the first of a series of more than 50 social dramas, which have been widely successful in the English-speaking world. Among these are some of the finest recent character plays. His work throughout is characterized by a keen sense of humor and excellent dramatic construction. Among his many plays are *The Middleman, Judah, The Dancing Girl, The Tempter, The Physician, The Liars, The Hypocrites, The Evangelist, Mary Goes First, Cock o' the Walk*, and *The Pacifists*.

Jones, Inigo (**1573-1652**), English architect, was born in London. In his youth his talent for drawing attracted the notice of the earls of Arundel and Pembroke; the latter enabled him to visit Italy to study landscape painting. At Venice his attention was drawn to the works of Palladio. These awoke in him a passion for architecture, to which his attention was thenceforward wholly directed. In 1620, he was named one of the commissioners for repairing Saint Paul's Cathedral, and, in 1622, he completed the banqueting house at Whitehall. He introduced a new monumental style of design into English architecture, and was long considered the foremost architect of England. He wrote a book on *Stonehenge*.

Jones, Jesse Holman (**1874-1956**), American banker and administrator, was born in Robertson County, Tenn. Educated in the public schools, he engaged in the lumber business in Dallas, Texas, and soon began constructing houses on a large scale. He organized the Bankers Mortgage Company to assist the financing of these and other projects. He was called to Washington, D. C., in 1933 to take the chairmanship of the Reconstruction Finance Corporation, which, under his direction, placed government loans of more than 7 billion dollars. When this corporation was later made part of the Federal loan agency and placed in the Department of Commerce, Jones was made in 1940, Secretary of Commerce. He resigned in 1945 at President Roosevelt's request.

Jones, John Paul (**1747-1792**), American naval commander, was born in Kirkcudbrightshire, Scotland. His original name was John Paul. He became a sailor, was for a short time engaged in the slave trade, and afterward settled in Virginia, assuming the name of Jones. He ardently embraced the cause of the American colonies. When Congress, in 1775, resolved to fit out a naval force, he offered his services. Visiting the British coast in a brig of 18 guns, he performed some remarkably bold exploits, and took advantage of his familiarity with the scenes of his boyhood to make a hostile visit to the shores of the Solway firth.

In 1779, Jones was appointed to the command of a squadron of five vessels, three American and two French, and again visited the British coasts, causing great alarm and taking some prizes. Off Flamborough he fell in with a fleet of 41 British merchantmen, convoyed by the 40-gun *Serapis* and the 20-gun *Countess of Scarborough*. Jones lashed his *Bon Homme Richard* to the *Serapis* and after three hours of desperate fighting, compelled her surrender, after which, his own ship sinking, he transferred his crew to the *Serapis*.

In 1788, he accepted an appointment in the Russian service and took an active part in the Turkish war, but soon left the service. He died at Paris. After a long search instituted by General Horace Porter, American ambassador to France, his burial place was discovered, 1905, in the old Saint Louis cemetery in Paris. In 1906, his body was conveyed by a United States squadron to Annapolis, Md., where it was buried with naval honors. He was elected to the American Hall of Fame in 1925.

Jones, Robert Edmond (**1887-**), American stage designer, was born at Milton, N. H. Graduating from Harvard University in 1910, he began designing scenery for theaters in New York City. His work was marked by bold originality and proved highly influential in the art of stage design in America. Among the well known productions for which he conceived and executed the settings were Shakespeare's *Richard III*, *Macbeth*, and *Hamlet*, O'Neill's *Desire under the Elms*, and John Alden Carpenter's *Birthday of the Infanta* for the Chicago Opera Association. With Kenneth MacGowan, he wrote *Continental Stagecraft* and *Drawings for the Theatre*. He began designing for color films in 1933, one of his first being *Becky Sharp*.

Jones, Wesley Livsey (**1863-1932**), American politician, was born at Bethany, Ill. He was graduated at Southern Illinois College in 1886, studied law, and was admitted to the bar. In 1889, he went to the Territory of Washington, shortly before its admission as a state. He settled at North Yakima and, in 1890, began the practice of law. In 1917, he removed to Seattle. From early youth he took great interest in political matters. He was a speaker in Illinois in the Blaine campaign of 1884 and in the Harrison campaign of 1888. After his removal to the Pacific Northwest, he participated actively in public affairs. He was member of Congress from 1899 to 1909, when he was chosen United States senator for the state of Washington. He was re-elected for terms extending from 1915 to 1933.

Jones, Sir William (**1746-1794**), English Oriental scholar, was born at London and was educated at Oxford University. In 1783, he was made a judge of the supreme court in India, where he had opportunity to translate extensively from Hindu and Mohammedan literature. He founded the royal Asiatic Society and did more perhaps than any other English scholar to make known Oriental culture to the Western world. On his death, the East India Company erected a monument to his memory in Saint Paul's Cathedral.

Jonson, Benjamin, or **Ben** (**c. 1573-1637**), English dramatist, was born probably at Westminster, and was educated at Westminster School. After serving in the English army against Spain in the Netherlands, he returned to

England in 1592 and devoted himself to writing. The first piece that brought him into prominence was *Every Man in His Humor*, produced in 1598. The best of his subsequent productions are *Volpone, or the Fox*; *The Silent Woman*; and *The Alchemist*. He also composed two tragedies, *Sejanus* and *Catiline*. His *Masques*, written for the courts of James and Charles, are very graceful. In his dramas he sought to adapt the spirit of ancient comedy to a setting of contemporary life. Jonson was the intimate friend of many of the poets of the time, including Shakespeare. His tombstone in Westminster Abbey bears the inscription, "O rare Ben Jonson." See *Alchemist, The*.

Jordaens (*yôr'dănz*), **Jakob (1593-1678)**, Flemish painter, was born at Antwerp. He ranks next to Van Dyck among the pupils of Rubens. He excelled in humorous scenes of Flemish life; also painted scriptural and mythological subjects. Among his works are "Jupiter and Mercury." "The Adoration of the Shepherds," and many other religious and mythological paintings. In the Metropolitan Museum, New York, are his "Holy Family" and "The Philosophers."

Jordan, David Starr (1851-1931), American zoologist and educator, was born at Gainesville, N. Y. He was educated at Cornell University, Indiana Medical College and Butler University. In 1879, he became professor of zoology in the University of Indiana, of which he was president, 1885-91. From 1891 to 1913, he was president of Stanford University, of which he was chancellor from 1913 to 1916.

In zoology he specialized in the study of fishes and became prominent as an ichthyologist. For many years he was assistant to the United States Fish Commission. In 1903-04, he conducted the salmon investigation in Alaska and, in 1906-09, was International Fish Commissioner for the United States and Canada. His extensive zoological writings include *A Guide to the Study of Fishes*, *Footnotes to Evolution*, and *Animal Life*.

In 1910, he was made director of the World Peace Foundation and became active in opposing the war system of the world. Among his writings in this connection are *War and the Breed, War and Waste, World Peace and the College Man*, and *Ways to Lasting Peace*. He wrote also *The Stability of the Truth, The Religion of a Sensible American, Democracy and World Relations, Eric's Book of Beasts* (for children), and *The Days of a Man* (autobiography).

Joseph II (1741-1790), emperor of Germany, son of Francis I and Maria Theresa. In 1764, he was elected king of the Romans, and, after his father's death in 1765, emperor of Germany; but until his mother's death his power was limited to the command of the army and the direction of foreign affairs. He acquired Galacia, Lodomeria, and Zips, at the first partition of Poland in 1772. In 1780, he appropriated a great part of Passau and Salzburg.

As soon as he found himself in full possession of the government of Austria, he declared himself independent of the pope, and prohibited the publication of any new papal bulls without his approval. He suppressed 700 convents, reduced the number of the regular clergy from 63,000 to 27,000, prohibited papal dispensations as to marriage, and, in 1781, published the edict of toleration for Protestants and Greeks. He also abolished serfdom, reorganized taxation, and curtailed the feudal privileges of the nobles.

Josephine, Marie Josèphe Rose Tascher de la Pagerie (1763-1814), first empress of the French, was born in Martinique. She married first the Vicomte de Beauharnais, by whom she became mother of Eugene Beauharnais and of Hortense, mother of Napoleon III. Her husband perished during the reign of terror, and she married, in 1796, Napoleon Bonaparte, the newly appointed commander in chief of the army in Italy. Sharing her husband's fortunes, she became in time the occupant of an imperial throne, which she adorned by her beauty, grace, and womanly virtues. But, she failed to produce an heir to the new monarchy, Napoleon divorced her, and she retired into privacy at her château of Malmaison.

Josephus (*jō-sē'fŭs*), **Flavius (37 A. D.-c. 100)**, Jewish historian of priestly descent, was born at Jerusalem. He took part in the revolt of the Jews against the Romans, 66-73, and served as one of the Jewish generals. He was taken prisoner by Vespasian, by whom, however, and by Vespasian's successors, Titus and Comitian, he was treated with great favor. As a dependent of the Flavian family, he assumed the name of Flavius. His *Antiquities of the Jews* gives an account of Jewish history from the creation of the world to 66 A.D. A passage in this work relating to Jesus Christ is now believed to be spurious. His other works are a *History of the Jewish War* and an *Autobiography*.

Joule (*joul*), **James Prescott (1818-1889)**, English physicist, was born at Salford. He was a pupil of Dalton and devoted his time to physical and chemical research. He made discoveries in connection with the production of heat by voltaic electricity, demonstrated the equivalence of heat and energy, and established on experimental grounds the doctrine of the conservation of energy. The electrical unit of work, the joule, is named for him.

Jowett (*jou'ĕt*), **Benjamin (1817-1893)**, English classical scholar, was born at Camberwell. He was a fellow and tutor of Baliol College, Oxford, and was elected master in 1870. In 1882, he was appointed vice chancellor of the University. He wrote *On the Interpretation of Scripture*, a commentary on certain epistles of Saint Paul; but he achieved his greatest literary successes by his translation of Plato's *Dialogues*, the *History* of Thucydides, and the *Politics* of Aristotle.

Jowett, John Henry (1864-1923), English clergyman, was born in Halifax, England. He was educated at the Universities of Edinburgh and Oxford and entered the Congregational ministry. From 1890 to 1895, he was pastor at Newcastle on Tyne and from 1895 to 1911 at Birmingham. In 1911, he became pastor of the Fifth Avenue Presbyterian Church of New York City, serving until 1918, when he returned to England and was minister of Westminster chapel until 1922. He was one of the best known preachers of his day. The materials from many of his sermons appeared in his books, which include *Thirsting for the Springs*, *The High Calling*, *Our Blessed Dead*, *Things That Matter Most*, and *The Friend on the Road*.

Joyce, James (1882-1941), Irish novelist and poet, was born at Dublin. Educated at University College, Dublin, he published, in 1907, *Chamber Music*, a small volume of poems, many of which have been set to music. *Dubliners*, tales of personalities in Dublin, and *A Portrait of the Artist as a Young Man*, an autobiographical novel, revealed Joyce as a writer of the first order.

Leaving Ireland, he resided in Italy, Switzerland, and France, devoting seven years to the production of *Ulysses*, published in 1922. This novel, a stream-of-consciousness, psychological study of a man and his wife during one day of life, produced a sensation in the literary world. Couched in expressive but often difficult language forms and complicated by the author's erudition, it expressed the thoughts of the characters with a freedom of inhibition unexampled in English literature. Its influence on other authors was widely felt. He wrote also the play *Exiles*, the volume of verse *Pomes Penyeach*, and *Finnegans Wake*, a novel.

Juárez (*hwä'rās*), **Benito Pablo (1806-1872)**, Mexican politician, was born in Oaxaca, of Indian parents. He became an advocate, and was governor of his native state, 1847-52. Exiled by Santa Ana in 1853, he returned two years later, and, in 1857, was elected president of the Supreme Court. In 1858, he assumed the office of chief executive, but was compelled to retire to Vera Cruz, whence he issued decrees abolishing religious orders and confiscating church property. In 1861, he entered the capital and was elected president for four years.

In 1862, Napoleon III, the emperor of France, declared war against Juárez, who retreated to the northern frontier. By the aid of French troops, Maximilian, archduke of Austria, was installed as emperor of Mexico. Following the complete withdrawal of the French forces at the demand of the United States, Maximilian, in 1867, was captured and shot. Juárez immediately re-entered Mexico City. He was again chosen president and, in 1871, was re-elected.

Judd, Charles Hubbard (1873-1946), American psychologist and educator, was born at Bareilly, British India, and came to America in 1879. He was graduated from Wesleyan University in 1894 and received the degree of doctor of philosophy from the University of Leipzig in 1896. After serving as instructor in philosophy at Wesleyan University, 1896-98, he was professor of psychology successively at New York University, at the University of Cincinnati, and at Yale University. In 1909, he became professor of education at the University of Chicago, and was made director of its School of Education. He served until 1938, then becoming consultant for the National Youth Administration and the War Department.

His writings on psychology and education include *Genetic Psychology for Teachers*, *Psychology—General Introduction*, *Psychology of High School Subjects*, *Measuring the Work of the Public Schools*, *Introduction to the Scientific Study of Education*, *Evolution of a Democratic School System*, and *Education and Social Progress*.

Judd, Orange (1822-1892), American agricultural journalist, was born at Niagara Falls, N. Y. He was graduated at Wesleyan University in 1847. From 1853 to 1883, he was editor of the *American Agriculturist*. From 1855 to 1863, he edited the agricultural department of the New York *Times*. In 1883, he assumed editorship of the *Prairie Farmer* and, in 1888, became editor of the *Orange Judd Farmer*. By his efforts and financial support, he secured in 1875 the establishment of the first State Agricultural Experiment Station. This was located in the Orange Judd Hall of Natural Sciences, which he had previously presented to Wesleyan University at Middletown, Conn. He

ranks among the pioneer promoters of scientific agriculture, upon the progress of which he exercised an extensive influence.

Judson, Adoniram (1788-1850), pioneer American Baptist missionary, was born at Malden, Mass. He was graduated at Brown University in 1807 and at Andover Theological Seminary in 1810. Becoming inspired with missionary zeal, he sailed with his wife for India in 1812. He settled soon afterward at Rangoon and began to preach and to write in Burmese, translating parts of the New Testament into Burmese. During the Burmese War, he was imprisoned at Ava, 1824-26. Subsequently, he labored in various towns of British Burma and among the Karens with remarkable success. During 37 years of missionary service, he translated the Bible and other valuable works into Burmese and compiled a Burmese-English dictionary and also a Pali grammar.

Dr. Judson was thrice married. In 1812, he married Ann Hasseltine (1789-1826), who shared with great fortitude her husband's pioneer hardships in Burma. In 1834, he married Sarah Hall Boardman (1803-45), widow of George Dana Boardman. She translated a hymn book and part of the *Pilgrim's Progress* into Burmese and aided in translating the New Testament into Peguan. In 1846, he married Emily Chubbock (1817-54), who became known as a writer under the pen name Fanny Forester.

Julian (*jōōl'yăn*; *jōō'lĭ-ăn*), or **Julianus Flavius Claudius (c. 331 A. D. -363 A. D.),** surnamed the Apostate, Roman emperor, was born in Istanbul. He was a nephew of Constantine the Great and was educated in the tenets of Christianity; but, at an early age, he renounced that religion in favor of Neoplatonism. In 355, he received the title of Cæsar and was sent to Gaul, where he won several victories over the Germans. In 361, the troops in Gaul revolted from Constantius and declared for Julian, who soon afterward made a triumphal entry into Istanbul. He publicly declared himself a pagan, but the mildness of his edict of toleration surprised Christians and non-Christians alike. However, he selected most of his officers from the old Roman religion and compelled the Christians to aid in restoring the heathen temples. He was a prolific writer and composed in Greek a large number of orations, letters, satires, and poems. He was killed in an expedition against the Persians.

Julius II (1443-1513), otherwise known as Giuliano della Rovere, pope, was born in Italy, and became pope in 1503. He restored the papal states to the Church by force of arms, defeating Rimini, Venice, and other cities. Later, in alliance with Venice, he drove a French army out of Italy. Julius abolished simony (sale of spiritual benefits) in the college of cardinals. He was known also as a patron of artists; those receiving commissions from him included Michelangelo and Raphael. He laid the cornerstone of St. Peters at Rome. Henry VIII of England obtained from him sanction for his marriage with Catherine of Aragon by annulment of a former marriage.

Jung (*yŏŏng*), **Carl Gustav (1875-),** Swiss psychologist and psychiatrist, was one of the early followers of Freud, with whom he worked until differences of opinion concerning the theory of libido or human driving force caused a break. Freud's conception of libido was that it was derived from the sex instinct, but Jung considered it as nonsexual energy deriving from a general primal urge to live. He divided people into two classes, introverts and extroverts, and gave the name "complex" to the groups of ideas that exert a dominating influence upon the personality. His numerous publications include *Psychology of the Unconscious* (1916) and *Psychological Types* (1923). In addition to many articles which have appeared from time to time he has published three important works as recently as 1953. These are *Psychology and Alchemy, Two Essays on Analytical Psychology,* and *The Transference and Other Papers on the Analytical Process.*

Jusserand (*zhū's'-răN'*), **Jean Adrien Antoine Jules (1855-1932),** French diplomat and man of letters, was born at Lyon. He was educated at Lyons and Paris, and entered the foreign office in 1876. He was councilor of the French embassy at London from 1887 to 1890 and minister to Denmark from 1898 to 1902, when he was appointed French ambassador to the United States. In this last-named office he served with distinction for more than 20 years, being a close friend of each president who served in the period. His writings include *Les Anglais au moyen âge, Shakespeare en France,* and *With Americans of Past and Present Days.*

Jussieu (*zhū'syû'*) **Antoine Laurent de (1748-1836),** French botanist, was born at Lyons. At the age of 17, he began his botanical studies under his uncle Bernard, and four years later was nominated assistant to Lemonnier, the professor of botany in the Jardin du Roi. He reformed the arrangement of the gardens and collections of plants under his charge, and applied to them his own and his uncle's ideas of botanical classification based on the nature rather than adventitious characteristics of the plants.

For 30 years he continued to develop his views; and, when his *Genera Plantarum* was completed in 1789, the natural system was finally established as the true basis of botany. In 1793, he became professor of botany in the newly organized Jardin des Plantes, where he continued to teach until 1826.

Justin (c. 100 A. D.-c. 165 A. D.), surnamed the Martyr, was born at Shechem in Samaria. He was first a Stoic and then a Platonist. Later, after his conversion to Christianity, he wandered about, arguing for the truth of the new faith. At Rome between 150 and 160, he wrote the *Apologia* of Christianity addressed to the emperor. He is said to have been martyred.

Justinian the Great (483 A. D.-565), Roman emperor, was born in the village of Tauresium. His reign, which extended from 527 over a period of 38 years, was the most brilliant in the history of the Eastern Empire. Justinian had the fortune or the skill to select the ablest generals of the last days of Roman military ascendancy. He constructed or renewed and strengthened the vast line of fortifications along the eastern and southeastern frontier of his empire. These works of defense and the construction of many public buildings involved an enormous expenditure. In consequence, the fiscal administration of Justinian pressed heavily on the public resources; but it is admitted to have been ably and uprightly conducted.

It is, however, as a legislator and jurist that Justinian gained widest renown. Immediately on his accession, he compiled a code, now known as the *Code of Justinian,* which comprised all the constitutions and laws of his predecessors. The authoritative commentaries of the jurists were next harmonized and published under the title *Digesta* or *Pandectæ.* The code was republished in 534 with the addition of Justinian's own constitution. His third great legal undertaking was the composition of a systematic treatise on the laws for the guidance of students and lawyers, published under the title of *Institutiones.*

Juvenal, or **Juvenalis, Decimus Junius (c. 60 A. D.-140 A. D.),** Latin poet and satirist, was born in Aquinum. He was a friend of Martial and contemporary of Statius and Quintilian. He practiced at Rome as an advocate. His satires, 16 in number, are characterized by a burning moral indignation at the vices and follies which they depict. Juvenal may be regarded as a type of the older Roman moralist, in distinction to an urbane satirist like Horace, who aimed to amuse by the depiction of human frailties.

Kafka, Franz (1883-1924), Austrian novelist, was born in Prague. His semi-surrealistic works caused great excitement in intellectual circles after his death, and have enjoyed considerable popular success. Kafka, trained as a lawyer, was a painstaking writer; his care is reflected in his limpid, exact style. In his most famous novels, *The Trial* and *The Castle,* both published posthumously in the mid-20's, he portrays the awful nakedness of soul of harried modern humanity, and, in eerie settings, points up many of the anomalies of civilization. His diaries have been published, and biographies have been written about him. Kafka died in Vienna.

Kahn (*kän*), **Julius (1861-1924),** American lawyer and politician, was born at Kuppenheim, Germany, and, at the age of five, was taken to California. He was educated in the public schools of San Francisco and entered the theatrical profession. During his career on the stage, he played with Edwin Booth, Joseph Jefferson, Clara Morris, and other noted actors. In 1890, he returned to San Francisco and took up the study of law; in 1892, he was elected to the state legislature; and, in 1894, he was admitted to the bar. In 1898, he was elected to Congress as a Republican. With the exception of one term, 1903-05, he was continuously re-elected. Following the declaration of war against Germany in 1917, Kahn was the leader in the House of Representatives in securing the passage of the Selective Draft Act. In 1919, he became chairman of the House Committee on Military Affairs.

Kahn, Otto Hermann (1867-1934), American financier, was born at Mannheim, Germany. His father was a German refugee to the United States following the revolution of 1848 and became an American citizen, but later returned to Germany. Otto Kahn was educated at Mannheim, spent a year in the German army, and then entered a banking house. In 1888, he entered the London branch of a German bank and became a British citizen.

In 1893, he joined the house of Speyer and Company in New York City. After two years' service, followed by travel in Europe, he entered the firm of Kuhn, Loeb, and Company, bankers, of New York. In 1917, he became an American citizen again. He served as chairman of the board of directors of the Metropolitan Opera Company and of the French Theater of New York.

During World War I, he took an active part in persuading the Germans in the United States that Germany

should be resisted. His writings include *Our Economic Problems* and *Two Years of Faulty Taxation.*

Kaiser, Henry J. (**1882-**), American construction expert, was born at Canajoharie, N. Y. After sixteen years of road construction, 1914-30, he took up the building of dams. In 1933 he became the head of the Six Companies, Inc., who built the Hoover and Parker Dams. He began shipbuilding in 1941, using new methods to expedite construction. One of his yards, using prefabricated sections, assembled a 10,500-ton ship in twenty minutes less than four days. In 1943 he proposed applying his methods to air freighters. After the war he became interested in housing and in aluminum and automobile manufacture.

Kalakaua (*kä'lä-kou'ä*), **David** (**1836-1891**), seventh king of the Hawaiians, 1874-91, was born in Honolulu, of royal descent. He received an English education in the Royal School at Honolulu and in 1860 visited California. In 1874, on the death of Lunalilo, who appointed no successor, he became king after a contest with the partisans of the Queen Dowager Emma, in which he was assisted by Americans and English. In 1887 he granted a new constitution restricting the royal prerogatives.

Kalb (*kälb*), **Johann, Baron de** (**1721-1780**), general in the American Revolution, was born in Bavaria. After studying the art of war in the French army, he accompanied Lafayette to America in 1777. He was then appointed a major general by Congress, served in the field in New Jersey and Maryland, and was second in command to General Gates. He was mortally wounded in the battle of Camden.

Kaltenborn, Hans von (**1878-**), American journalist and radio commentator, was born at Milwaukee, Wis. He was associated with his father in a building material business and was a newspaper reporter prior to 1905, when, at the age of 27, he entered Harvard University. After graduation, he was on the staff of the Brooklyn *Eagle*, 1910-30, rising to the position of associate editor. In 1922, he began broadcasting news, in which he showed himself so effective that the National Broadcasting Company engaged him as news analyst. He soon established a reputation as one of the ablest radio editors in the world.

While reporting the Spanish civil war in 1936, he broadcast for the first time actual gunfire in a battle by means of taking the microphone into the combat. During the diplomatic crisis of Munich in 1938, Kaltenborn was largely responsible for bringing to world-wide audiences an illuminating and impartial explanation of the most important historical event ever to be reported and analyzed in this way. His broad grasp of history likewise made of particular value his comments on events of the war in Europe that began in 1939. He wrote *We Look at the World, Kaltenborn Edits the News,* and *I Broadcast the Crisis.* A comprehensive review of his long career as radio and television reporter is contained in his autobiographical work *Fifty Fabulous Years* (1950).

Kant (*känt*; G., *känt*), **Immanuel** (**1724-1804**), German philosopher and founder of so-called critical philosophy, was born in Königsberg, Prussia. In 1740, he entered the University of Königsberg, where he studied mathematics, theology, and science with great thoroughness, but gave comparatively little attention to history and poetry. In 1755, he received from the university the degree of doctor of philosophy and published an essay on *Natural History and Theory of the Heavens.*

Kant now settled as a *docent* at the university and delivered lectures on logic, metaphysics, natural philosophy, and mathematics. In 1770, he obtained the chair of mathematics. He soon exchanged this for the professorship of metaphysics and logic, which he held until 1797.

Works. Kant's inaugural dissertation, *Form and Principles of the Sensible and Intelligible World,* contains germs of his philosophical system. Not until 1781, however, did his scheme of a transcendental philosophy appear in the form of the *Critique of Pure Reason.* The negative results of the system of pure reason prepared the way for more positive work, *Foundation of the Metaphysics of Ethics* in 1785 and *Metaphysical Elements of Natural Science* in 1786. In 1787, he developed more fully the principles of the metaphysics of the natural sciences and supplemented many positions in his other treatises.

Besides his larger works and essays, Kant wrote many minor treatises, sufficient to have made a literary reputation for most men. He was a zealous advocate of freedom and sympathized with the American colonies and the French people in their revolution and struggles for liberty. He acted always from a keen and paramount sense of duty. His habits were severely simple, and he was well known for his benevolence.

Manner of Life. Kant spent his entire life in Königsberg, engaged in his professorial duties and the evolution of his great philosophical works. He lived in retirement under strict, self-imposed rules for health and study, never having traveled, it is said, more than sixty miles outside of his native city.

Philosophy. Kant's chief contribution to philosophy is the conception of knowledge as the result of the interaction of two factors,—one supplied by the outer world, the other by the structure of the human mind. Against the materialist and the skeptic, he proved that the mind has its *a priori* principles of knowledge. In opposition to the dogmatist, he maintained that the sphere of the supersensible, though a reality, is not disclosed to positive thought. He declared that empiricism is right in so far as it asserts that the matter of our ideals is drawn from without, but wrong in so far as it implies that their form can also be found there. He is allied with the principle of the traditional moralists in ascribing an absolute validity to certain moral ideas by which life should be guided.

Kantor, MacKinlay (**1904-**), American writer, was born at Webster City, Iowa, where he began his writing career as a reporter with the Webster City *Daily News* (1922-24). He later worked for other Iowa newspapers. His first novel, *Diversy,* published in 1928, has been followed by many others, including *Long Remember* (1934), his story of the Gettysburg campaign, and *The Voice of Bugle Ann* (1935). His Civil War novel, *Andersonville* (1955), was an outstanding success. Kantor also has been a scenario writer for several motion picture producers.

Karsh, Yousuf (**1908-**), Canadian photographer whose portraitures of the world's most eminent people have made him famous, was born in Armenia. He studied art in Boston, moved to Canada and began his photographic career in Ottawa in 1932. Karsh is adept at portraying character. He has photographed Winston Churchill, Thomas Mann, Albert Schweitzer, Albert Einstein, Jan Sibelius, George Bernard Shaw, and many other notables. His photographs are masterful in their detail, artistically lighted, and show, with a startling sense of discovery on the part of the viewer, the individual inner strengths of his subjects.

Katsura (*kä'tsōō-rä*), **Taro, Prince** (**1847-1913**), Japanese statesman, three times premier of Japan, was born in the province of Choshu. During the restoration era, in 1867, he distinguished himself in the civil war. He studied military science in Germany, and, for some time, he was military attaché in Berlin. On his return home, he was gazetted major general, was appointed vice minister of the war office, under General Oyama, and took a prominent part in the modernization of the Japanese army. For his services in the Chino-Japanese War, he was created a viscount, and, two years later, he was promoted to the rank of general. In 1898, he was appointed war minister, and held that post until the downfall of the Yamagata cabinet in 1900. He was premier of Japan from 1901 until 1906, covering the period of the war with Russia. In 1906, he was appointed a member of the high military council of Japan. He was again premier, 1908-11 and 1912-13.

Kauffer, Edward McKnight (**1890-1954**), Anglo-American poster artist and illustrator, was born at Great Falls, Mont. Beginning as a scene painter for theaters, he studied art in Chicago, Paris, and Munich, and settled in London in 1914. There he made posters for the London underground railway, the striking character of which brought him wide recognition as leader in the art of the poster. His work is represented in English and Italian galleries and in the Corcoran Art Gallery, Washington. He illustrated many books, including *Don Quixote,* Burton's *Anatomy of Melancholy,* and Arnold Bennett's *Venus Rising from the Sea.*

Kaufman, George (**1889-**), American playwright, noted for his comic invention, was born in Pittsburgh, Pa. He was a newspaperman in Washington, D. C., and New York, and was drama critic on both the New York *Times* and the old New York *Tribune.* The list of plays which Kaufman wrote, co-wrote, or "doctored" is imposing. His reputation as a "play doctor" is legendary, as is his reputation as a member of the famous "Algonquin Round Table," meetings that brought together such wits as Alexander Woollcott, Dorothy Parker, and *New Yorker* editor Harold Ross. Kaufman, creator of scores of Broadway hits, is best known for such productions as *The Butter and Egg Man* (1925), *Beggar on Horseback* (1924), *Strike Up the Band* (1927), *The Band Wagon* (1931), *Of Thee I Sing* (1931), *Dinner at Eight* (1932), the hilarious *You Can't Take It With You* (1936), *The Man Who Came to Dinner* (1939), and, more recently, *The Solid Gold Cadillac* (1952) and *Silk Stockings* (1953). Kaufman is also a gifted director.

Kaufmann (*kouf'män*), **Angelica** (**1741-1807**), Swiss historical and portrait painter, was born at Chur. She began to paint portraits when only a child. In 1765, persuaded by Lady Wentworth, she went to London, where she became famous as a painter of portraits and of classical and mythological pictures. She married the Italian painter Zucchi in 1781, and, returning to Rome, she spent the remainder of her life in a circle of poets, artists, and scholars.

Kean, Charles John (**1811-1868**), British actor, son of Edmund Kean, was born at Waterford, Ireland. He was

educated at Eaton. He made his debut at Drury Lane, 1827, but did not establish his reputation until 1838, when he appeared as Hamlet, Richard III, and Sir Giles Overreach. In 1842, he married Miss Ellen Tree, a celebrated actress. From 1850 to 1859, he was manager of the Princess's Theater, London. In 1865, he played in the United States.

Kean, Edmund (1787-1833), English actor, son of Ann Carey, a strolling actress, was born in London. At an early age he played children's parts. He himself at 16 turned "stroller," and, after ten years in the provinces, made his first appearance at Drury Lane as Shylock in 1814. He at once took rank as the first actor of the day. A period of great success followed both in England and the United States; but by breach of contracts and dissipation he gradually forfeited public approval. His most celebrated roles were Richard III, Shylock, Hamlet, Iago, Othello, and Luke in *Riches*.

Keane, John Joseph (1839-1918), American churchman, was born in Ballyshannon, Ireland. He came to the United States in 1846 and was educated at Saint Charles's College and at Saint Mary's Seminary, Baltimore, Md. Ordained priest in 1866, he was assistant pastor of Saint Patrick's Church, Washington, D. C., from 1866 to 1878, when he was made bishop of Richmond, Va. He was the first rector of the Catholic University of America at Washington, which he had helped to found, serving from 1886 to 1897. He was then elevated to archiepiscopal dignity, with the title of Archbishop of Damascus, and went to Rome. Returning in 1900, he was transferred to the see of Dubuque, Iowa.

Kearny (*kär'nĭ*), **Philip (1815-1862),** American soldier, was born in New York. He was attached to the staff of General Scott, 1841-44, and distinguished himself in the Mexican War. He then served as a volunteer in the French army in the war against Austria, and was present at the battles of Magenta and Solferino. He commanded the cavalry of the army of the Potomac in the peninsula campaign during the Civil War, in which he won an enviable reputation for courage and gallantry. He took an active part in the second battle of Bull Run, and was killed at Chantilly, Va., while reconnoitering in front of his command.

Keats, John (1795-1821), English poet, was born in London. He was apprenticed to a surgeon at Edmondton, near London. From his boyhood he exhibited a taste for poetry. In 1817, he published a volume of juvenile poems, having already made several contributions to the London *Examiner*, then under the editorship of Leigh Hunt.

In 1818 appeared his *Endymion*, a poetic romance founded in part on the model of Fletcher's *Faithful Shepherdess*. This work was severely criticized in the *Quarterly Review* and in *Blackwood's Magazine* as of the "Cockney school" of poetry. His later poems avoided faults present in this work.

In 1820, Keats published his *Eve of St. Agnes*, his odes to *The Nightingale* and *The Grecian Urn*, and the fragments of *Hyperion*, taken, like *Endymion*, from mythological sources and written in an airy strain of classic imagery. His poetry stands alone in English literature for its sensuous imagery and haunting melodiousness of language. He was attacked by tuberculosis in 1820 and in 1821 went to Italy, where he died. Like Spenser, Keats was a poet's poet and his work profoundly influenced 19th-century poetry in England.

Keble (*kē'b'l*), **John (1792-1866),** English clergyman and poet. His early education was directed by his father. At the age of 15 he entered Corpus Christi College, Oxford, where he won several prizes and otherwise distinguished himself. In 1827, he published his volume of sacred poetry entitled the *Christian Year*, which attained a very large circulation and exerted an enormous influence. He was one of the leading spirits in what was known as the "tractarian movement" in the English Church, and for several years was actively engaged with Pusey, Newman, and others in issuing *Tracts for the Times*.

Kefauver (*kē'fô-vĕr*), **Estes (1903-),** lawyer and politician, was born in Madisonville, Tennessee. After he was graduated from the University of Tennessee in 1924 and Yale Law School in 1927, he practised law in Chattanooga. He was a Congressman from Tennessee from 1939 to 1949, when he became United States Senator for the term expiring in 1955. As chairman of the Senate Committee to Investigate Crime, he won nation-wide recognition in 1951 for his sensational disclosures. In 1952 he made an impressive showing in the presidential primaries for the Democratic nomination for president, but lost to Adlai E. Stevenson at the convention. He was re-elected to the United States Senate in 1954. As in the 1952 campaign, he entered a number of state primaries in competition with Adlai Stevenson for endorsement as nominee for president on the Democratic ticket. At the National Convention held in Chicago in August, 1956, he was nominated for the vice-presidency as running mate for Mr. Stevenson, who was chosen to head the ticket.

Keitel, Wilhelm (1862-1946), German military leader. He was a commander of artillery in World War I. After Hitler came to power, Keitel was made major general. He took an active part in the reoccupation of the Rhineland in 1936. In 1938, after a "purge" of the more conservative army leaders, Keitel was made commander in chief. In this capacity, he led the German army into Austria and Czechoslovakia in 1938 and conquered Poland in 1939, and France in 1940, employing the technique of the *Blitzkrieg*, "lightning war." He signed the terms of surrender at Berlin, May 8, 1945. He was afterwards tried as a war criminal, and sentenced to death.

Kellar, Harry (1849-1922), entertainer and magician, was born in Erie, Pa. He was educated at Painesville, Ohio, 1866. When a young man, he was assistant to the "Fakir of Ava," the magician. He joined Davenport Brothers, spirit mediums, as business manager in 1867. With other illusionists he traveled in Mexico, South America, Africa, Australia, and Oriental countries. After 1884 he performed in American cities. He was perhaps the most widely known illusionist of his time. He published *A Magician's Tour Up and Down and Round About the Earth* and *Kellar's Variety Entertainments*.

Keller, Helen Adams (1880-), American writer and lecturer, was born at Tuscumbia, Ala. By severe illness, at the age of 19 months, she was deprived of both sight and hearing. Until she was seven, no serious attempt was made toward her education. She was then placed in charge of Miss Anne Mansfield Sullivan, of the Perkins Institute for the Blind, Boston, who came to her home. As a result of Miss Sullivan's teaching, she learned the deaf and dumb language by touch; she also learned to read by the Braille system and to write by using a special typewriter. At the age of ten, under the instruction of Miss Sarah Fuller, of the Horace Mann School, New York, she learned to speak.

In 1892, Miss Keller went to Boston and, at 16, entered a preparatory school. She was accompanied to all classes by Miss Sullivan, who repeated the lectures and discussions by touch. In 1900, Miss Keller entered Radcliffe College, and, with the continued aid of her devoted teacher, she graduated with honors in 1904. She used textbooks printed in Braille and wrote examinations on her own typewriter. After graduation she became well known as a writer and lecturer on educational possibilities for the blind. The motion picture play *Deliverance* was based on her autobiography, *The Story of My Life*. She wrote also *Out of the Dark*, *Peace at Eventide*, and *Helen Keller's Journal*.

Keller, James G. (1900-), American clergyman, was born at Oakland, Calif., and was ordained priest in the Roman Catholic Church in 1925. He is known as the founder in 1945 and the director since then of the Christophers, and is also known for his many books. These include *You Can Change the World* (1948), *Three Minutes a Day* (1949), *One Moment, Please* (1950), and *Stop, Look and Listen* (1954).

Kelley, Edgar Stillman (1857-1944), American composer, was born at Sparta, Wis. He studied music in Chicago, 1874-76, and at Stuttgart, where he was graduated from the Conservatory in 1880. Later he taught in San Francisco and contributed musical criticism to the *Examiner*. In 1896, he became a teacher in the New York College of Music, and was engaged as lecturer on music in university extension work. He resided in Berlin from 1902 to 1900, and, upon his return, became professor of composition at the Cincinnati Conservatory. Among his compositions are the comic opera *Puritania*; incidental music to *Ben Hur*, *Prometheus Bound*, and *Macbeth*; the symphonic poem *The Pit and the Pendulum;* the orchestral suite *Aladdin*, on Chinese themes; and the *New England Symphony*. He published *Chopin the Composer* and *The History of Musical Instruments*.

Kellogg, Frank Billings (1856-1937), American lawyer, was born at Potsdam, N. Y. He removed to Minnesota with his parents in 1865; studied law; and, in 1877, was admitted to the bar. He was city attorney in Rochester, Minn., for three years and county attorney in Olmsted County for five years. In 1887, he removed to Saint Paul. He was special counsel for United States in the cases against the paper trust and the Standard Oil Trust. He was also special counsel for the Interstate Commerce Commission in the investigation of the Harriman railroads and for the United States in the action to dissolve the Union Pacific and Southern Pacific merger. He was elected United States senator for the term, 1917-23, and soon thereafter was appointed United States ambassador to England, serving until 1925. He was Secretary of State, 1925-28. His principal achievement in this office was the negotiation of the Paris Pact, a multilateral treaty renouncing war as an instrument of national policy. In 1929, he was awarded the Nobel peace award and, 1930-35, he served as judge in the International Court of Justice at The Hague.

Kelly, Grace Patricia (1929-), American film actress, now Princess Gracie Patricia of Monaco, was born at Philadelphia, Pa. Daughter of a wealthy builder, she was educated at schools in Germantown, Pa. and at the American Academy of Dramatic Arts, New York. She made her Broadway stage debut in 1949 in Strindberg's *The Father*, starring Raymond Massey, and soon after began appearing in motion pictures, playing opposite such Hollywood stars as Gary Cooper and James Stewart. In 1954 she won the Oscar for her acting in *The Country Girl*. On April 19, 1956, Miss Kelly married Prince Ranier III, sovereign of Monaco, becoming the first American to wed a reigning monarch. A daughter, Caroline, was born to them early in 1957.

Kelly, James Edward (1855-1933), American sculptor, was born at New York. He studied wood engraving and became an illustrator, principally for magazines. After 1881 he devoted his time exclusively to sculpture and became known as "the sculptor of American history." His first piece of sculpture was "Sheridan's Ride," 1878. Forty generals, including Grant, Sherman, Sheridan, and Hancock, gave him sittings for a series of bronzes. His work includes also "Monmouth Battle Monument"; "Call to Arms," Troy, N. Y.; "General John Buford at Gettysburg"; "Battle of Harlem Heights" memorial at Columbia University; "Destruction of the Bridge at Princeton"; equestrian figures of General Sherman and Colonel Roosevelt at San Juan Hill; busts from life, of Admiral Dewey and of Roosevelt as colonel of the Rough Riders; and the bronze work "Leatherstocking and the Last of the Mohicans."

Kelvin, William Thompson, Baron (1824-1907), British physicist and mathematician, was born at Belfast, Ireland. He early distinguished himself at Glasgow University in mathematics and the classics. In 1841, he went to Cambridge University, where he received his bachelor's degree and was elected a fellow in 1845. He then went to Paris, studied for a time under the famous Regnault, and there, as at Cambridge, made valuable original contributions to science.

In 1846, Lord Kelvin was appointed professor of natural philosophy in Glasgow University. Here he carried forward investigations into thermodynamics, electrostatics and the theory of magnetism, contact electricity, thermoelectricity, the mechanical energies of the solar system, the action of the tides, and the size and motion of atoms. Popular attention was directed to his scientific attainments by his connection with the more practical problems of ocean telegraphy. Lord Kelvin was electrical engineer to the Atlantic Cable Company in 1857-58 and again in 1865-66. After the construction of the Atlantic cable, his most popular achievement was the invention of a mariner's compass that was free from the magnetic action of the iron of the ship.

Theory of the Earth's Age. As early as 1842, Lord Kelvin had published, in a paper which appeared in the Cambridge and Dublin *Mathematical Journal*, the germ of his theories about the age of the earth. He announced that the age of the earth as a habitable planet, far from being unlimited, could not possibly exceed 400 million years and was more probably within 20 million. The resulting controversy among biologists and geologists has lasted until the present day.

Electrical Measurement. In 1851, Lord Kelvin, impelled by the characteristic precision of his scientific spirit and by the need which he perceived for exact measurement in telegraphy, had already adopted the so-called C. G. S., or absolute, system of measurement, based on the centimeter, the gram, and the second. Its general acceptance also was more directly due to him than to any other man. The unit of electric energy known as the kilowatt hour was first defined by him, and much of his attention was devoted also to the production of commercial instruments for the measurement of the electric current.

Later Work. Lord Kelvin's later work included many valuable investigations in molecular physics. The lectures that he delivered at Johns Hopkins University in 1884 on his first visit to America ranged from the most recondite problems of optics to speculations on molecular dynamics and were both a criticism and a protest regarding the ultimate dynamics of physical nature.

His chief publications were: a *Treatise on Natural Philosophy*, which he wrote in conjunction with Professor Tait and issued in 1867; *Mathematical and Physical Papers*, published 1882-90; *Popular Lectures and Addresses*, 1889-94; *Molecular Tactics of a Crystal*, 1894; and *Baltimore Lectures*, delivered in 1884, in the later revision of which he practically abandoned his famous vortex theory of atoms.

The genius of Lord Kelvin, as one of the greatest scientific intellects of the latter half of the 19th century, displayed a threefold ability; power to construct valuable theories, ingenuity in their application, and the capacity to secure their general usefulness by the invention of appropriate instruments.

Kemal Pasha. See *Mustapha Kemal Pasha.*

Kemble, Charles (1775-1854), English actor, was born at Brecknock, South Wales, younger brother of John Philip Kemble. He received his education at Douai, France, and, on his return to England, he devoted himself to the stage. In 1794, he made his first appearance at Drury Lane, London, in the character of Malcolm in *Macbeth*. He gained wide fame for his impersonations of such characters as Romeo, Falconbridge, Charles Surface, Cassio, and Benedick. He also gave readings from Shakespeare with notable success. In 1832, he visited the United States, accompanied by his daughter Frances Anne Kemble and met with an enthusiastic reception.

Kemble, Frances Anne (1809-1893), (Fanny Kemble), English actress and Shakespearean reader, was born in London, daughter of Charles Kemble. She was educated chiefly in France. In 1829, she made her debut on the stage as Juliet at Covent Garden, London. By her attractive personality she soon won great popularity playing such roles as Portia, Beatrice, Lady Teazle, and Julia.

In 1832, she came to the United States with her father and met with noted success. In 1834, she married Pierce Butler, an American and retired from the stage to her husband's plantation in Georgia. They were divorced in 1849. Returning to the stage, she appeared as a Shakespearean reader, attracting large audiences in Boston and in other cities. In 1877, she returned to England, where she was a prominent figure in the social life of London.

Besides several plays and a volume of poems, she wrote *A Journal of a Residence in America*, *Notes on Some of Shakespeare's Plays*, *Far Away and Long Ago*, and *Further Records*. Her grandson Owen Wister became a well-known American novelist.

Kemble, John Philip (1757-1823), English actor, was born at Prescott, Lancashire. His father intended him for the Catholic priesthood, and sent him to a seminary at Sedgley Park, Staffordshire, and to the English College at Douai. His first appearance as an actor was at Wolverhampton in 1776. The success of his sister, Mrs. Siddons, gave him his opportunity, and, in 1783, he played Hamlet at Drury Lane, arousing the keenest interest. For many years he continued to play leading tragic characters at Drury Lane, and, in 1788, he became Sheridan's manager. In 1803, he purchased a share in Covent Garden Theater, became manager, and made his first appearance there as Hamlet in the same year. As a tragedian, Kemble had no superior in his time. He retired in 1817.

Kempis, Thomas à (c. 1380-1471), German devotional writer, was so called from Kempen, a town in the Prussian Rhine provinces, where he was born. He was educated at Deventer, and, in 1400, entered the monastery of Mount Saint Agnes, near Zwolle. Here he took the vows in 1406. He entered into priest's orders in 1413 and was chosen subprior in 1425, to which office he was re-elected in 1448. His whole life appears to have been spent in the seclusion of this convent.

For sanctity and ascetic learning, Thomas à Kempis stood very high among his contemporaries. His historical reputation rests almost entirely on his writings, which consist of sermons, ascetical treatises, pious biographies, letters and hymns. Of these, the celebrated *Imitation of Christ* is a work that in the regard of many ranks second only to the Bible. It has been translated into many languages.

Kendall, William Mitchell (1856-1941), American architect, was born at Jamaica Plain, Mass. He studied architecture at the Massachusetts Institute of Technology and in Italy and France. Returning to America, he joined the firm of McKim, Mead and White. The long list of well-known structures designed by him includes the Plymouth Rock portico, the Tennessee War Memorial at Nashville, the Harvard School of Business, the Arlington Memorial Bridge at Washington, D. C., and the building for the American Academy of Arts and Letters, to which body he was elected in 1929.

Kennedy, Charles Rann (1871-1950), dramatic writer, was born at Derby, England. At 13 he became an office boy and largely educated himself. Later, he became an actor, press agent, and theatrical business manager. Removing to America, he settled in New York, where he made his first appearance on the American stage in 1903. From 1905, he devoted himself chiefly to writing dramas. These deal mainly with social problems and are characterized by deep ethical purpose. Among his plays are *The Servant in the House*, *The Terrible Meek*, *The Necessary Evil*, *The Army with Banners*, *The Fool from the Hills*, *Old Nobody*, *Flaming Ministers*, and *Face of God*.

Kennedy, John Fitzgerald (1917-), American statesman, was born at Brookline, Mass., a son of Joseph P. Kennedy, former U. S. ambassador to the Court of St. James's. He was graduated from Harvard in 1940, and served in the navy during World War II. He was a Democratic representative in Congress from Massachusetts for three terms (1947-1953), and since 1953 has been

United States senator. He is the author of *My England Slept* (1940), and *Profiles in Courage* (1956).

Kensett (*kĕn'sĕt*), **John Frederick (1818-1872)**, American landscape painter, was born at Cheshire, Conn. In early life he became an engraver but devoted his leisure to the study of painting. In 1840, he began a period of five years' study in England, supporting himself by engraving. The success of his first picture, exhibited at the Royal Academy, led him to devote himself entirely to painting. After two years' work in Italy he exhibited his view on the "Arno" and the "Shrine" in New York in 1848. This established his reputation and he was elected to the National Academy in 1849. Kensett was a versatile painter of moods and seasons and ranks as one of the greatest of early artists of the so-called Hudson River school. About 40 of his works, some unfinished, are in the Metropolitan Museum, New York. His "Sunset on the Coast" and "October Afternoon" are in the Corcoran Art Gallery, Washington.

Kent, James (1763-1847), American lawyer and jurist, was born in Philippi, N. Y. He was graduated at Yale in 1781, was admitted to the bar in 1785, and soon became noted for his legal learning. He was several times elected to the New York legislature, and, in 1793, became professor of law in Columbia College. Afterward he was chosen to many important offices, becoming chief justice of New York in 1804, and chancellor, or judge of the court of chancery, in 1814. His decisions in hundreds of law cases are still often cited; but he is best known for his *Commentaries on American Law*, which were published from 1826 to 1830 and are now in common use by American lawyers as well as by many in other countries. He was elected to the American Hall of Fame, 1900.

Kent, Rockwell (1882-), American painter and illustrator, was born at Tarrytown Heights, N. Y. He studied and practiced architecture but turned later to the pictorial arts. Among his paintings are "Deer Season" in the Chicago Art Institute, "Annie McGinley" in the Carnegie Institute at Pittsburgh, "Marine" in the New York Metropolitan Museum of Art, and "Mother and Child" and "Lone Woman" in the Brooklyn Institute of Arts and Sciences. He became well known also for his many symbolical illustrations in books. He wrote *Wilderness*, *Voyaging*, *Salamina*, and *It's Me, O Lord* (1955).

Kepler, or **von Kappel, Johann (1571-1630)**, German astronomer, was born at Weil der Stadt, Württemberg, Germany. As a child, he was of a sickly constitution and of marked precocity. From the University of Tübingen he received his bachelor's degree in 1588 and his master's degree in 1591.

Though he knew little of the subject, Kepler was unwillingly made to accept the class in astronomy at Graz in 1594. Forced into this branch of learning, he bent all his energy to ascertaining the size, motions, and orbits of the planets. In 1596, he published his *Cosmographical Mystery*, a book filled with fanciful hypotheses. He was saved from continued extravagance of this kind by his connection with the celebrated astronomer Tycho Brahe at Prague.

After an unfortunate marriage in 1597, pecuniary difficulties and religious persecution soon obliged Kepler to escape to Hungary. In 1600, he became the assistant of Tycho Brahe. Their first joint work was the computation of the *Rudolphine Tables*, named for Rudolph II, who was to defray the expense of their publication. Upon the death of Tycho in 1601, Kepler succeeded him as principal mathematician to the emperor. In 1606, he published a *Supplement to Vitellio*, in which he treated the optical part of astronomy. His *Dioptrics* of 1611 definitely founded the science of optics.

The work on which Kepler's fame chiefly rests is his *New Astronomy, or Commentaries on the Motions of Mars*, published in 1609. He proved that Mars moves in an elliptical orbit, in one of the foci of which is the sun. He also ascertained that the radius vector, or the line joining the planet and the sun, passes over equal areas in equal times. These two great principles he extended to all the planets in the solar system. His third great law, that the squares of the periodic times of the planets vary as the cubes of their distances, he discovered in 1618. It was announced in *The Harmonies of the World*, which he dedicated to James I of England in 1619. These three laws were the basis of Newton's discoveries, by which the nature of the planetary system was finally made intelligible.

Kepler became professor of mathematics at Lienz, Austria, in 1612. In 1615, he was summoned to the diet at Ratisbon to give his opinion on the reformation of the calendar. Kepler worked incessantly to complete the astronomical *Rudolphine Tables*, and, in 1627, they at length appeared. Two years later he obtained a professorship in the University of Rostock.

Kern, Jerome (1885-1945), American composer, was born in New York of German-Czech descent. He studied music in New York and Europe. He wished above everything to compose for the theater. His first hit was the song "They Didn't Believe Me" from *The Girl from Utah* (1914). His most successful music was written for Oscar Hammerstein II's dramatization of Edna Ferber's novel *Show Boat* (1927), which included the songs "Why Do I Love You?" and "Ol' Man River." Other popular tunes by Kern were "Look for the Silver Lining" (*Sally*, 1920), "Don't Ever Leave Me" (*Sweet Adeline*, 1929), "I've Told Every Little Star" and "The Song Is You" (*Music in the Air*, 1932), "Lovely to Look At" and "Smoke Gets in Your Eyes" (*Roberta*, 1933), and "All the Things You Are" (*Very Warm for May*, 1939).

At the time of his death the following message by President Truman was read over the radio: "I am one of the many grateful millions who have played and listened to Jerome Kern's music. And I want to be one of his countrymen paying tribute to him today. His tunes will live in our voices and warm our hearts for many years to come, for they are one with those simple and sincere songs that are independent of time and fashion."

Kettering, Charles Franklin (1876-), engineer, was born on a farm near Loudonville, Ohio. A graduate of Ohio State University, he is also a product of experimental workshops. He has made many contributions to industry as a research engineer for the National Cash Register Company, inventor of the electric starter for automobiles, head of the Dayton Engineering Laboratories Company, president of General Motors Research Corporation, and vice president of General Motors Corporation. His practical approach to engineering problems is indicated by one of his favorite rules: "Formulas should always follow facts." In his later period he has become a good deal of a philosopher and has paid less attention to improving gadgets than to discovering basic laws. He has been influential in training and inspiring young engineers.

Key (*kī*), **Ellen Karolina Sofia (1849-1926)**, Swedish writer, was born at Sundsholm, Smaland, of Scottish and English descent. In her 20th year, she became secretary to her father, who was a member of the Riksdag.

An ardent feminist, she held advanced views on sexual ethics which subjected her to severe criticism but early won the admiration of such thinkers as Maeterlinck, Brandes, and Havelock Ellis. Causes for which she worked included measures for child welfare and enlarged opportunities for women. Among her works are *The Century of the Child*, *Love and Ethics*, *The Morality of Woman*, *The Younger Generation*, and *Life-Lines*.

Key (*kē*), **Francis Scott (1780-1843)**, American poet, author of "The Star-Spangled Banner," was born in Maryland. He was educated at Saint John's College, Annapolis, Md. He was a lawyer of note, and for many years was district attorney of the District of Columbia. Being detained by the British during the bombardment of Fort McHenry, September 13, 1814, his feelings found vent in the verses which have become the American National Anthem. They were printed on his return to Baltimore.

Keynes (*kānz*) **of Tilton, John Maynard Keynes, Baron (1883-1946)**, English economist, was born at Cambridge. He was educated at Eton and at King's College, Cambridge. Entering the civil service, he served in the India office and later was attached to the treasury, of which he became acting principal clerk, 1917-19. He was a member of the Royal Commission on Indian finance and currency, 1913-14, and was chief representative of the British treasury at the Peace Conference of Versailles in 1919, from which he withdrew in protest over the reparations clauses.

Keynes pointed out that the reparations demands could not be carried out because the recipients would refuse to accept goods. This and other views set forth in his *Economic Consequences of the Peace* were justified by the event. He turned later to study the relation between unemployment and the use of money, many of his ideas finding acceptance in American governmental circles. He was raised to the peerage in 1942. His publications include *A Treatise on Money*; *The General Theory of Employment, Interest and Money*; and *How to Pay for the War*.

Keyserling (*kī'zĕr-lĭng*), **Hermann Alexander (1880-1946)**, German philosopher, was born at Koenno, Estonia, of a noble family, through which he inherited the title of count. He studied sciences, philosophy, and literature in the principal European universities and, in 1907, began a long period of travel in Europe, Asia, and America, the fruit of which was his *Travel Diary of a Philosopher*. In 1919, his estates were confiscated by the Estonian government. He later opened at Darmstadt, Germany, a center for the creative study of philosophy, known as the school of wisdom. He married a granddaughter of Bismarck.

Khrushchev (*krōōsh'chŏf'*), **Nikita S. (1894-)**, Soviet leader, was born in south central Russia, and as a boy worked as a shepherd and later as a coal miner in the Ukraine. He served with the Red forces in the revolution of 1917, and became a Communist party member in 1918. After training in one of the schools established by Lenin, he was a party organizer in the Ukraine. He was transferred to Moscow in 1929, where he attended the In-

dustrial Academy. In 1935 he became party boss in Moscow, but later returned to the Ukraine in the same capacity. Proving himself a proficient purger, he was made a member of the Politburo in 1939. In World War II he was involved in the direction of guerilla fighting against the Germans. He returned to the Ukraine after the war, but in 1949 was again head of the party apparatus in Moscow. Following Stalin's death, he succeeded Georgi M. Malenkov as first secretary of the Communist party. Khrushchev is credited with engineering Malenkov's resignation as premier in 1955, and replacing him with Nikolai Bulganin.

Kierkegaard (*kĭr'kĕ-gôr*), **Sören Aaby (1813-1855),** Danish philosopher and religious writer, was born at Copenhagen. He was opposed to all orthodox religion, contending that religion was a personal matter which the individual had to discover for himself. He believed that pessimism was commonly experienced by persons seriously contemplating the problems of existence, but despair could be overcome, or at least relieved, by absolute faith in God. This doctrine of Christian existentialism has revived interest lately in his teachings. Among Kierkegaard's principal works are *Either-Or* (1843) and *Stages on Life's Way* (1845).

Killian, James R., Jr. (1904-), American educator, was born at Blacksburg, S. C. He was graduated in 1926 from the Massachusetts Institute of Technology, where he majored in business and engineering administration. He immediately joined the staff of the institute's scientific publication, *The Technology Review*, of which he was managing editor from 1927 to 1930 and editor from 1930 to 1939. In the latter year he became assistant to Dr. Karl I. Compton, president of the institution, and was then successively executive vice president (1943-45), vice president (1945-48), and finally, in 1948, president. He is a fellow of the American Academy of Arts and Sciences.

Kilmer, Joyce (1886-1918), American poet, was born at New Brunswick, N. J. He was educated at Rutgers College and at Columbia University, graduating from the latter in 1908. After a year of teaching, he took up editorial work and journalism in New York City. He was a leader among the younger poets of America. His works in verse include *Summer of Love, Trees and Other Poems*, and *Main Street and Other Poems*. His best known poem is "Trees," which has been set to music and has become a classic song. Soon after the entrance of the United States into World War I in 1917, he became a private in the 165th infantry regiment of the national army. He was killed at the battle of the Ourc, in France.

Kilpatrick, William Heard (1871-), American educator, was born at White Plains, Ga. Educated at Mercer College and at Johns Hopkins and Columbia Universities, he taught mathematics at Mercer College from 1897 to 1906. From 1909, he lectured at Teachers College, Columbia University, becoming in 1918 professor of the philosophy of education. He retired in 1938.

By his clear grasp of modern educational problems and his effective leadership, he exercised a wide influence on school practice, particularly in the use of the pupil enterprise, or project, method of teaching. He held that schools should give direction to evolving social ideals rather than remain isolated from the world outside. Among his published works are *Education for a Changing Civilization*, *How We Learn*, and *Education and the Social Crisis*.

King, Clarence (1842-1901), American geologist, was born at Newport, R. I. He was graduated from Yale in 1862. From 1863 to 1866, he was a member of the California Geological Survey directed by Professor J. D. Whitney. In this exploration he discovered Mount Whitney, the highest mountain in California, and, with J. T. Gardiner, made the first survey of the Yosemite Valley. In 1866, he originated and secured government sanction for the "survey of the fortieth parallel" across the Rocky Mountains. His volume on the *Systematic Geology* of this region was published in 1878. In 1879-1881 he organized and became the first director of the United States Geological Survey. Later, as a mining engineer, he investigated the Comstock lode and the Eureka and Leadville districts, making important contributions to economic geology. Among his writings are *Mountaineering in the Sierras* and *The Age of the Earth*.

King, Ernest Joseph (1878-1956), American naval officer, was born at Lorain, Ohio. He was graduated from Annapolis in 1901, and advanced to the rank of rear admiral in 1933. He served in World War I and soon became interested in the development of naval air power. In 1941, as admiral, he was placed in command of the Atlantic fleet. After Pearl Harbor he was transferred to the Pacific and was made commander in chief of the United States fleet. Under his command, the fleet recovered from the crippling blow at Pearl Harbor, won a decisive victory at Midway, and took the offensive in the Southwest Pacific. He was made admiral of the fleet in 1944. He retired in 1945.

King, Rufus (1755-1827), American statesman, was born at Scarboro, Me. A graduate of Harvard College, he studied law, and in 1783 represented Newburyport in the Massachusetts legislature. From 1784 to 1786 he was a delegate to the Continental Congress. In 1787 he was a member of the Constitutional Convention at Philadelphia and the next year moved to New York. In 1796, King was appointed minister to England and remained there for seven years. In 1813, he was elected United States senator and served until the expiration of his second term in 1825. In 1825-26 he was again minister to England.

King, William Lyon Mackenzie (1874-1950), Canadian statesman and economist, was born at Kitchener, Ont. a grandson of William Lyon Mackenzie. He was graduated from the University of Toronto, 1895, studying later at the University of Chicago and at Harvard University. Becoming deputy minister of labor for Canada in 1900, he served with distinction on many commissions relating to labor and immigration. He was elected member of Parliament as a Liberal in 1908; was minister of labor from 1909 to 1911; and, in 1919, was chosen leader of the Liberal party. On its victory in 1921, he became prime minister. An election in 1925, left King without a clear majority, but he retained office for some months with the help of the Progressive party. A general election in 1926 returned him to power, which he retained until 1930. He was again elected in 1935 and 1940. In the latter year he negotiated with President Roosevelt an understanding for the joint defense of Canada in the event of its being menaced from abroad. His publications include *The Secret of Heroism* and *Industry and Humanity*.

Kingsley, Charles (1819-1875), English clergyman and author, was born in Devonshire. He was educated at King's College, London, and at Cambridge University. In 1842, he became curate and, two years later, rector, of Eversley. In 1848, he published *The Saint's Tragedy, or the True Story of Elizabeth of Hungary*, an admirable illustration of medieval piety. His opinions on the social anarchy of modern times are to be found in his *Alton Locke, Tailor and Poet*, a novel of extraordinary power. This was followed in 1849 by *Yeast, a Problem*, in which he handles the condition of the English agricultural laborer.

In 1853 appeared *Hypatia, or New Foes with an Old Face*, a most vigorous and brilliant delineation of Christianity. Two years later, Kingsley published *Westward Ho!*, probably the greatest of his works. In 1860, he was appointed professor of modern history at Cambridge. After resigning his chair he was made canon of Chester in 1869, canon of Westminster in 1873, and chaplain-in-ordinary to Queen Victoria. See *Hypatia*, *Yeast*.

Kingsley, Mary Henrietta (1862-1900), English traveler and author, niece of Charles Kingsley, was born in Islington, London. She went to Cambridge, where she studied sociology, but was most attracted to natural history. In 1893, she went to West Africa to investigate native folklore and religions and to study biology. She pursued her researches at Kabinda, Fernando Po, and on the lower Congo, returning to England the next year.

In 1894, Miss Kingsley made a second trip to explore the lower Niger region and to study its flora. She traveled through the Niger Coast Protectorate, Cameroon, and Gabun, often with only native attendants. The results of these two journeys were published in her interesting *Travels in West Africa* and *West African Studies*. She prepared for a third journey but while nursing sick Boer prisoners at Simons Town, South Africa, she contracted typhoid fever, of which she died.

Kipling, Joseph Rudyard (1865-1936), English short story writer, novelist, and poet, was born in Bombay, India. He was educated in United Service College, North Devon, England. He was assistant editor of *Civil and Military Gazette* and *Pioneer* in India, 1882-89. His stories of Indian life, written in his early twenties, won world-wide reputation. These were followed by novels, tales, sketches, and poems, which stamped him as one of the most original, versatile, and effective writers of his time. They characteristically glorified British imperialism.

Kipling traveled extensively in Japan, China, Africa, Australasia, and America. In 1892, he married Caroline Starr Balestier, daughter of H. Wolcott Balestier, of New York, and lived in Vermont, where he built a home with his own hands. He settled in England in 1896. In 1907, he was awarded the Nobel prize for literature. He was made rector of Saint Andrews University in 1923.

Among his writings are *Plain Tales from the Hills*, *The Light That Failed*, *Barrack-room Ballads*, *The Jungle Book*, *Captains Courageous*, *Just So Stories*, *The Five Nations*, *Puck of Pook's Hill*, *Fringes of the Fleet*, *Sea Warfare*, *Letters of Travel*, and *Something of Myself*. He was buried in Westminster Abbey. See *Literary Plots, Characters, and Allusions* under titles of chief works.

Kirk, Grayson Louis (1903-), educator, was born in Jeffersonville, Ohio. After he was graduated from Miami University (Ohio) in 1925, he continued his studies at Clark University, and also the University of Wisconsin,

where he taught government from 1929 to 1940. He then joined the faculty of Columbia University, teaching government and later international relations until 1953, when he was made president of the university.

Kitchener of Khartum, Horatio Herbert, Earl (1850-1916), British general, was born at Ballylongford, Ireland. He was educated at the Royal Military Academy at Woolwich and, in 1871, entered the British army. In 1882, he began service in Egypt, and in the action at Handub, in 1888, he led the Egyptian troops against Osman Digna. He was appointed Sirdar in 1888. In 1896, he commanded at the taking of Dongola; in 1898, he was in command of an English and Egyptian army near Omdurman, opposite the site of Khartum, and gained a notable victory. On his return to England, he was raised to the peerage and received a grant of £30,000.

During the Boer War, he was chief of the staff of the forces in South Africa, 1899-1900, and was commander in chief, 1900-02. In recognition of his services in bringing the war to a successful conclusion, he was promoted to lieutenant general and general, created viscount, and given a grant of £50,000. At the outbreak of World War I, in 1914, he was created earl, became British secretary of state for war, and devoted his organizing ability to the formation of an army. While en route to Russia, he was drowned by the sinking of the cruiser *Hampshire*.

Klaproth (*klăp'rôt*), **Martin Heinrich (1743-1817),** German chemist, was born at Wernigerode. In early life he followed the profession of an apothecary, first as an assistant in pharmacies at Hanover, Berlin, and Danzig, and later as proprietor of a pharmacy in Berlin. In 1878, he was appointed lecturer in chemistry to the royal artillery. He became the leading chemist of his time in Germany, and, in 1810, was selected professor of chemistry for the then newly established University of Berlin. His exact and thorough work did much to improve analytic chemistry. He was the first to discover and to characterize uranium, zirconium, and titanium as elements. He also distinguished the compounds of tellurium, strontium, cerium, and chromium.

Kleist (*klīst*), **Bernd Heinrich Wilhelm von (1777-1811),** German poet, dramatist, and novelist, was born in Frankfort on the Oder. With scanty education he entered the Prussian army at 15 and served seven years. After two restless years of study and clerical work, he visited Paris and then settled in Switzerland, becoming acquainted there with Zschokke and Wieland, son of the poet. In 1802, he returned to Germany, visiting Goethe, Schiller, and Wieland in Weimar. After some years of wandering, he settled in Berlin.

During a period of national disgrace, literary stagnation, and personal unrest, he produced dramas of great literary merit and still greater promise, all left unrealized by his untimely death. Kleist's dramas are still popular on the stage. *Der Zerbrochene Krug*, "The Broken Pitcher," is considered by many the best one-act comedy in German, and *Michael Kohlhaas* is one of the best German stories of the time. *Prinz Friedrich von Homberg* and *Die Hermannsschlacht* are regarded as his finest tragedies. Kleist was the most important North German dramatist of the romantic movement.

Klopstock (*klôp'shtôk*), **Friedrich Gottlieb (1724-1803),** German poet, was born at Quedlinburg, Prussia. Incited by Virgil's *Æneid* and Milton's *Paradise Lost*, he resolved to write a great epic, and as a student at Jena, in 1745, he began *The Messiah*. In 1746, he went to Leipzig, where the first three cantos of *The Messiah* appeared in 1748. He settled in Hamburg in 1771 with a sinecure appointment and with pensions from the king of Denmark and the margrave of Baden. The last cantos of *The Messiah* were published in 1773. Regarded in his own time as a great religious poet, he helped to inaugurate the golden age of German literature. Odes, tragedies, biblical dramas, and hymns make up the greater part of his poetry. Of these his odes alone possess interest now. *The Messiah* was translated into both English verse and prose.

Knight, Charles (1791-1873), English publisher and author, was born at Windsor. Among his first publications was *The Etonian*, a periodical supported by the Eton boys. In 1823, he started *Knight's Quarterly Magazine*, and continued it for some time in London. The whole of his career was devoted to the publishing of popular literature, in which field he was the pioneer. Among the works which he published or edited are the *Penny Magazine*, which at one time enjoyed a circulation of nearly 200,000 copies weekly; the *British Almanac* and *Companion to the Almanac; Penny Cyclopædia*; *Library of Entertaining Knowledge*; and *History of England*.

Knowland, William Fife (1908-), American politician and publisher, was born at Alameda, Calif. After he was graduated from the University of California in 1929, he joined the staff of the *Oakland Tribune*, a California newspaper published by his father. He was made assistant publisher in 1933, and that same year became a member of the California state assembly, serving until 1935. He was then a member of the state senate until 1939. In 1945, while he was still in the army overseas, Governor Earl Warren of California appointed him United States senator to fill the vacancy caused by the death of Hiram W. Johnson. Knowland has been re-elected a number of times. Following the death of Robert A. Taft in 1953, he became the Republican majority leader of the senate, and, after the elections of 1954, the minority leader. Known for his strong attitude in matters of foreign policy, he has sometimes found himself at odds with the international views of the Republican administration.

Knowles, James Sheridan (1784-1862), British dramatist, was born at Cork in 1784. He was the son of James Knowles, lexicographer and teacher of elocution. After serving in the militia and studying medicine, he appeared on the stage first at Bath and then at Dublin with indifferent success, and subsequently taught elocution in Belfast and in Glasgow. His plays, however, were highly successful, *Caius Gracchus* was first performed at Belfast in 1815. *Virginius*, his most effective drama, had been a success in Glasgow before Macready in 1820 produced it at Covent Garden with phenomenal popularity. Besides *William Tell*, in which Macready achieved one of his greatest triumphs, Knowles wrote also *The Hunchback*, *The Love Chase*, and *The Wife*. In 1845, he left the stage, joined the Baptist Church, and became an eloquent preacher.

Knox, Henry (1750-1806), American general, was born at Boston, Mass. He became a thriving bookseller in Boston, his store being a favorite resort of cultivated people. He was also an officer in a military company, and, when the Revolution broke out, he escaped from the city with his wife, who hid his sword in the folds of her dress. He took part in the battle of Bunker Hill. By his skill in planning fortifications and by his knowledge of artillery, he soon attracted the attention of Washington, and throughout the war he commanded the artillery in various battles. After the capture of Yorktown, Congress made him a major general, and, from 1785 to 1795, he was secretary of war.

Knox, John (c. 1505-1572), Scottish religious reformer, was born at Giffordgate, in Haddingtonshire. He became a priest and notary in the diocese of Saint Andrews before he had attained the age of 25. Having studied the writings of Saint Augustine and Saint Jerome, he renounced Catholicism about 1543 and openly preached the Protestant faith.

Engaged with other reformers in defending Saint Andrews against the French, Knox was taken prisoner and sent to the galleys. After a detention of 19 months, he returned to England, and was appointed chaplain to Edward VI; but he declined to accept a bishopric at the hands of that monarch on account of his objection to the common prayer and to Episcopacy. In the reign of Mary, he retired to Frankfort, and thence to Geneva, where he became acquainted with Calvin. A brief visit to Scotland to counsel the Protestant nobles led to their making a "covenant" to uphold the religion. Scottish Protestants were thereafter known as Covenanters.

Having returned to his own country in 1559, Knox denounced the priesthood, and especially the Mass and image worship, and declaimed against the queen of Scots, whom he called Jezebel. The queen sent for him and sought to influence him, but in vain. His preaching was so powerful that many of the cathedrals and parish churches were demolished by the excited populace as a result of his vigorous invectives. The Scottish Parliament decreed the end of papal rule in the country, and a confession of faith was drawn up by Knox and approved by Parliament in 1560. Knox thus became the founder of the Presbyterian Church. He was the author of several works, notably of a *Historie of the Reformation of Religion in Scotland*. But the influence he exerted was by the tongue rather than by the pen.

Knox, Philander Chase (1853-1921), American lawyer and statesman, was born at Brownsville, Pa. He was graduated at Mount Union College, Ohio, 1872, studied law, and was admitted to the bar in 1875. In 1877, he formed a partnership with James H. Reed under the name of Knox and Reed, the firm representing many large corporations, including the Carnegie Company. He was attorney general of the United States from 1901 to 1904, United States senator from 1904 to 1909, and was secretary of state from 1909 to 1913. His policy of furthering American investments in Latin America through aid of the State department became known as dollar diplomacy. In 1917, he was again elected to the United States Senate, where he was a leading opponent of America's adherence to the League of Nations.

Knox, (William) Franklin (1874-1944), American publisher and politician, was born in Boston, Mass. A graduate of Alma College, Alma, Mich., he got a job as reporter on the Grand Rapids *Herald*, rising in two years to be circulation manager. He then became publisher of various

small newspapers and, in 1927, of the Boston *American* and *Advertiser*. He was in addition general manager of the Hearst newspapers until 1931, when he purchased the Chicago *Daily News*.

Knox served in the Spanish-American War as one of Theodore Roosevelt's Rough Riders. During World War I, he was advanced to the rank of colonel. He was active also in politics in the Republican party, and, in 1936, was candidate for vice presidency of the United States on the unsuccessful ticket with Alfred Landon. When the European war took a turn in 1940 critical for American interests, Knox was one of the strongest supporters of a rapid increase in American defense facilities and of aid for Great Britain. His views and his energetic character commended him to President Roosevelt for the post of secretary of the navy. Accepting the offer despite political differences, Knox carried through plans for the manifold expansion of America's naval power and laid the basis for victory in World War II.

Knudsen, William Signius (1879-1948), American industrialist, was born in a village of Denmark. Coming to America at the age of 20, he worked as a laborer in shipyards, car shops, and mills in New York and Buffalo, N. Y., rising to the status of superintendent. Henry Ford put him in charge of building assembly plants. He was made general manager of the Matthews and Ireland Mfg. Co. in 1921, going the next year to the Chevrolet Motor Company as vice president. He later became president, from which post he was advanced to vice president of General Motors Corporation in 1933 in charge of production. He became president in 1937. In 1940, he was made director general of the office of production management and, from 1942 to 1945 he was lieutenant general and director of production in the war department.

Koch (*kôĸ*), **Robert (1843-1910),** German physician and bacteriologist, was born at Klausthal, Prussia. He studied medicine at Göttingen, receiving his doctor's degree in 1866. His first substantial achievement was the result of the penetration, skill, and thoroughness of his researches on the contagion of splenic fever in cattle. This gained for him a seat on the imperial board of health in 1880. In 1882, he announced his discovery of the tubercle bacillus before the physiological society of Berlin. In 1883, he was made a privy councilor, and was placed in charge of the German expedition sent to Egypt and India to investigate the causes of cholera.

This journey resulted in the discovery of the comma bacillus or cholera germ, in 1884. He was rewarded with a gift of 100,000 marks by the government, and imperial titles and honors were bestowed upon him. In 1885, he was appointed a professor in the University of Berlin, the chair of hygiene having been created for him. He subsequently returned to the investigation of tubercular diseases. In 1905, he was awarded the Nobel prize for medicine.

Kocher (*kôĸ'ĕr*), **Emil Theodor (1841-1917),** Swiss surgeon, was born at Bern. He was educated in medicine and surgery at Bern, Berlin, Paris, and London. After 1866, he was connected with the University of Bern, becoming professor of surgery in 1872. He specialized in operative surgery on the thyroid gland and was the first to investigate and describe cachexia thyreopriva. His researches include transplanting the thyroid gland, a study of cancer of the thyroid, a study of the blood in exophthalmic goiter, and the prevention of cretinism. He received the Nobel prize for medicine in 1909. His *Text Book of Operative Surgery*, translated into English, is a standard work. His other writings include *Die antiseptische Wundbehandlung, Vorlesungen über chirurgische Infektionskrankheiten,* and *Encyklopädie der Chirurgie.*

Kolbe (*kôl'bĕ*), **Adolph Wilhelm Hermann (1818-1884),** German chemist, was born near Göttingen. He studied chemistry under Wöhler and became assistant to Bunsen and to Playfair. He was professor of chemistry at Marburg, 1851-65, and at Leipzig, 1865-84. In the field of organic chemistry Kolbe studied the decomposition of organic acids by electrolysis, and, in association with Lautermann, he discovered in 1860 a method of making salicylic acid by a combination of carbolic and carbonic acids. This achievement led the way to the artificial production of many organic compounds.

Koo, Vi Kuyuin Wellington (1887-), Chinese diplomatist, was born in China; was educated at Columbia University; and became a councilor in the Chinese foreign office. He was appointed Chinese minister to Washington in 1915; represented China at the Peace Conference in Paris and in the League of Nations at Geneva; and, in 1920, was made Chinese minister to Great Britain. He was a delegate for China at the Washington Disarmament Conference in 1921-22. After the rise of Chiang Kai-shek's government he was ambassador to France, 1936-40, to Great Britain, 1941-46, and to the United States after 1946. He represented China at the League of Nations, at Dumbarton Oaks, and at San Francisco.

Körner (*kûr'nĕr*), **Karl Theodor (1791-1813),** German lyric poet, was born at Dresden. He studied at Freiberg, Leipzig, and Berlin and settled at Vienna in 1811. He was dramatist to a Vienna theater and wrote *Der Grüne Domino, Der Nachtwächter,* and other light comedies besides some tragedies, of which *Zriny* was the most successful. The uprising of the German nation against Napoleon inspired him with patriotic ardor, and, in 1813, joining Lützow's corps, he distinguished himself by his valor and encouraged his comrades by fiery patriotic songs. These were published in 1814 under the title of *Leier und Schwert.* The most famous, *Das Schwertlied,* was hastily composed during a pause in battle only a few hours before the author fell at Gadebusch near Schwerin.

Korngold (*kôrn'gôlt*), **Erich Wolfgang (1897-),** Austrian musical composer, was born at Brünn. His father, a music critic, encouraged his son's precocious talent for composition. In his 12th year he wrote a two-act musical pantomime entitled *The Snowman,* which was produced at the Vienna imperial opera. He later composed piano and orchestral works of remarkable fertility, originality, and technical excellence. In 1915, his *Sinfonietta* was produced by the Chicago Orchestra and by the New York Philharmonic Orchestra. He composed piano sonatas; *Fairy Pictures* for the piano; a trio for piano, violin, and cello; and an opera, *Die Kathrin.* He subsequently established residence in Hollywood, Los Angeles, Cal.

Kosciusko (*kŏs'ĭ-ŭs'kō*), **Tadeusz (1746-1817),** Polish general and patriot, was born in Minsk, West Russia. He became a captain in the Polish army; came to America and served in the Revolutionary War; and returned to Poland in 1786 with the rank of general. At the second partition of Poland, Kosciusko resigned his command of the Polish army and retired to Leipzig; but he returned in 1794 and put himself at the head of the national movement in Krakow and afterward in Warsaw. With 20,000 regular troops and 40,000 poorly armed peasants, he resisted for months the united Russian and Prussian armies of 150,000 men. Overpowered by superior numbers in the battle of Maciejowice, 1794, he was captured and kept a prisoner until after the accession of the emperor Paul.

When Napoleon, in 1806, formed a plan for the restoration of Poland, Kosciusko felt himself restrained from taking an active part by his promise to the emperor Paul. In 1814, he wrote to the emperor Alexander, entreating him to grant an amnesty to the Poles in foreign countries and to make himself constitutional king of Poland. In 1817, he released from servitude the peasants on his own estate in Poland. His death occurred in consequence of a fall from his horse.

Kossuth (*kŏsh'ōōt*; *kŏ-sōōth'*), **Louis (1802-1894),** Hungarian patriot, orator, and leader, was born at Monok, Hungary. In 1832, he commenced his political career as editor of a Liberal paper. In 1847, he was sent by the county of Pest as deputy to the Hungarian diet. To his speeches must in part be ascribed not only the Hungarian revolution but the insurrection in Vienna in 1848. On the dissolution of the ministry in 1848, he found himself at the head of the committee of national defense, and he prosecuted with extraordinary energy the measures necessary for carrying on the war. To put an end to all the hopes and schemes of the moderate party, he induced the National Assembly at Debreczen, in 1849, to declare the independence of Hungary. He was then appointed provisional governor of Hungary, but abandoned his position and fled into Turkey, where he was made a prisoner.

In 1851, Kossuth was liberated and sailed in an American frigate to England. Later in the same year, he landed in the United States. Everywhere he met with a most enthusiastic reception. He returned in 1852 to England, and there he chiefly resided until the Italian war broke out against Austria, when he organized a Hungarian legion in Italy. Later he lived in Turin.

Kostelanetz, André (1901-), Russian-American conductor, was born at Petrograd, where at the age of twenty he was appointed assistant conductor at the Imperial Opera. He and his family came to the United States in 1922, where he made his debut as conductor in 1924. Not long afterward, he was made permanent conductor of the Columbia Broadcasting System. Millions of records of his original arrangements of popular and classical music have been sold. He has been guest conductor of leading American symphony orchestras, often with his wife Lily Pons as soloist.

Koussevitzky (*kōō'sĕ-vĭts'kĭ*), **Serge (1874-1951),** Russian-American conductor, received his musical education in Moscow. He began as a double bass player, and in 1905 married the daughter of a wealthy Russian. Asked by his father-in-law what he would like for a wedding present, he answered, "A symphony orchestra." With the money given to him, he founded an orchestra of 75 players. For several years he and the orchestra traveled down the Volga in steamboats, bringing music to places where a symphony orchestra had never been heard. After the Russian revolu-

tion he fled to Paris, where for a number of years he organized and conducted the Concerts Koussevitzky. In 1924 he was appointed conductor of the Boston Symphony Orchestra, a position he held for twenty-five years. He was the organizer of the Berkshire Music Center, where each summer at "Tanglewood," an estate at Lenox, Mass., symphonic festivals are held.

Kreisler (*krīs'lĕr*), **Fritz (1875-)**, Austrian violinist, was born in Vienna. He entered the Vienna Conservatory at the age of seven; won the gold medal for violin playing at ten; and then went to the Paris Conservatory, where he studied violin under Massart and composition under Delibes. At the end of two years, he won the gold medal. In 1888, he began concert tours, appearing with Moritz Rosenthal in the United States in 1889. He then studied art and medicine, and served a year in the army.

In the period of his retirement from the concert hall, he completely changed his musical ideals from those of a marvelous technician of the Paganini type to those of an interpretative artist of the foremost rank. When, in 1899, he again appeared in Berlin, it was as one of the greatest masters of the violin. He was wounded at Lemberg in 1914, while serving with the Austrian army. He later described his experiences in *Four Weeks in the Trenches—The War Story of a Violinist*. Kreisler has been an American citizen since 1943. In 1952 he presented to the Congressional Library a valuable violin made by Josef Guarnerius del Gesu in 1737.

Kreuger, Ivar (1880-1932), Swedish engineer, industrialist, and financial pirate, was born at Kalmar, Sweden. At 19 he was graduated from Stockholm Technical College and, in 1900, came to the United States, where he was engaged in the construction of the Flatiron Building and other large structures in New York. In 1907, he returned to Sweden and, with Paul Toll, organized the firm of Kreuger and Toll for the construction of large, modern buildings. This firm entered the match business in 1913. During World War I, it secured control of the Swedish match industry. In 1922, Kreuger secured a monopoly of the match business in Poland in return for a loan to the Polish government. This was the first of numerous match monopolies obtained in return for government loans, by the help of which Kreuger and Toll's subsidiaries, numbering over 200, succeeded in obtaining over 75 per cent of the entire match business of the world.

In 1932, Kreuger committed suicide in Paris. The fact then transpired that, by accounting manipulations, convincing misrepresentations, and actual forgery, including that on a pseudo-issue of Italian government bonds, he had grossly deceived the principal bankers and investors of the entire world regarding the value of his companies. It is estimated that the trust reposed in him cost investors a total loss of over 500 million dollars.

Kropotkin (*krȧ-pôt'kĕn*), **Peter Alexĕievitch, Prince (1842-1921)**, Russian revolutionist and writer, was born at Moscow. At 15, he entered the corps of pages at Leningrad. After five years' service and exploration in Siberia, he returned to Leningrad in 1867 to study mathematics at the university while acting as secretary to the Russian Geographical Society. In 1871, he explored the glacial deposits of Finland and Sweden. In 1872, while on a visit to Belgium and Switzerland, he associated himself with the most extreme section of the International Working Men's Association. In 1874, after his return to Russia, he was arrested, but, in 1876, escaped to England. He was condemned at Lyons, in 1883, to five years' imprisonment for anarchism, but was released in 1886 and returned to England. His publications include *In Russian and French Prisons*; *The State, Its Part in History*; *Modern Science and Anarchism*; *Ideals and Realities in Russian Literature*; *The Conquest of Bread*; and *Terror in Russia*.

Kruger (*krü'gĕr*), **Stephanus Johannes Paulus, (1825-1904)** Boer statesman, was born in Colesberg in Cape Colony. With his family, he "trekked" to Natal, the Orange River Free State, and the Transvaal, and won such a reputation for cleverness, coolness, and courage that, in the war against England in 1881, he was appointed head of the provisional government. In 1883, he was elected president of the Transvaal, or South African Republic, and held that office as long as the Republic stood. "Oom Paul," as he was often called, was the soul of the policy that resulted in the Boer War of 1899-1902, in the prosecution of which he showed consummate resolution and energy. After the tide had fairly turned against the Boers, he went to Europe to seek alliances against Britain. He made his headquarters at Utrecht and thence issued *The Memoirs of Paul Kruger*. See *Boers*.

Krupp (*krŏŏp*), **Alfred (1812-1887)**, German ironmaster, was born at Essen, Prussia. He succeeded his father, Friedrich Krupp, who had founded a small iron forge at Essen in 1810. Krupp established the first Bessemer steelworks and the first forging hammer erected in Germany and was foremost in the technical development of the German iron and steel industry. The first steel gun manufactured by him, in 1847, was a 3-pounder muzzle-loader; in 1880, at the Düsseldorf Exhibition, he showed the first 100-ton steel gun. He acquired large mines and collieries and greatly extended his works at Essen. He supplied artillery to almost every European nation and was the recipient of many foreign orders and decorations.

Kubelik (*kōō'bĕ-lĭk*) **Jan (1880-1940)**, Bohemian violinist, was born at Miehle, near Prague. He received his first musical instruction from his father, a market gardener, and, at 12, entered the Prague Conservatory. He was very successful at concerts in Austria-Hungary prior to appearing in Berlin with the Philharmonic Orchestra, 1900. In 1905, he began a two years' tour round the world and met with notable success.

Kundt (*kōōnt*), **August Adolf Eduard Eberhard (1839-1894)**, German physicist, was born at Schwerin. In 1866, he became instructor at the University of Berlin; in 1868, was made professor of physics at Zurich; and later taught at Würtzburg, at Strasbourg, and at the University of Berlin, where he succeeded Helmholz in the chair of experimental physics. He made notable researches on sound, discovering a method, named after him, of determining the velocity of sound in gases. He made elaborate investigations also on the dispersion of light, on the conduction of heat and the friction of gases, the electrical properties of crystals, the rotation of the plane of polarization in gases, and the optical characteristics of metals. He published numerous works and scientific papers embodying his researches.

Kuroki (*kōō'rō-kē*), **Tamesada, Count (1844-1923)**, Japanese general, was born at Satsuma. He was a colonel on the Imperialist side during the Satsuma rebellion of 1877, distinguished himself in the war with China in 1895; and was promoted to the rank of general in 1903. He commanded the first army in the Russo-Japanese War, 1904-05, and was victorious at Yalu, Kiulienling, Liaoyang, Mukden, and Shaho. In 1906, he became inspector general of the Japanese army, and he subsequently made a tour of the United States. For his military services, he was made baron after the war with China and count after the war with Russia.

Kuropatkin (*kōō'rō-pät'kĭn*), **Alexei Nikolayevitch (1848-1921)**, Russian general, was born in the government of Pskov. After receiving an excellent education in the Russian military schools, he entered the army and distinguished himself in the war against the Bokharans. He served in the Russo-Turkish War; was governor of Transcaspia, 1890-98; and commander in chief of the Russian army for the period of the Russo-Japanese War. After his failure in this campaign, he was succeeded by General Linievitch, and, at his own request, was appointed to command the first Manchurian army. He commanded a Russian army group for a period of World War I and, in 1916, was made governor of Turkestan. He retired the next year and taught in a village school.

Kutuzov (*kōō-tōō'zôf*), **Mikhail, (1745-1813)**, prince of Smolensk, Russian field marshal, was born at Leningrad. He early entered the Russian army; distinguished himself in the Turkish wars; and, in 1787, was appointed governor general of the Crimea. After various other services, he was appointed, in 1805, to the command of the first army corps against the French. In that year, he was victorious over Marshal Mortier at Durrenstein. At Austerlitz, he was second in command of the allied army, of which Emperor Alexander was commander in chief. In 1811-12, he commanded the Russian army in the war against the Turks. Notwithstanding his advanced age, he succeeded Barclay de Tolly in 1812 as commander in chief of the army against the French and obtained a great victory over Davout and Ney at Smolensk.

Kyne, Peter Bernard (1880-), American author, was born at San Francisco. Educated in the public schools, he was successively a clerk, a lumber broker, and a newspaper man. He was captain of the 144th Field Artillery in World War I. Among his best-known works are *Cappy Ricks, The Valley of the Giants, The Pride of Palomar, Tide of Empire, Island of Desire, Comrades of the Storm*, and *Soldiers, Sailors and Dogs*.

Labouchere (*lȧb'ōō-shâr'*), **Henry du Pré (1831-1912)**, British radical politician and editor, was born in London. He was educated at Eton, and, for a short time, attended Cambridge. After several years in the diplomatic service, he entered politics. From 1880 to 1905, he was a Radical member of the House of Commons, with Charles Bradlaugh as his colleague.

He began his journalistic career on the London *Daily News*, just before the Franco-Prussian War. He wrote *Letters of a Besieged Resident*, and sent them from Paris to the *Daily News* by balloon post during the siege. In 1876, he founded the London *Truth*, as a rival society paper to the London *World*. For many years it had a remarkable record in the exposure of various frauds.

In Parliament, where he was familiarly known as "Labby," he was the recognized jester of the House. Nevertheless, his pungent and frequently cynical speeches reflected

highly independent democratic convictions. He vigorously urged the abolition of the House of Lords. After 1903, he lived chiefly in Italy. He left a fortune valued at about ten million dollars.

Lacordaire (*lá'kôr'dâr'*), **Jean Baptiste Henri, (1802-1861),** French preacher, was born at Recey sur Ource. He went to Paris to continue his legal studies, but in 1824 gave up law for theology. He was ordained priest in 1827 and became chaplain to the College Henri IV. He assisted Lamennais and Montalembert in editing *L'Avenir*, in which he taught that the people were supreme in civil life and the pope was supreme in religion. This combination of liberalism and Catholicism was denounced by the pope, and *L'Avenir* was given up.

In 1834, Lacordaire gave to students a series of "conferences" or lectures which attracted great attention and led the way to conferences in Notre Dame, Paris, in 1835-36. These had an immense appeal because they provided a bridge between religion and revolutionary zeal. In 1839, he entered the Dominican order, and, from 1843 to 1850, he continued his conferences at Notre Dame.

La Farge (*lá färzh'*), **Christopher Grant (1862-1938),** American architect, son of John La Farge, the painter, was born at Newport, R. I. He studied at Massachusetts Institute of Technology and, in 1882, entered the office of H. H. Richardson in Boston. In 1883, he formed a partnership with G. L. Heins, practicing with him in Minneapolis and in New York from 1886 to 1910, when he became member of the firm La Farge and Morris. In collaboration with his partner he produced the designs for the Protestant Episcopal Cathedral of Saint John the Divine, New York, one of the most elaborate religious edifices in the New World. The firm designed many other churches, libraries, and mausoleums erected in various parts of the United States; also the buildings for the New York Zoological Park and the stations for the New York subway. In 1918, he served as assistant general manager of the United States Housing Corporation.

La Farge, John (1835-1910), American mural painter, was born in New York. He studied with Couture in Paris and with William Morris Hunt in Boston. In 1876, he was employed to execute the mural decorations of Trinity Church, Boston, and, in 1878, began glass painting and window designing. During an extended tour in 1886, he made many water color studies of native life and scenes in Japan and in the Pacific Islands. In 1887, he painted his fine altar piece in the Church of the Ascension, New York.

La Farge was a pioneer in mural painting and exercised great influence upon American art, particularly in the making of stained glass. In recognition of distinguished achievements, he was chosen, in 1904, one of the seven original members of the American Academy of Arts and Letters. Among his best paintings are "Christ and Nicodemus," Trinity Church, Boston; "The Three Kings," Boston Art Museum; "The Muse of Painting," Metropolitan Museum, New York; and "The Arrival of the Magi," Church of the Incarnation, New York.

His writings include *Considerations on Painting, Great Masters, The Higher Life in Art,* and *Reminiscences of the South Seas.* See *Painting.*

Lafayette (*lä'fâ-yĕt'*), **Marie Jean Paul Roch Yves Gilbert Motier, Marquis de (1757-1834),** French general and statesman, descended from an ancient family of Auvergne, was born in the Castle of Chavagnac, now in the department of upper Loire. He became a soldier at an early age, and, in 1777, came to America to take part with the colonists in the war for independence.

The friendship of Washington exercised a great influence over the development of his mind and the formation of his opinions. The declaration of war between France and Britain gave him opportunity to aid the new republic in America and, following 1779, in France, where he was received with honor by the court and with enthusiasm by the people. He again came to America and was intrusted by Congress with the defense of Virginia, where he rendered important services.

Lafayette had imbibed liberal principles, and, on his second return to France, eagerly sought to promote a thorough reform in his native country. He was called to the assembly of notables in 1787, and was one of those who most earnestly urged the summoning of the States-General. He took part also in the movements which converted the assembly of the states into the National Assembly of 1789. He was very active in the proceedings of the assembly, and, being appointed to the chief command of the armed citizens, laid the foundation of the national guard and gave it the tricolor cockade.

The extreme French Republicans soon came to dislike Lafayette because he advocated a constitutional kingdom, and the court party, especially the queen, were displeased because of his zeal for the new order of things. After the adoption of the constitution of 1790, he retired to his estate of Lagrange until he received the command of the army of Ardennes, with which he won the first victories at Philippeville, Maubeuge, and Florennes. Nevertheless, the calumnies of the Jacobins rendered him exceedingly unpopular and he was accused of treason, but acquitted.

After several vain efforts to maintain the cause of national liberty, Lafayette left Paris for Flanders. He was taken prisoner by the Austrians and remained at Olmütz until Bonaparte obtained his liberation in 1797; but he took no part in public affairs during the ascendancy of Bonaparte. He sat in the Chamber of Deputies from 1818 to 1824 and from 1825 to 1830. In 1824, he revisited America by invitation of Congress, which voted him a grant of $200,000 and a township of land.

La Follette (*lä fŏl'ĕt*), **Robert Marion, (1855-1925),** American lawyer and legislator, was born at Primrose, Wis. He was graduated at the University of Wisconsin in 1879; studied law; was admitted to the bar; and, in 1880, became district attorney of Dane County. He was a member of Congress from 1885 to 1891, and took a prominent part in framing the McKinley Bill. He was governor of Wisconsin from 1901 to 1905 and led the successful movement to nominate all candidates by direct vote. In 1905, he was elected United States senator and was re-elected in 1911, 1917, and 1923.

La Follette made important contributions toward railway regulation and other public reforms and came to be regarded as one of the ablest debaters in the United States Senate. In 1909, he established a weekly periodical known as *La Follette's Magazine.*

In March 1917, during the closing days of the 64th Congress, he led a historic filibuster against authorizing President Wilson to arm merchant ships against German submarines. After the entrance of the United States into World War I, he became a pronounced and conspicuous pacifist. To him chiefly was due the investigation disclosing the Teapot Dome lease irregularities of 1924. Later in the same year he was nominated for the presidency by the Progressive party and received nearly 5 million votes in the ensuing election. His writings include an *Autobiography.*

La Follette, Robert Marion Jr. (1895-1953), American politician, was born at Madison, Wis., a son of the preceding. After acting as private secretary to his father for six years, he was appointed in 1925 as United States Senator to succeed his father, who had died in that year. He was elected in 1928, 1934, and 1940 as a Progressive, and attracted attention as a leader of a liberal group within the Senate. In 1936, he was made head of a committee charged with investigating violations of civil rights and in that capacity prosecuted a thorough-going inquiry into industrial espionage. In 1946 he was chairman of a committee which prepared an act simplifying and strengthening the organization and procedure of Congress.

La Fontaine (*lä'fôn'tän'*), **Henri (1854-1943),** Belgian jurist, the son of a banker, was born in Brussels. He was educated for the law at the University of Brussels. In 1889, he became secretary of the Belgian Peace Society; in 1892, head of the International Peace Bureau. He was made professor of international law in the University of Brussels in 1893. He served also from 1894 and 1936 in the Belgian Senate. In 1907, he was chosen president of the Interparliamentary Peace Congress at Bern. In recognition of his efforts to promote international peace, he was awarded, in 1913, the Nobel peace prize. He later represented Belgium at the League of Nations.

La Fontaine, Jean de (1621-1695), French poet and fabulist, was born at Chateau Thierry in Champagne. He early devoted himself to the study of the old writers and to verse making. In 1654, he published a verse translation of the *Eunuchus* of Terence and then went to Paris, where Fouquet awarded him a pension of 1000 francs for a piece of verse quarterly. His *Contes et nouvelles en vers* appeared in 1665, his *Fables* in 1668, and his *Amours de Psyché et de Cupidon* in 1669. The subjects of the *Contes* are taken from Boccaccio, Ariosto, Machiavelli, Rabelais, and other fabliau writers and the stories are retold with inimitable skill and wit. The *Fables,* or animal stories, are remarkable in that they appeal alike to children for their vividness, to students of literature for their skillful narrative, and to persons of mature experience for their subtle reflections on life.

Lagerlöf (*lä'gĕr-lûf*), **(Ottilia Lovisa) Selma (1858-1940),** Swedish story-writer, was born at Marbacka, Vermland. In 1891, she produced her first book, *Gösta Berling's Saga,* which won immediate and notable success. Subsequent study in Italy resulted in *Miracles of Anti-Christ;* after a year's travel in Greece, Egypt, and Palestine, she finished her *Jerusalem* in 1902. In 1907, she completed *Nils Holgersson's Wonderful Journey through Sweden,* a children's classic in Swedish literature, now widely known in English as *The Wonderful Adventures of Nils.* For these successes the Swedish Academy awarded her its gold medal and Upsala University conferred upon her the degree of doctor of letters. In 1909, she received the Nobel prize for literature, and, in 1914, she was elected to the Swedish Academy—the first woman so honored. Her writings in-

clude also *Christ Legends, From a Swedish Homestead, Invisible Links, The Girl from the Marsh Croft, Further Adventures of Nils, Liljecrona's Home, The Legend of the Sacred Image, Matilda Wrede, Dunungen, The Emperor of Portugallia,* and *Men and Trolls.*

Lagrange (*là'grănsh'*), **Joseph Louis, Count (1736-1813),** French mathematician, was born at Turin, Italy, of French parentage. He was educated in the college of his native city and, at the age of 19, became professor of mathematics in the Royal School of Artillery there. In 1764, he won a prize offered by the French Academy of Sciences for a *Theory of the Librations of the Moon.* In 1766, he was appointed by Frederick the Great to succeed Euler as director of the Berlin Academy of Sciences, a post which he held for 20 years. He then settled in Paris, where he remained during the Revolution. Afterward, he was patronized by Napoleon, who made him a count and a senator. He developed the theory of differential equations and was to a considerable degree responsible for the adoption of the decimal system in France. His most noted work was *Analytical Mechanics.*

La Guardia, Fiorello Henry (1882-1947), American politician, was born of Italian parentage in New York City. After serving at consulates in various European countries, 1901-06, and as interpreter at Ellis Island Immigration Station, 1907-10, he obtained a law degree at New York University and began the practice of law.

He served in the House of Representatives as a Republican in 1917-21 and 1923-32, where he sponsored legislation limiting labor injunctions and initiated an investigation into banking practices which led to new regulation of banks and security exchanges. Defeated for re-election in 1932, he was elected the next year as Mayor of New York City, on an anti-Tammany ticket. His re-election for a second four year term in 1937 was the first instance in the City's history of a "reform" administration surviving one term of the mayoralty. In 1940 he became head of the American members of the United States-Canada Defense Commission. He was director general of UNRRA, 1946. He wrote *The Making of an Insurgent,* an uncompleted autobiography.

Lalande (*là'lănd'*), **Joseph Jérôme Le-Français de (1732-1807),** French astronomer, was born at Bourg. He devoted himself to mathematics and astronomy with such success that, in 1751, the French Academy sent him to Berlin to determine the moon's parallax. He returned in 1752, was subsequently made astronomer royal, and, in 1762, professor of astronomy in the Collége de France. In 1795, he became director of the Paris Observatory. He constructed planetary tables which made possible important predictions. He also mapped 50,000 stars. His chief work is his *Treatise on Astronomy.*

Lamarck (*là'märk'*), **Jean Baptiste Pierre Antoine de Monet de (1744-1829),** French naturalist and pre-Darwinian evolutionist, was born at Bazentin. At 16, he joined the French army in Germany. Stationed as an officer at Monaco, he became interested in the Mediterranean flora. After an injury, he resigned and held a post in a Paris bank, meanwhile pursuing the study of botany. In 1778, he published his *Flora of France.* In 1779, he became a member of the French Academy and keeper of the royal garden, afterward the nucleus of Jardin des Plantes, and here he lectured for 25 years on invertebrate zoology.

About 1801, Lamarck began to think about the origin of species, expressing his conclusions in his famous *Zoological Philosophy,* published in 1809. His *Treatise on Invertebrate Animals* appeared between 1815 and 1822. He sought to explain their transformations and thus account for the evolution of the animal world. While his views concerning the effects of use and disuse and upon the inheritance of acquired characters are not now considered tenable by most naturalists, he was the first to make a clear statement of the doctrine of evolution. He thus prepared the way for the now widely accepted theory of descent. See *Evolution, Organic.*

Lamb, Charles (1775-1834), English essayist and poet, the son of a clerk to one of the benchers of the Inner Temple, was born in London. He was educated at Christ's Hospital, where he was the schoolfellow and friend of Samuel Taylor Coleridge. From 1792 to 1825, he was a clerk in the accountant's office of the East India Company, retiring on a pension. During most of these years, and indeed up to the close of his life, he devoted himself, in a spirit of noble self-sacrifice, to the care of his sister Mary, who suffered from recurrent mania as a result of which she had killed her mother.

Lamb's earliest literary efforts were in verse. In 1807, he published, in conjunction with his sister, a series of *Tales from Shakespeare* and, in 1808, two volumes of *Specimens of English Dramatic Poets who lived about the time of Shakespeare,* with short but felicitous notes. On the establishment of the *London Magazine* in 1820, he began a series of essays, signed *Elia,* which are the chief foundation of his literary fame. Part of their charm consists of their fantastic humor and restrained pathos.

Lamont, Thomas William (1870-1948), American banker, was born at Claverack, N. Y. Graduating at Harvard in 1892, he was a reporter for the New York *Tribune* for a year and then entered banking. He was an officer of the Bankers Trust Co. and later of the first National Bank prior to 1911, in which year he was made a partner in the firm of J. P. Morgan and Co., becoming chairman in 1943. Lamont was usually the spokesman for this firm in its relations with the public. He served as financial adviser to the United States government at the Paris Peace Conference in 1919 and took an active part in the work of various conferences on German reparations.

Lancaster, Joseph (1778-1838), English educator, was born in London. At an early age, he served as a seaman, but motives of philanthropy impelled him to teach the children of the poor. When only 20 years of age and utterly untrained, he had 1000 pupils under his supervision. He was, however, enabled to accomplish remarkable results by his adoption and improvement of the monitorial system previously developed by Dr. Andrew Bell at Madras, later known as the Lancastrian system.

Following this system, pupils as they advance in their work become, under the direction of the master, instructors or monitors of those in the grades below. For a time this plan was very popular in England, the Netherlands, France, and Germany. Lancaster personally introduced his system into America, where it was adopted in New York, Philadelphia, Baltimore, and other cities. While long outgrown where originally established, the Lancastrian system has been used with success in Mexico and in South American countries.

Landis, James McCauley (1899-), American jurist and administrator was born of American parents in Tokyo, Japan. Educated at Princeton and Harvard universities, he was law clerk to Supreme Court Justice Brandeis in 1925. He then taught at Harvard until 1933, when he was appointed to the Federal Trade Commission and, a year later, to the Securities and Exchange Commission. Here he served with marked ability in the new and complex field of finance regulation until 1937, when he accepted the deanship of the Harvard Law School. He served on a number of important special assignments and as special examiner for the Department of Labor in 1939 to determine the deportability of Harry Bridges, labor leader, as a Communist. In 1942-43, he headed the Office of Civilian Defense and then was sent on an economic mission to the Middle East. He was chairman of the Civil Aeronautics Board, 1946-47. He wrote *Cases in Labor Law* and *The Administrative Process.*

Landis, Kenesaw Mountain (1866-1944), American jurist, was born at Millville, Ohio. Graduating at the Union College of Law, Chicago, he practiced in Chicago until 1905, when he was appointed federal district judge. His most celebrated decision was in an antitrust case in which he assessed a fine of 29 million dollars against the Standard Oil Company of Indiana. The decision was reversed, however, on appeal. In 1920, he was made arbiter of all disputes arising in the major baseball leagues, the various clubs agreeing to accept his decisions in lieu of litigation. He resigned his judgeship in 1922.

Landor, Walter Savage (1775-1864), English poet and prose writer, was born at Warwick. He studied at Oxford, where he won high reputation as a scholar. In 1808, he raised a body of men at his own expense and joined the Spanish patriots to fight against Napoleon, returning after the disaster of Cintra. In 1798, he wrote a poem called *Gebir,* which was followed by *Count Julian, Idyllia Heroica,* and *Imaginary Conversations of Literary Men and Statesmen.* He was a thorough classical scholar, and his Greek and Roman characters speak as we should expect the ancient heroes to have spoken. He is greater as a prose writer than as a poet; but, according to Emerson, nature meant him rather for action than for literature. "He has," says Emerson, "an English appetite for action and heroes."

Landseer, Sir Edwin Henry (1802-1873), English animal painter, was born in London. He was trained in sketching by his father and studied at the Royal Academy schools. His first notable work was "Fighting Dogs," exhibited in 1819. This was followed by the "Dogs of St. Gothard," the popularity of which was very great. For more than 30 years every London exhibition contained new successes from his brush. In 1831, he was elected a royal academician, and, in 1850, was knighted.

Among Landseer's most noted pictures are "High Life," "Low Life," "A Jack in Office," "The Old Shepherd's Chief Mourner," "A Random Shot," "A Distinguished Member of the Humane Society," "Dignity and Impudence," and "The Monarch of the Glen." He painted animals, especially the dog, in their relation to man and endowed them with human sentiments. This is the secret of the great popularity of his pictures.

Landsteiner, Karl (1868-1943), pathologist, was born in Vienna, Austria, and was graduated from the University of Vienna in 1891. He was professor of pathology at that institution from 1909 to 1919. Coming to the United States, he was made a member of the Rockefeller Institute, New York, in 1922. Landsteiner discovered that human beings are divisible into four groups on the basis of the nature of their blood. This fact is of great importance in connection with blood transfusions since a transfusion must be from a subject having the same type of blood as the patient if serious results are to be avoided. For this discovery he was awarded the Nobel prize for medicine in 1930. He conducted valuable researches also on syphilis, infantile paralysis, and the chemistry of immunity. His study of the blood of primates showed that there is a closer relation between the blood of man and of the ape than between the blood of the ape and the monkey.

Lane, Franklin Knight (1864-1921), American public official, was born near Charlotteton, P. E. I., Canada. He removed to California in early childhood and was educated at the University of California. At first he engaged in journalism and became editor of the Tacoma *Daily News*. He then studied law, was admitted to the bar in 1889, and practiced in San Francisco, where he was corporation counsel from 1897 to 1902. In 1905, he was appointed member of the Interstate Commerce Commission, of which he later became chairman.

In 1913, Lane entered President Wilson's cabinet as Secretary of the Interior. In this capacity he advocated conservation of coal lands. He gave special attention to the Indians, maintaining that perpetual tutelage is wrong. He also urged a policy of Americanization for the foreign population. In 1920, he resigned from the cabinet. In 1922 were published *The Letters of Franklin Lane*, edited by his wife, Anne Wintermute Lane, and by Louise Herrick Wall.

Lanfranc (*lăn'frăngk*) **(c. 1005-1089),** Italian churchman, was born at Pavia. His life story falls into two parts. From 1042 to 1066, he ruled a monastery at Bec, near Rouen, conducting a school which was famous throughout Europe; from 1070 until his death, he was archbishop of Canterbury and gave to the Church of England the form it largely retained until the Reformation.

Having conducted a Cathedral School for three years at Avranches, Lanfranc went to Bec and there taught logic and theology. His students came from all parts of Europe and many were leaders of the Church later. He wrote a defense of transubstantiation which became the classic statement of the doctrine during the middle ages. Lanfranc incurred a sentence of exile from William of Normandy for opposing William's uncanonical marriage with Mathilda in 1053. Becoming reconciled with William, however, he secured the pope's approval both of the marriage and of William's conquest of England in 1066.

William repaid his services by having him made Archbishop of Canterbury in 1070. He established the primacy of this see over that of York, laid down rules of celibacy for the English clergy, and secured church courts separate from those of the state. He replaced Saxon churchmen with Normans in important positions.

Lange, Christian (1869-1938), Norwegian pacifist. He became professor of history at the Norwegian Nobel Institute and secretary to the Nobel committee in the *Storthing*, or Norwegian Parliament. In 1907, he was the Norwegian representative to the Second Peace Conference at The Hague. He represented Norway in the League of Nations Assembly, and, in 1921, severely criticized the League Council for its inaction in regard to disarmament. His writings include many works, pamphlets, and articles for the promotion of peace among the nations. In 1921, jointly with his compatriot Hjalmar Branting, he was awarded the Nobel prize for peace.

Langland, William (c. 1332-?), English poet, was born probably near Malvern. He spent most of his life in London in poverty, a clerk and singer of masses for the dead in churches. The allegorical poem *The Vision of Piers Plowman*, attributed to him, contains much vigorous satire on the abuses of the church and the state and is one of the earliest and most eloquent cries from an oppressed people. Nothing is known of Langland except the supposed evidence in the text of the poem itself. Some consider it the work of several writers and regard Langland as a mythical author. See *Piers Plowman*.

Langley, Samuel Pierpont (1834-1906), American astronomer and physicist, was born at Roxbury, Mass. He was educated at Boston Latin School, studied in Europe, and worked for a time as architect and civil engineer. In 1865, he became assistant in astronomy at Harvard; in 1867, he was made director of the Allegheny Observatory; and, in 1887, was appointed secretary of the Smithsonian Institution. He made important solar observations, invented the bolometer, and established at Washington the Astrophysical Observatory and the Zoological Park.

Langley also made valuable researches in the dynamics of the air and developed the principles upon which successful airplanes were later constructed. In 1896, a motor-driven airplane, designed and built by him, made the first sustained flight on record, but his further experiments were not so successful. Congress voted him $5000 with which to carry out his plans, but criticism, ridicule, and the lack of proper support caused him to abandon his experiments when, as it appears now, he was on the verge of success. The correctness of his design of apparatus and of the fundamental principles upon which it was constructed are now recognized by aeronautical engineers. In proof of this, Glenn Curtiss, in 1914, after installing a more powerful engine in Langley's machine of 1903, made a successful flight with it. His writings include *The New Astronomy, Experiments in Aero-Dynamics*, and *Internal Work of the Wind*.

Langmuir, Irving (1881-), American chemist, was born at Brooklyn, N. Y. He was graduated from the Columbia School of Mines in 1903 and, in 1906, received the degree of doctor of philosophy from the University of Göttingen. He was instructor in chemistry in Stevens Institute of Technology from 1906 to 1909, when he became research chemist in the research laboratory of the General Electric Company at Schenectady, N. Y.

In this post he was engaged in the development of gas-filled tungsten lamps, electron discharge apparatus, condensation high vacuum pumps, and atomic hydrogen welding. During World War I, he experimented on devices for submarine detection. For his researches on chemical reactions at low pressures, he was awarded, in 1915, the Nichols medal. In 1932, he received the Nobel prize for chemistry, by which recognition was given to his founding of surface chemistry, referring to molecular phenomena taking place when a minute amount of one liquid is brought into contact with the surface of another liquid.

Lanier (*lă-nēr'*), **Sidney (1842-1881),** American poet, was born at Macon, Ga. He was graduated at Oglethorpe College, Ga., in 1860. During the Civil War, he served in the Confederate army. He then studied law and from 1868 to 1872 practiced in company with his father at Macon. His passionate devotion to music as well as to literature impelled him to give up the law. In 1873, he settled in Baltimore, where he joined an orchestra and delivered lectures on English literature. He formed a helpful friendship with Bayard Taylor, won recognition by his writings, and, in 1879, was appointed lecturer on English literature at Johns Hopkins University. His two most notable books are his *Science of English Verse* and *Poems*. Of his poems, "Corn" and "The Marshes of Glynn" are typical, realizing to a remarkable degree Lanier's conviction that poetry is language conjoined with music. He was elected to the American Hall of Fame in 1945.

Lankester (*lăng'kĕs-tĕr*), **Sir Edwin Ray (1847-1929),** English zoologist, was born in London. He was educated at Downing College, Cambridge, and at Christ Church, Oxford. He was professor of zoology, University College, London, 1874-90; professor of comparative anatomy, Oxford, 1891-98; and director of the natural history departments of the British Museum, 1898-1907. He became known particularly for showing the relation between extinct species of animals and those still existing. Among his numerous publications are *Comparative Longevity, Degeneration, The Advancement of Science, The Diversions of a Naturalist, Extinct Animals, The Kingdom of Man*, and *Secrets of Earth and Sea*. He also edited an extensive *Treatise on Zoology*.

Lansing, Robert (1861-1928), American administrator and lawyer, was born at Watertown, N. Y. He was graduated from Amherst College in 1886, was admitted to the bar in 1889, and practiced law at Watertown until 1907. He acted as counsel or representative for the United States in a number of arbitration proceedings, including those over the Alaskan boundary in 1903.

Lansing was made counselor for the Department of State in 1914 and, from June 1915 to February 1920, was Secretary of State in President Wilson's cabinet. He was a member of the American commission to the Peace Conference at Versailles, 1918-19. President Wilson asked for his resignation in 1920 on learning that, during the president's illness, Lansing had several times convened the cabinet. During 1923-25, Lansing was counsel for Chile in the Tacna-Arica Controversy. His writings include *The Peace Negotiations, The Big Four and Others of the Peace Conference*, and *Notes on Sovereignty*.

Lao Tzu (*lä'ô tsû'*) **(c. 604 B.C.-?),** Chinese sage, was a contemporary of Confucius. He spent much of his life as librarian to an emperor. He is the reputed founder of Taoism, one of the principal religions of China, which emphasized the importance of simplicity and the desirability of being free from the tyranny of passion and interests outside oneself. The basis of the religion is found in Lao Tzu's work *Tao Te King*, one of the sacred books of China.

Lapérouse (*lä'pā'rōōz'*), **Jean François de Galaup, Count de (1741-1788),** French navigator, was born near Albia. He entered the navy in 1756, fought against the English, and was made captain in 1780. In 1785, supplied with two well equipped ships and accompanied by scientists, he was placed in command of an expedition of general discovery. After exploring the west coast of the Americas from Cape Horn to Mount Saint Elias, he crossed the Pacific, discovered Necker Island northwest of the Hawaiian group, and found the passage between Sakhalin and Yezo, now called Lapérouse Strait. From the coast of Kamchatka he sent Lesseps, his interpreter, across Siberia to France with the records of the expedition. Turning south he landed at the Navigator Islands, touched at Tasmania, and was last seen at Botany Bay early in 1788. In 1828, a French expedition found that Lapérouse and his entire party had perished in shipwreck in the New Hebrides.

Laplace (*lä'pläs'*), **Pierre Simon, Marquis de (1749-1827),** French mathematician and astronomer, was born at Beaumont en Auge, Normandy. At 18 he went to Paris, where he attracted the notice of D'Alembert, through whose influence he was appointed professor in the Military School and admitted to the Academy of Sciences. He rapidly rose to distinction and became one of the foremost scientists of France. He was the author of the nebular hypothesis, and with Lagrange did much to verify Newton's theory. Next to Newton's *Principia*, Laplace's *Mécanique céleste* and supplements to it constitute one of the world's most valued contributions to science.

LaRochefoucauld (*lä rôsh'fōō'kō'*), **François, Duc de (1613-1680),** French moralist, was born at Paris. At an early age he joined the army and after some years of service became engaged in intrigues against Richelieu at the instance of the queen. He joined the Fronde and was wounded at the siege of Paris. In 1652, again wounded, he retired to the country. On Mazarin's death in 1661 he repaired to the court of Louis XIV. His celebrated *Réflexions ou sentences et maximes morales* appeared in 1665. For epigrammatic force, brevity, clearness, and finish of style these maxims, some 700 in number, have never been surpassed.

LaSalle (*lä-säl'*), **René Robert Cavelier, Sieur de (1643-1687),** French navigator and explorer, was born in Rouen. He came to America in 1666, and became a trader in furs and the possessor of a tract of land in Canada. After a voyage of exploration from Lake Erie to Lake Superior, he made his way down the Mississippi, being the first European to travel from the upper waters of this river to its mouth. He took possession of the land around the Gulf of Mexico, called it Louisiana in honor of the French king, and went to France to get men and means to colonize it.

LaSalle succeeded in sailing from France with four vessels. But quarrels arose between him and Beaujeu, the commander of the fleet, resulting in the return of the latter, with a part of the people, to France. With the remainder LaSalle kept on his way, but failed again to find the Mississippi, and wandered from place to place until nearly all his followers were dead. At last, giving up hope of reaching the land he was seeking, he set out for Canada with a small company in 1687. On the way two of the men shot him.

Laski, Harold Joseph (1893-1950), English economist, was born at Manchester. After he was graduated from Oxford University, he lectured at McGill University, Montreal, in 1914-16, and at Harvard University for the next four years. Returning then to England, he joined the faculty of the London School of Economics and was made professor of political science at the University of London in 1926. His interests, taking a socialistic bent, were set forth in numerous vigorously written works characterized by a realistic grasp of economic behavior. These include *Authority in the Modern State, Democracy in Crisis, The State in Theory and Practice,* and *The Rise of European Liberalism.*

Lassalle (*lä'säl'*), **Ferdinand (1825-1864),** founder of socialism in Germany, was born of Jewish parents in Breslau. He attended the universities of Breslau and Berlin, became a disciple of Hegel, took part in the revolution of 1848, and was sent to prison for six months. In 1861, his *System of Acquired Rights* started an agitation of labor against capital and he was again thrown into prison. On his release he founded an association to secure universal suffrage and other reforms. While he added little to the socialistic teachings of Marx, yet by his eloquence and fascinating personality he established modern socialism as a political force. He was killed in a duel, the result of a love affair.

Lassus (*läs'sŭs*), **Orlandus di (c. 1532-1594),** composer of Church music, was born at Mons, Belgium. When a choir boy in Mons he is said to have been taken by the viceroy of Sicily to Milan, where he remained some years. In 1557, he went to Munich and was organist in the court chapel from 1563 until his death. He was the forerunner of Palestrina, devoting his talents chiefly to the composition of sacred music in contrapuntal style. He was one of the most prolific composers in the history of music, the number of his known works exceeding 2000. The *Penitential Psalms of David* ranks as his finest work, and his influence on the development of Church music is second only to that of Palestrina.

Lathrop, Julia Clifford (1858-1932), American humanitarian, was born at Rockford, Ill. She was educated at Rockford College and Vassar College, from the latter of which she was graduated in 1880. Devoting herself to various reform movements, she made a special study of child welfare and of the care of the insane. From 1893 to 1909, she was a member of the Illinois State Board of Charities. Beginning with 1899, she spent much time as a voluntary resident of Hull House, Chicago, studying various civic and social problems. She was the first chief of the Children's Bureau in the Department of Labor, Washington, being appointed by President Wilson in 1912 and reappointed by President Harding. She worked with the Child Welfare Committee of the League of Nations. Her writings include numerous reports and articles on child welfare and the care of the insane.

Latimer, Hugh (c. 1490-1555), English bishop and martyr, was born at Thurcaston. He was educated at the University of Cambridge. In early life he was a zealous Catholic, but, being converted to Protestantism, he became an equally zealous champion of the Reformation and, in 1535, was made bishop of Worcester by Henry VIII. On the passing of the "Act of the Six Articles," he resigned the bishopric and was punished therefor by being imprisoned during the remainder of Henry's reign. The accession of Edward VI set Latimer at liberty and he began preaching anew, but refused to resume the miter. Shortly after Mary's ascent to the throne he was again imprisoned. In 1555, he was brought to the stake where he died with unshaken courage. Ridley was his fellow martyr.

Latrobe (*lä-trōb'*), **Benjamin Henry (1764-1820),** American architect and engineer, was born in Yorkshire, England. He studied architecture and, in 1789, was made surveyor of the public offices of London. In 1796, he came to the United States, was made engineer of the James River and Appomattox Canal, and superintended the building of the penitentiary in Richmond. He designed the Bank of Pennsylvania, the old Academy of Art, and the Bank of the United States, in Philadelphia. In 1803, he was made surveyor of public buildings in Washington, and advised concerning the plans of the Capitol, which he was engaged to rebuild after it was burned by the British in 1814. Latrobe was largely instrumental in introducing Greek forms into American architecture.

Lauder (*lô'dĕr*), **Sir Harry MacLennan (1870-1950),** Scottish singer, was born at Portobello, near Edinburgh. When a boy, he was employed in a flax-spinning mill at Arbroath, and later he worked in the coal mines. He finally took to the variety stage, and became immensely popular for his Scottish songs, written and composed by himself and sung in character. His many tours throughout Great Britain, the United States, Australia, and New Zealand netted him a large fortune. During World War I he organized the "Harry Lauder Million Pound Fund for Maimed Men, Scottish Soldiers and Sailors."

Although Lauder was generally regarded as a comedian, his songs and characterizations include not only rollicking humor but also the tenderest tributes to home, love, and country. Among his numerous songs are "Roamin' in the Gloamin'," "Wee Hoose amang the Heather," "She's the Lass for Me," and "The Laddies Who Fought and Won." He wrote also *Harry Lauder at Home and on Tour, Harry Lauder's Logic, A Minstrel in France, Roamin' in the Gloamin',* and a Scottish comedy.

Laughton, Charles (1899-), actor, producer, lecturer, and interpreter of the Bible and Shakespeare, was born in England. He served in the British army in France in World War I and was wounded shortly before the Armistice. While employed unwillingly at his father's work of hotel-keeping, he began serious preparation for a stage career. Prophetic of his later accomplishments was his winning of the Bancroft gold medal at the Royal Academy of Dramatic Art in London for reciting one of Falstaff's scenes from *The Merry Wives of Windsor.* As an actor on stage and screen, he is known especially for his performance of Henry VIII, Captain Bligh in *Mutiny on the Bounty,* Barrett in *The Barretts of Wimpole Street,* and Javert in *Les Miserables.* He is an American citizen and lives in California.

Laurier (*lō'ri-ā'*), **Sir Wilfrid (1841-1919),** Canadian statesman, first French Canadian premier of the Dominion, was born in Saint Lin, Quebec. He was educated for the bar at L'Assomption College and at McGill University, and rose rapidly in his profession. In 1871, he was elected as a Liberal to the Quebec provincial assembly, and, in 1874, he was elected to the Federal Assembly. His high personal character, his loyalty and attachment to the connection of Canada with Great Britain, together with the great

oratorical powers which earned for him the title "silver-tongued Laurier," soon gave him high rank in the Liberal party.

On the retirement of Blake in 1887, Laurier was chosen leader of the Liberal party, and, at the general election of 1896, he led his followers to victory. In 1900, he again secured the approval both of the Dominion and of the British Empire by the prompt dispatch of Canadian troops to aid the mother country in South Africa, and led his party to another triumph at the polls. He was returned to power in 1904 and again in 1908 but was defeated in the elections of 1911 on the issue of reciprocity with the United States.

Laurier's premiership was notable for transcontinental railway building, development of agriculture, expansion of trade, and promotion of close relationship with Great Britain, while constantly increasing Canadian initiative. He also labored zealously to establish good relations between the two races in Canada and between Canada and the United States.

Lausche, Frank J. (1895-), American politician, was born at Cleveland, Ohio. After he was graduated from the John Marshall Law School in 1920, he practiced law in Cleveland until 1932. He then served as judge of the Municipal Court (1932-35) and judge of the Common Pleas Court (1935-41) and was mayor of Cleveland from 1941 to 1944. A Democrat in politics, Lausche was governor of Ohio in 1945 and 1946 and 1949-57. In 1956 he was elected to the United States Senate.

Laval, Pierre (1883-1945), French statesman, was born at Chateldon. Elected as a Socialist to the Chamber of Deputies in 1914, he served in the army during World War I, returning to the legislature in 1924. He left the Socialist party and, in 1925, held his first cabinet post, the Ministry of Public Works. He was prime minister, 1931-32, leading a conservative government. He blocked a proposed customs union between Germany and Austria and agreed to the settlement which in the event, ended German reparations payments. Imports were restricted in a vain attempt to ward off the effects of the world-wide economic depression.

In the period preceding the outbreak of war with Germany in 1939 he was an advocate of appeasement to Hitler, whose rise appeared to him to be a bulwark against radical tendencies in society. His policy thus prepared for his selection as vice premier in the emergency government of Pétain which negotiated surrender of a large part of France to Germany in 1940. Pétain dismissed him because of his pro-German policy, but was forced to hand over authority to him in 1942. When France was liberated in 1944, he retired to Germany and later to Spain. From there he was returned and was subsequently tried and executed.

Lavedan (*läv'dăN'*), **Henri Léon Emile (1859-1940),** French dramatist and novelist, was born at Orleans. He was educated at Orleans and later studied law at Paris. Lavedan is at his best in character portrayal, the finest examples of which are found in *The Prince d'Aurec*, his best-known play, in *The Latest Fad*, and in *The Marquis de Priola*. He wrote some 15 plays, of which *The Duel* and *Sire* have been presented in the United States by Otis Skinner. Lavedan was elected to the French Academy in 1898.

Laveran (*läv'răN'*), **Charles Louis Alphonse (1845-1922),** French physician, was born in Paris. He was educated in military medicine at Strasbourg and, in 1873, became professor at Val de Grace. In 1878, he went to Algeria to study malarial fevers, returning in 1883 to Val de Grace, where he was professor of military hygiene until 1894. He then entered the medical service of the army and later became head physican at the Lille Hospital and a member of the French Academy of Medicine. In a treatise on fevers, published in 1884, he announced the important discovery of the blood parasite of malaria, for which service he was awarded the Bréant prize. In 1907, he received the Nobel prize for medicine.

Lavoisier (*lä'vwä'zyā'*), **Antoine Laurent (1743-1794),** French chemist and one of the founders of modern chemistry, was born at Paris, France. He was carefully educated at the Collège Mazarin. In 1766, he received the prize offered by the French Academy of Sciences for the best and cheapest means of lighting city streets, and, two years later, he was admitted to the Academy. In 1769, he was appointed farmer-general of revenue.

Lavoisier's entire scientific career is marked by his use of the experimental, inductive method. From mineralogy he turned his attention to chemistry about 1770. After four years, he published *Physical and Chemical Essays*, in which he described his own theory of combustion, the destined center of modern chemistry. It had been believed that bodies decomposed upon combustion and that a substance termed phlogiston was released from them. Lavoisier determined by precise, unwearied experimentation that, in all cases of combustion, the one real combustible substance receives an addition, and that the matter with which it combines is, in all instances, "vital air," termed today oxygen.

In 1776, Turgot, then minister of finance, engaged Lavoisier to superintend the manufacture of gunpowder for the government. In 1778, Lavoisier announced the great discovery "that the respirable portion of the atmosphere is the constituent principle of acids," which he named oxygen. Plenteous riches afforded Lavoisier unlimited instrumental aid, and he generously extended similar advantages to others. His house soon became a point of general resort for the philosophers of Europe and brought into communication men engaged in many different branches of science.

With Lavoisier's *Method of Chemical Nomenclature*, published in 1787, phraseology in the chemical sciences assumed precision. He synthesized his scientific views into a connected system, which appeared in 1789 under the title *Elementary Treatise on Chemistry*. He then began researches looking toward the application of pneumatic chemistry to the science of medicine.

Lavoisier also served the government in various capacities. He improved the methods of agriculture on scientific principles; took an active part in the preparation of the metric system; and formed a plan for simplifying the collection of taxes. After the Revolution, this connection with the government was the occasion of his indictment in 1794 before the Revolutionary tribunal. Condemned to the guillotine, he was executed on May 8, 1794.

Law, Andrew Bonar (1858-1923), British statesman, was born in New Brunswick, Canada. Taken to Scotland as a boy, he later acquired there a substantial fortune as an iron merchant. Entering politics at the age of 40, he rose to be leader of the Unionist party in the House of Commons by 1911. He was a member of the cabinets of both Asquith and Lloyd George during World War I and, on the retirement of Lloyd George in 1922 as head of the coalition government, became prime minister. He resigned a few months later owing to failing health.

Lawrence, Abbott (1792-1855), American merchant and philanthropist, was born at Groton, Mass. In partnership with his brother Amos, he acquired a large fortune, a part of which was invested in the cotton factories of Lowell and Lawrence. He was member of Congress, 1835-37 and 1839-40. In 1842, he was chosen one of the commissioners to settle the northeast boundary question with Great Britain. He founded the Lawrence Scientific School at Harvard University.

Lawrence, David (1888-), American journalist, was born at Philadelphia, Pa. After he was graduated from Princeton in 1910, he joined the Washington staff of the Associated Press. From 1916 to 1919, he was Washington correspondent of the New York *Evening Post*, and from 1919 to 1933 president of the Consolidated Press Association. He was founder and editor of *The United States Daily* (1926-33), *United States News* (1933-48), and *World Report* (1946-48). Since 1948 he has been president and editor of the weekly publication *United States News and World Report*. His dispatches on national and international affairs are syndicated to more than 250 newspapers. He has written a number of books, including *Nine Honest Men* and *Diary of a Washington Correspondent*.

Lawrence, David Herbert (1885-1930), English novelist, was born at Eastwood and was educated at the University of Nottingham. His early books, *The White Peacock* and *Sons and Lovers*, gave evidence of great force and originality as well as a rare artistry in diction. A growing preoccupation with the mysteries of sex is evident in *Women in Love*, *The Lost Girl*, and *Lady Chatterley's Lover*. Lawrence was essentially a mystic and a poet, and the wizardry of a transcendent beauty plays over his descriptive passages, notably in his *Sea and Sardinia*, *Mornings in Mexico*, and *England, My England!*

Lawrence, Ernest Orlando (1901-), American physicist, was born at Canton, S. D. Educated at the universities of South Dakota, Minnesota, Chicago, and Yale, he taught at Yale University from 1925 to 1928. He then joined the staff of the University of California, becoming director of its radiation laboratory in 1936. His researches into the structure of atoms, the transmutation of atoms, and applications of radiation to medicine brought him the award of the Nobel prize in physics for 1939. He has been professor of physics at the University of California since 1930.

Lawrence, James (1781-1813), American naval officer, was born at Burlington, N. J. In the war with Tripoli, 1804, he served under Commodore Decatur. By brave conduct, he rose successively to the command of the *Argus*, the *Vixen*, the *Wasp*, and the *Hornet*. In 1813, after a short engagement, he captured the British brig-of-war *Peacock* and afterward was made commander of the frigate *Chesapeake*. In June 1813, he met the British frigate *Shannon* just out of Boston, and, after a hard fight, he was mortally wounded and his ship was captured. Here he uttered the

words, "Don't give up the ship!", which became a motto in the navy.

Lawrence, Sir Thomas (1769-1830), English portrait painter, was born in Bristol. He succeeded Sir Joshua Reynolds in 1792 as first painter to King George III. From 1820 until his death, he was president of the Royal Academy. He painted portraits of nearly all the monarchs and other notable personages of Europe. His pictures are distinguished by thoroughly refined taste and great technical perfection. See *Painting*.

Lawrence, Thomas Edward (1888-1935), British adventurer and scholar, was born in Wales. Graduating at Oxford University in 1910, he made a tour of Syria on foot, learning the Arabic language and becoming familiar with Arab habits. He then assisted in archeological explorations in Iraq until 1914, when he joined the British intelligence service in the Near East. When Turkey entered World War I as an ally of Germany, Lawrence was sent to stir up the Arabs to revolt against Turkey. By the confidence he inspired in the chieftains and the success he achieved in harassing or openly attacking the Turkish forces, Lawrence became a legendary figure. He entered Jerusalem ahead of Allenby in the final Turkish defeat. At the Versailles Peace Conference he sought vainly to obtain independence for the Arabs. Failing, he refused knighthood from the king and went into retirement to write his memoirs, which were published later as *The Seven Pillars to Wisdom*. To avoid publicity, he enlisted under the name of T. Shaw as a mechanic in the air force. He was killed in a motorcycle accident, in which he avoided running over a child.

Layard (*lā'ärd*), **Sir Austen Henry (1817-1894),** English archeologist and diplomat, was born in Paris. He spent his boyhood in Italy and developed a taste for travel. Journeying along the Tigris in 1840, he was struck with the ruins of Nimrud, the supposed site of Nineveh. In 1845-47, he carried on excavations there, finding the remains of ancient buildings. Many large stone slabs covered with bas-reliefs and cuneiform inscriptions together with gigantic winged human-headed bulls and lions, were unearthed and sent by Layard to the British Museum, London. In 1852, he became a member of Parliament; in 1869, he was made British ambassador to Spain; and, from 1877 to 1880, he was ambassador to Turkey. Layard was the author of the famous expression "the right man in the right place."

Lea (*lē*), **Henry Charles (1825-1909),** American author and ecclesiastical historian, was born at Philadelphia. He received a private education and engaged in the publishing business from 1843 to 1880. He then retired and engaged in literary and historical research, rising to foremost rank among modern Church historians. His collection of books and manuscripts, the finest of its kind in the world, was bequeathed to the University of Pennsylvania. In recognition of his distinguished work, he was, in 1908, made member of the American Academy of Arts and Letters.

Lea's historical works include *Superstition and Force*, *A History of the Inquisition of the Middle Ages*, and *The Inquisition of the Spanish Dependencies*.

Leacock, Stephen Butler (1869-1944), Canadian humorist and economist, was born at Swanmoor, England. He was educated at the University of Toronto and the University of Chicago. He taught in Upper Canada College and in the University of Chicago prior to 1904, when he became head of the department of economics at McGill University, Montreal. His publications include *Elements of Political Science*, biographies of Charles Dickens and Mark Twain, *Too Much College*, and *How to Write*. His humorous works, characterized by grotesque and surprising exaggeration, include *Behind the Beyond*, *Moonbeams from the Larger Lunacy*, and *College Days*.

Leader, George Michael (1918-), American politician, was born near York, Pa. After attending York Collegiate Institute and Gettysburg College, he was graduated from the University of Pennsylvania in 1939. During World War II he served as lieutenant in the USNR. A Democrat in politics, Leader was a member of the Pennsylvania state senate 1950-54, and in 1955 became governor of Pennsylvania. He has been proprietor of Willow Brook Farms, Dover, Pa., since 1949.

Leahy, William Daniel (1875-), American naval officer, was born at Hampton, Iowa. He was graduated from Annapolis and was promoted through grades to rear admiral in 1930. He was made admiral in 1936 and became chief of naval operations in 1937. Retiring in 1939, he was made governor of Puerto Rico and later was sent as ambassador to the French government at Vichy. In 1942 he was made chief of staff to the commander in chief. In 1944 he was promoted to admiral of the fleet.

Lebrun (*lē-brŭN'*), **Albert (1871-1950),** president of France, was born near Mercy-le-Haut, Lorraine. An engineer by training, he was elected to the Chamber of Deputies in 1900 and to the Senate in 1920, serving in several ministries. He became president of France in 1932 and remained in office until the Third Republic was overthrown in 1940. In October, 1944, he formally resigned.

Lebrun, Charles (1619-1690), French historical painter, was born in Paris. For 40 years he exercised a dominating influence in French art, being considered the founder of the French school of painting. He was director of the Gobelins Tapestry Works, and was employed in the decoration of Versailles. Many of his works are in the Louvre.

Lecky (*lĕk'ĭ*), **William Edward Hartpole (1838-1903),** British historian and philosopher, was born near Dublin, Ireland. He was graduated at Trinity College, Dublin, in 1859. In 1861, he published anonymously *The Leaders of Public Opinion in Ireland*, four brilliant essays on Swift, Flood, Grattan, and O'Connell. In 1865, his *Rationalism in Europe* created a marked impression on the literary world for its erudition and profundity. This was followed by other historical works which gained him literary eminence. Among his chief works are *History of European Morals*, *History of England in the 18th Century*, *The Political Value of History*, and *Democracy and Liberty*.

Le Conte (*lē kŏnt'*), **Joseph (1823-1901),** American geologist and physicist, was born in Liberty County, Ga. He was graduated at Franklin College, University of Georgia, in 1841 and at the New York College of Physicians and Surgeons in 1845, and practiced his profession at Macon, Ga. In 1850, he went to Harvard, where he studied under Agassiz. He subsequently held several professorships and, in 1869, became professor of geology and natural history in the University of California. He developed the theory that mountains are formed by lateral pressure as the earth shrinks. He did much to popularize the study of this science in America. Among his chief works are *Religion and Science*, *Elements of Geology*, *Sight*, *A Compend of Geology*, and *Evolution*.

Le Corbusier (1887-), architect, painter, and city planner, was born Charles-Edouard Jeanneret-Gris in the French-speaking part of Switzerland. In partnership with a cousin, Pierre Jeanneret, he experimented with ribbon windows, exterior spiral staircases, extensive use of glass and concrete, asymmetrical facades and other new kinds of construction. Le Corbusier thinks of a house as a functional unit and of a city as an efficient group of buildings utilizing the materials of city planning, "which are sky, space, trees, steel and cement, in this order." His book, *Towards a New Architecture*, contains many ideas which were new at the time concerning uses of concrete. Other works by him are *Urbanisme* (The City of Tomorrow) and *New Worlds of Space*.

Lee, Henry (1756-1818), American general, familiarly known as "Light Horse Harry," was born in Virginia. He was one of the most daring, vigilant, and successful cavalry officers on the side of the colonists. "Lee's legion" was probably the most effective and courageous body of troops raised in America. In the famous retreat of Greene before Lord Cornwallis, it formed the rear guard, the post of honor, and covered itself with glory. At the battles of Guilford Courthouse and Eutaw Springs, Lee particularly signalized himself. After the war, he was sent to Congress as a delegate from Virginia. He advocated the adoption of a federal constitution, and, in 1792, was chosen governor of Virginia. When Washington died, Lee was chosen by Congress to write a eulogy of him; in it occur the famous words, "First in war, first in peace, and first in the hearts of his countrymen."

Lee, Richard Henry (1732-1794), American patriot and signer of the Declaration of Independence, was born in Virginia, and was educated in England. He returned to America in 1752, and, at the age of 25, was chosen a delegate to the House of Burgesses, where he soon distinguished himself by his powers in debate. In 1766, he was appointed to draft an address to the king and a memorial to the House of Lords, which are among the best state papers of the period.

Lee's efforts in resisting the various encroachments of the British government were indefatigable, and, in 1774, he attended the first Continental Congress at Philadelphia as a delegate from Virginia. The memorial of Congress to the people of British America and the second address of Congress to the people of Great Britain were from his pen. In June 1776, he introduced the measure that declared the colonies free and independent states and supported it by a speech of the most brilliant eloquence. He was a member of the convention which adopted the present Constitution of the United States and was one of the first senators under it. In 1792, he retired from public life.

Lee, Robert Edward (1807-1870), American general, son of Henry Lee, was born in Westmoreland County, Va. At 18, he entered West Point, was graduated second in his class in 1829, and received a commission in the corps of engineers. During the Mexican War, he was repeatedly promoted for distinguished services, first at Cerro Gordo,

again at Churubusco, and finally at Chapultepec. From 1852 to 1855, he was superintendent of the United States Military Academy and greatly improved its efficiency. His next service was as cavalry officer on the Texan border, 1855-59. At the John Brown raid he was ordered to Harpers Ferry to capture the insurgents. He was in command in Texas in 1860, but was recalled to Washington in March 1861, when seven states had formed the Southern Confederacy.

In April 1861, Colonel Lee sent in his resignation, and, within two days, he was made commander in chief of the military forces of Virginia. At Richmond he superintended the defense of the city until the autumn, when he was sent to oppose General Rosecrans in West Virginia. In the spring of 1862, he was working at the coast defenses of Georgia and South Carolina, but on McClellan's advance was summoned to Richmond. General J. E. Johnston, chief in command, was wounded at Seven Pines in May and Lee was put in command of the army around Richmond. In the Seven Days' battles around Richmond, he defeated McClellan's purpose.

His successes against McClellan in the peninsular campaign led Lee to invade Maryland. This advance was checked by McClellan at the battle of Antietam in September 1862. Lee then withdrew to Virginia, followed somewhat later by the Union forces. Defeating Burnside's larger army at Fredericksburg in December 1862 and outgeneraling Hooker's superior forces at Chancellorsville in May 1863, Lee once more determined to invade the North. Attacking the Union army under General Meade at Gettysburg, Pa., in a terrific three days' battle, in July 1863, Lee was decisively defeated, but conducted his shaken army safely back to Virginia. Here he devoted himself mainly to defensive operations until attacked, in May 1864, by Grant's superior armies. Temporarily staying the Union advance in the desperate conflicts of the Wilderness, Spottsylvania, and Cold Harbor. Lee was at length forced into the defenses of Richmond. Here he withstood siege until April 1865, when he was compelled to abandon the Confederate capital. He made an attempt to join forces with General J. E. Johnston in North Carolina but failed. On April 9, 1865, Lee surrendered his army to General Grant at Appomattox Courthouse, Virginia, and the war was practically ended.

Lee frankly accepted the result, and, although deprived of his former property at Arlington on the Potomac, he declined proffers of pecuniary aid and accepted the presidency of Washington College, now Washington and Lee University, at Lexington, Va., at whose head he remained until his death. He was buried in the college chapel, his tomb being marked by a recumbent effigy; elected to the American Hall of Fame, 1900. See *Civil War, American.*

Leeuwenhoek (*lā'vĕn-hōōk*), **Antony van (1632-1723)** Dutch microscopist and naturalist, was born at Delft. Although without technical education, he was possessed of funds which enabled him to devote himself to the manufacture of lenses and to the study of the minute structure of plants and animals by means of the microscopes which he constructed. The excellent quality of his lenses and his own remarkable powers of observation enabled him to make many interesting discoveries.

In 1674, he discovered and described the red corpuscles of the blood, which he noted were circular in man but oval in frogs and fishes. In 1677, he described and illustrated spermatozoa though the actual discovery is credited to his pupil, Ludwig Hamm. In 1680, he detected in yeast what are now known as yeast plants. By revealing the true life history of various low forms of animal life, he did much to disprove Aristotle's doctrine that these could be generated spontaneously.

Le Gallienne (*lē găl'ĭ-ĕn'*), **Eva (1899-)**, American actress, producer and manager, was born in London, England, the daughter of Richard Le Gallienne. She made her London debut at the Prince of Wales Theater in *The Laughter of Fools*, 1915, and her New York debut in 1916 in *The Melody of Youth*. Ten years later she founded the Civil Repertory Theater in New York. She acted with great distinction in Molnar's *Liliom*, Schnitzler's *Call of Life*, and Ibsen's *Master Builder*. Among plays which she produced and acted in were *The Cherry Orchard, Peter Pan, Twelfth Night, Romeo and Juliet*, and *Alice in Wonderland.*

Le Gallienne, Richard (1866-1947), poet and essayist, was born in Liverpool, England. He was educated at Liverpool, entered business, but, after seven years, abandoned it for literary pursuits. He became literary critic for the *Star* and for a time lived in London. In 1902, he took up his residence in New York. Among his numerous writings are *My Ladies' Sonnets, Volumes in Folio, The Book-Bills of Narcissus, The Religion of a Literary Man, The Quest of the Golden Girl, If I Were God, Little Dinners with the Sphinx, Vanishing Roads and Other Essays, Love Letters of the King, Omar Repentant, From a Paris Garret*, and *Modern Book of English Verse.*

Lehman, Herbert Henry (1878-), American banker and statesman, was born in New York City. Educated at Williams College, he entered the employ of a textile firm, J. Spencer Turner Co., becoming vice president and treasurer in 1906. Two years later he entered the investment banking firm of Lehman Brothers. He served in World War I and later became interested in politics. He was elected lieutenant governor of New York in 1928 and 1930. In 1932, he succeeded Franklin D. Roosevelt as governor, and was re-elected for succeeding terms to 1942. Lehman exerted his influence consistently for liberal legislation and was regarded as a strong supporter of the New Deal administration. He urged maximum aid to Great Britain in 1940. In 1942 he resigned the governorship and until 1946 directed foreign relief and rehabilitation. Elected to the U. S. Senate in 1949; re-elected, 1950. In 1956 he announced that he would not run again.

Leibnitz (*līp'nĭts*), **Gottfried Wilhelm von (1646-1716)**, German philosopher and mathematician, was born at Leipzig. He learned Greek and Latin at the School of Saint Ncholas and, at the age of 15, he entered the University of Leipzig, where he devoted himself to philosophy, literature, jurisprudence, and mathematics. He received his bachelor's degree in 1663, when he presented a thesis *On the Principle of Individuation*. In 1666, he published his *Treatise on the Art of Combination* and received his degree as doctor of laws at Altdorf University. These works laid the foundation for a theory he later developed, that the ultimate elements of the universe are monads, or centers of force, ranging in complexity from the simplest to the highest, which is God.

Leibnitz became councilor of state at Frankfort in 1667, and later was appointed to the bench of the upper court of appeals there. His time was divided between philosophical jurisprudence, theology, mathematics, and physics. In 1672, he submitted to Louis XIV the essay *Egyptian Project*, containing a plan for the invasion of Egypt. In Paris, Leibnitz became associated with that critical period of mathematical research which, dating from the geometry of Descartes, was to culminate four years later in his own discovery of the infinitesimal calculus. Public business took him in 1673 to London, where he made the acquaintance of the founders of the Royal Society, among them, Newton.

Leibnitz entered the service of the Duke of Brunswick at Hanover and, in 1676, was made privy councilor and librarian. He rearranged and enriched the famous Wolfenbüttel library, and he took an active part in negotiations for Church union between Protestants and Catholics, as is evidenced by his *System of Theology*. Leibnitz was the chief organizer and first president, in 1700, of the Academy of Sciences at Berlin. He originated projects for the establishment of similar bodies at Dresden, Vienna, and Leningrad.

In 1704, Leibnitz wrote an examination of Locke's philosophy. Six years later he published, in French, *Theodicy*, which seeks to prove that this is the best of all possible worlds. The fragment *Monadology*, in which he developed his system of metaphysics, belongs to the year 1714. A controversy with Newton concerning the discovery of the differential calculus embittered his later years, though there is little doubt that Newton's method of fluxions and Leibnitz's method of infinitesimals were independent and original discoveries.

Leibnitz is one of the most extraordinary examples of universal scholarship in intellectual history. He was eminent in languages, history, divinity, philosophy, political studies, experimental science, mechanical science, and even belles-lettres. He was perhaps the first among modern philosophers to read the literature of opinion in an eclectic spirit and to recognize the mutual relations of the different systems.

Leighton (*lā'tŭn*), **Frederick, Lord (1830-1896)**, English historical painter, was born at Scarborough. His early years were spent in the study of art under eminent masters in Rome, Florence, Frankfort, Paris, and Brussels. His famous picture "Cimabue's Madonna Carried in Triumph through the Streets of Florence" was first exhibited at the Royal Academy in 1855 and was at once purchased by the queen. Among his chief paintings are "Ariadne," "Hercules Wrestling with Death," "Captive Andromache," "The Harvest Moon," "Helen of Troy," "Romeo and Juliet," "Bath of Psyche," and "Wedded." His "Lachrymae," "Lucia," and "An Odalisque" are in the Metropolitan Museum, New York. In 1878, he became president of the Royal Academy, was made a baronet in 1886, and was raised to the peerage in 1896, a few days before his death.

Lemaître (*lĕ-mâ'tr'*), **François Elie Jules (1853-1914)**, French critic and dramatist, was born at Vennecy. He began his active life as a teacher at Havre in 1875, became professor at Grenoble in 1883, and, at 31, went to Paris, where he became a dramatic critic. His *Impressions of the Theater* and *Contemporaries* contain his widely known articles on criticism. His first drama, *The Woman Who Revolted*, appeared in 1889, after which he wrote several social dramas of a high order, the best of which are *The*

Pardon and *The Studio Assistant*. In 1895, he was elected to the French Academy.

Lenbach (*lĕn'băĸ*), **Franz von (1836-1904)**, German portrait painter, was born at Schrobenhausen. He studied art at the Polytechnic School in Augsburg and under Graefle and Piloty at Munich. In 1857, he visited Italy, where he studied old masters, and, in 1860, he was called to teach in the new Art School at Weimar. Between 1863 and 1868, he again spent much time in Italy, where he made numerous copies of old masterpieces for a private collector at Munich.

Lenbach then devoted himself exclusively to portraiture and became the foremost portrait painter of his century in Germany. His long series of portraits includes the greatest Germans of his generation and constitutes a pictorial epic of his age and country. His widely known portraits of Bismarck, Moltke, William I, Liszt, Helmholtz, Wagner, and Mommsen are excellent examples of his strong, individual style.

Lenin (*lyĕ'nĕn*), **Nicolai (1870-1924)**, Russian revolutionary leader and statesman, was born at Ulyanovsk. His true name was Vladimir Ilich Ulianof. His elder brother was hanged for the attempted assassination of the czar, an event which was a determining factor in his life. Lenin studied law at Kazan and Leningrad, where he became familiar with the works of Karl Marx. In 1895, he organized the union for the liberation of the working class, which became a vehicle for spreading the Marxian doctrine of socialism. He was arrested, imprisoned for a year, and spent 1907-10 as an exile in Siberia. There he met and married Nadezhda Konstant Skrupskaya. He also wrote *The Development of Capitalism in Russia*.

Years of Wandering. In 1900, Lenin went to Switzerland, where he began editing *The Spark* (*Iskra*). Its purpose was to create an underground party, whose members would lead the working classes of Russia in overthrowing the Russian government. The Social Democratic party accepted in 1903 this program of the dictatorship of the proletariat, but a split occurred between the opportunists, or Mensheviks, and the direct action group, or Bolsheviks, the latter being led by Lenin.

Lenin returned to Russia in 1905 to take advantage of an uprising against the government, but the revolt was quickly suppressed. When World War I broke out in 1914, Lenin began working for an international revolution rather than only a Russian one. The czar was deposed in 1917. Immediately Lenin took train to Russia, the German government cooperating on the theory that his influence would weaken Russia. His party, changing its name from Social Democratic to Communist, promised to divide up the landed estates for the peasants, thus winning their support. On Oct. 27, 1917, Lenin proclaimed the dictatorship of the proletariat and seized the government. Industry and trade were nationalized. A new economic system began to be created.

Rule over Russia. Meanwhile Lenin was surrounded by armed foes. Germany exacted from Russia much territory by the treaty of Brest-Litovsk, which Lenin signed in the expectation that a revolution would shortly follow in Germany. This expectation failed, despite Germany's defeat, and the Allies supported civil revolts against the new government which were not finally crushed until 1921. Lenin then turned his full attention to industrializing the country, although he was obliged to countenance private trade for a while under a so-called "new economic policy." His health began to fail in 1922 and for a year before his death he was paralyzed and unable to speak.

Lenin combined to a rare degree intellectual vigor and fearless resolution. Appreciating art and literature, he subordinated their enjoyment to the ideal of making them universally accessible. The success of his party was due to his powerful opposition alike to those who favored compromise with the capitalist class and those who favored anarchic but ineffective violence.

His embalmed body is housed in a magnificent monument on the Red Square, Moscow. Visible to the public, it is reverenced as the remains of the founder of Soviet Russia. See *Bolsheviki*.

Leo XIII (1810-1903), pope, Giocchino Pecci, son of Count Lodovico Pecci, was born at Carpineto, in the Papal States. He was educated at the Collegio Romano and the Accademia dei Nobili, and, in 1837, was appointed a domestic prelate by Gregory XVI. He was made archbishop of Diamietta *in partibus* and, in 1843, was sent to Belgium as nuncio. In 1846, he was nominated archbishop of Perugia and, in 1853, was created a cardinal by Pius IX.

Upon the death of Pius IX in 1878, he was elected to the papacy under the title of Leo XIII. He followed a policy of friendly relations with, and support for, all governments outside Italy where they represented social order. Italy he regarded as the despoiler of the papal states. While opposing revolutionary socialism, he issued a famous encyclical, *rerum novarum*, in 1891 supporting rights of the laboring classes. This encyclical was hailed as setting the papacy free from the claims of capitalism and won its author the name of the "working man's pope." He held that the Church should be supreme in all civil matters, condemned modern philosophical systems, and attributed moral and political disorders to atheism.

In 1883, he opened the archives of the Vatican for historical investigations, and made himself known as a poet, chiefly in the Latin tongue.

Leoncavallo (*lā'ŏn-kä-väl'lō*), **Ruggiero (1858-1919)**, Italian composer was born at Naples. He received his musical education at the Conservatory of Music in his native city. He was an admirer of Wagner and his compositions reflect German influence. The world-wide success of his short opera *I Pagliacci*, produced in 1892, indicated where his talents as a composer lay. Among his other operas are *Chatterton*, *La Bohême*, *Zaza*, *Maia*, *Malbruk*, and *La Reginetta delle Rose*. Like Wagner, he wrote his own librettos. Besides operas, his compositions include a symphony, a ballet, and songs. See *I Pagliacci*.

Leonidas I (*lē-ŏn-ĭ'dăs*), king of Sparta, succeeded his half brother, Cleomenes I, about 490 B. C. When the Persian monarch Xerxes approached with an immense army, Leonidas opposed him at the narrow pass of Thermopylæ, 480 B. C., with a force of 300 Spartans and more than 5000 auxiliaries. The treachery of one of his men having made it impossible to bar any longer the progress of the foe, Leonidas and his little band threw themselves on the swarming myriads, and met a heroic death.

Leopold III (1901-), king of Belgium, was born at Brussels. He succeeded to the throne in 1934 after the death of his father Albert I, who was killed in a fall from a mountain. In his reign Belgium took steps to abandon the policy of depending largely on a French alliance for her defense and set about constructing large scale fortifications on her borders. His wife, Queen Astrid, was killed in an automobile accident in 1935.

The German army invaded Belgium in 1940. Leopold called on the British and French for aid and fought for several days, until he was forced to surrender. During the remainder of the war, he was a prisoner in Germany. After the war, the Belgian parliament, appointing his brother Charles as regent, refused to allow him to return. Leopold was recalled in 1950, but agreed to delegate his powers to his son, who, following his father's abdication in 1951, became King Badouin I.

Lesage (*lĕ-säzh'*), **Alain René (1668-1747)**, French novelist and dramatist, was born at Sarzeau, Brittany, and studied at the Jesuit College at Vannes. He was called to the bar in Paris, 1692, practiced law for a short time, and then adopted the profession of letters. In 1707, he rose at once into popularity by his comedy of *Crispin the Rival of his Master* and by his romance of *Le diable boiteux*. The comedy of *Turcaret*, in 1709, added to his fame, which subsequently was rendered imperishable by his *Gil Blas*. Among his other novels are *The Adventures of Guzman d'Alfarache*, *The Adventures of the Chevalier Beauchesne*, *The History of Estévanille Gonzales*, and *The Bachelor of Salamanca*. See *Gil Blas*.

Lesseps (*lĕ'sĕps'*), **Ferdinand, Viscount de (1805-1894)**, French engineer and diplomat, was born at Versailles. He held various consular offices. When in Egypt in 1854 he proposed to the viceroy the cutting of the Suez Canal. The concession was granted, the financial assistance of the Egyptian government was secured, and, after much delay, diplomatic obstructions were removed. De Lesseps began actual work in 1859 and completed the canal in 1869.

After this achievement he entertained other great projects, such as a Central Asian Railroad and the conversion of a part of the Sahara into an inland sea. In 1881, he began the construction of the Panama Canal, subsequently taken over and completed by the United States.

Lessing, Gotthold Ephraim (1729-1781), German dramatist and critic, was born at Kamenz, Germany. His father, a Lutheran pastor, intended him for the ministry, and, accordingly, at the age of 17, he entered the University of Leipzig. Although he was withdrawn on account of his taste for general literature and his fondness for the theater, he later went to Berlin and completed his academic education at Wittenberg, receiving his master's degree in 1752.

After graduation, Lessing became a man of letters, took up his residence in Berlin, and there wrote several essays and criticisms. With Moses Mendelssohn, he wrote *Pope as a Metaphysician*; in a literary journal, *The Library of the Beautiful Sciences*, and in his *Letters on Literature*, he co-operated with Mendelssohn in creating a school of criticism in Germany. In addition to several dramas of minor importance, he wrote in 1755 the prose tragedy *Miss Sara Sampson*, which won extraordinary favor and was translated into other languages.

In 1760, Lessing lived at Breslau as secretary to the commandant, and, among his military acquaintances, he planned the spirited drama *Minna von Barnhelm*. Returning to Berlin, he completed his *Laokoön*. This essay, like his other philosophical speculations, is merely a collection

of hints, not the exposition of a system; but the principles here established went further toward founding a theory of literature and art than any other work on æsthetics.

For some years, Lessing then led an uncomfortable and shifting life. In Hamburg, he wrote a masterly criticism on celebrated plays, called the *Hamburg Dramaturgy*. In 1770, he was appointed librarian of the celebrated library at Wolfenbüttel, near Brunswick. Here he spent his last eleven years and completed *Emilia Galotti*. Shortly after taking up work at Wolfenbüttel, he married the widow of a Hamburg merchant. Upon her death and that of their child, Lessing was prostrated by grief. After a heated theological controversy, in which he appeared as the champion of toleration, he gave his confession of faith in poetical and dramatic form in *Nathan the Wise*.

Lessing polished his mother tongue and made it classic. He never resigned his freedom of thought nor compromised its dignity. His interests and influence were extended through theology, æsthetics, drama, poetry, criticism, and philology. He died impoverished.

Leutze (*loit'sĕ*), **Emanuel (1816-1868)**, German American historical painter, was born at Gmund in Württemberg. He was brought up in America, studied art and resided at Düsseldorf, 1841-59, then returned to the United States. Among his works are "Washington Crossing the Delaware," "Washington at Monmouth," "Washington at Princeton," "Landing of the Norsemen," "Cromwell and His Daughter," "Cromwell's Visit to Milton," "Lafayette in Prison," and "News from Lexington."

Leverrier (*lĕ-vĕ-ryā'*), **Urbain Jean Joseph (1811-1877)**, French astronomer, was born at Saint Lo, Normandy. Appointed professor of astronomy in the Ecole Polytechnique, Paris, in 1837, he continued the work of Laplace in celestial mechanics. His *Tables de Mercure* appeared in 1843. At the suggestion of Arago, he attacked the problem of the unexplained motions of Uranus and solved it by making the calculations by which the planet Neptune was discovered, September 23, 1846, from his indications. These same calculations had been independently made during the previous year by the English astronomer J. C. Adams, but no search for the undiscovered planet had been instituted. Leverrier entered the Legislative Assembly in 1849, was later named senator by Napoleon III, and, in 1854, became director of the Paris Observatory, a post which he held, except during three years, until his death.

Lewes (*lū'ĭs*), **George Henry (1817-1878)**, English philosopher and critic, was born at London. He was educated at various schools, and, after entering upon a business career, decided to devote himself to literature. In 1838, he went to Germany and remained there nearly two years, studying the life, language, and literature of the country. On his return to London, he became a miscellaneous writer. He was editor of the *Leader* from 1850 to 1854 and of the *Fortnightly*, which he himself founded, in 1865-66. In 1854, he set aside an early and unhappy marriage and lived with Mary Ann Evans (George Eliot) until his death.

Lewes's many-sidedness of mind made him one of the best critics and biographers. As a popularizer of philosophy and science he had few superiors. His works include *The Spanish Dramas, Comte's Philosophy of the Sciences, Life and Works of Goethe, Physiology of Common Life, Studies in Animal Life, Aristotle, On Actors and the Art of Acting*, and *Problems of Life and Mind*.

Lewis, Isaac Newton (1858-1931), American soldier and inventor, was born at New Salem, Pa. After his graduation at the United States Military Academy in 1884, he held various army commands. A report made by him in 1900 led to the rearmament of the United States field artillery. About the time of his retirement from active service in 1913, he obtained a patent for the so-called Lewis machine gun, which was extensively used during World War I. He refused about $1,000,000 in royalties on his guns made for the United States government after the country entered the war. Among the devices patented by him was the first successful range finder.

Lewis, John Llewellyn (1880-), American labor leader, was born at Lucas, Iowa. After a public school education and an early life spent in mule driving and mining, Lewis began labor union work and became legislative representative of the United Mine Workers in 1909. By 1917, he had become vice president, and was elected president in 1920. He piloted the affairs of this union through 13 years of defeat and dissension, then in 1933 took advantage of a governmental policy fostering collective bargaining to build it into the country's strongest union.

Convinced that labor's future lay in the organization of all wage earners and that this could be accomplished only by bringing all those of one industry into one so-called industrial union, he broke in 1935 with leaders of the American Federation of Labor, who favored continuance of a craft union policy, involving a separate organization for each type of work. Taking with him other large unions, he threw his energy in organizing workers in mass production industries and preparing the way for the entry of organized labor into the political arena as a separate party.

The new movement was organized in 1937 as the Congress of Industrial Organization with Lewis as its first president. Lewis broke with other leaders of the body in 1940 by supporting the Republican candidate. He resigned after Roosevelt's re-election. In 1943, he withdrew the United Mine Workers from the Congress of Industrial Organization and, in 1946, brought them back to the American Federation of Labor, but the following year the United Mine Workers again became an independent union. During World War II, he adroitly defied governmental policies in securing wage increases for miners by means of strikes.

Lewis, Meriwether (1774-1814), American explorer, was born near Charlottesville, Va. He was a volunteer at the time of the Whisky insurrection of 1794, an ensign in the regular army in 1795, and a captain in 1800. Shortly afterward he became President Jefferson's private secretary. During 1803-06, he was engaged with Captain William Clark in an expedition to the Pacific Ocean, the results of which were important to geographical science and highly valuable in the settlement of the West. In 1807, he was made governor of the territory of Louisiana. He planned to publish an account of his great journey but met his death mysteriously in a pioneer cabin in Tennessee when en route to Washington. His memoir by Jefferson was published, together with Biddle and Allen's *Narrative of the Lewis and Clark Expedition*, in 1814.

Lewis, Sinclair (1885-1951), American novelist, was born at Sauk Center, Minn. He was graduated at Yale in 1907 and engaged in editorial work, contributing also short stories to periodicals. In 1914, he published the novel entitled *Our Mr. Wrenn*, which was followed by *The Trail of the Hawk, The Innocents*, and *Free Air*. In 1920, his *Main Street*, depicting life in a small Middle-Western town, attracted wide attention, as did also his *Babbitt*, a story of a self-made business man, which appeared in 1922. His later works include *Arrowsmith*, awarded the Pulitzer prize for 1925, *Elmer Gantry*, a satire on the professional evangelist, *Dodsworth*, a study of a retired manufacturer, and *It Can't Happen Here*, an imaginary picture of the United States in the grip of a dictatorship. Lewis received in 1930 the first award of a Nobel prize in literature given to an American. In 1938 he was elected to the American Academy of Arts and Letters. He was essentially a satirist of the middle class while at the same time sympathetic with its ideals. He assisted in the dramatization of several of his works. His later novels include *Work of Art, Prodigal Parents, Bethel Merriday*, and *Gideon Planish*.

Ley (*lī*), **Robert (1880-1945)**, German administrator, was born at Niederbreitenbach. Educated as a chemist at Jena, Bonn, and Münster universities, he served in the air force in World War I and was a prisoner in France, 1917-20, having been severely wounded. He was employed as an industrial chemist from 1921 to 1928 and then entered politics. Joining the Nazi party in 1932, he was made by Hitler head of the "labor front," a governmental organization which took over all trade unions. The principle of loyalty to employers, or leaders, was substituted for self-organization. The slogan "strength through joy" was used to promote morale of employees, but wages were limited. He committed suicide in prison.

Lie (*lē*), **Trygve (1896-)**, Norwegian politican, was born at Oslo. After being graduated in law from the University of Oslo, 1919, he was legal advisor to Norwegian trade unions, and became a member of the Norwegian government in 1935. After occupying several cabinet positions, he became minister of foreign affairs in 1941. He served in the government-in-exile in England, and in the coalition and labor governments after the liberation of Norway. In January 1946 he was chosen first secretary-general of the United Nations. In 1950 his term was extended three years. He resigned in 1953 and was succeeded by Dag Hammarskjold.

Liebig (*lē'bĭĸ*), **Justus, Baron von (1803-1873)**, German chemist, was born in Darmstadt. He studied at Bonn and Erlangen; then went to Paris, and attracted the attention of Humboldt by a paper on the fulminates. In 1824, he was appointed professor at Giessen, where he established a laboratory noted for researches in organic chemistry and for the application of chemistry to agriculture and food. He disproved the prevalent notion that plants derive their nourishment from humus. In 1852, he became professor of chemistry at Munich. He is regarded as the founder of agricultural chemistry. Among his chief works are *Organic Chemistry in its Application to Agriculture and Physiology, The Natural Law of Husbandry*, and *Dictionary of Chemistry*.

Lieurance, Thurlow (1878-), American composer, was born at Oskaloosa, Iowa. He attended school in Kansas, and studied music at Cincinnati. He spent 20 years among Indians and based his music on their themes. Among his best known pieces are "By the Waters of Minnetonka," and the musical "Drama of the Yellowstone." He wrote *Songs of North American Indians* and *Forgotten Trails*.

Lilienthal, David Eli (1899-), American lawyer and administrator, was born at Morton, Ill. Educated at DePauw and Harvard universities, he practiced law in Chicago. In 1933 he was made a director of the Tennessee Valley Authority, formed for the purpose of developing low cost electric power, and directing its use for public advantage. Lilienthal's task of power development and sale involved five years of litigation on constitutional questions. He then negotiated the purchase of many large distribution networks to sell the power, developed at the Authority's dams. By selling to municipalities and distributing through them he lowered the cost of electricity in the area. In 1946 he was made chairman of the U. S. Atomic Energy Commission. Resigned, 1949.

Lillie, Beatrice (1898-), brilliant comedienne of stage and television, was born in Toronto, Canada, and made her theatrical debut in London in 1914. A small woman with a mobile and perenially youthful face, she can convey both elegance and absurdity at the same time. One of her most famous and funny numbers is "There Are Fairies At The Bottom Of My Garden," a piece that gives her full opportunity to display her genius for droll mimicry. Beatrice Lillie appeared first in vaudeville. She came to New York in 1924 with Andre Charlot's *Revue*. Her talent has enlivened, and often completely carried, such productions as *Big Top, The Seven Lively Arts, Better Late, Inside U. S. A.*, and many television shows. A road tour, *An Evening With Beatrice Lillie*, endeared her to a host of American theatergoers. During World War II, she worked tirelessly to entertain the armed forces, and was honored for it by both the American and English governments. In private life, Beatrice Lillie is Lady Peel.

Lily, William (c. 1468-1522), English grammarian and schoolmaster, was born at Odiham. After graduation at Oxford, he traveled in the East to increase his knowledge of the Greek language, and studied several years in Rhodes, Rome, and Venice. Upon his return to London, about 1509, he engaged in private teaching and, in 1512, was appointed by Dean Colet first head master of St. Paul's School, where he became one of the most noted exponents of the "new learning." With Grocyn and Linacre, he ranks among the earliest English classical scholars of the Renaissance period. He was probably the first teacher of Greek in London. His fame rests on his *Latin Grammar*.

Linacre (*lĭn'ā-kẽr*), **Thomas (c. 1460-1524)**, English humanist and physician, was born at Canterbury. He was educated at Oxford, where he became fellow of All Souls College in 1484. Following a period of study in Italy, devoted to Latin, Greek, natural philosophy, and medicine, he was appointed professor of medicine at Oxford and became physician to the court, serving Henry VII and Henry VIII. After a time he gave up practicing and studied for the Church. In 1509, he was made rector of Mersham and, in 1519, became precentor in York Cathedral.

With Latimer and Grocyn, Linacre was among the earliest teachers of Greek at Oxford, where Sir Thomas More and Erasmus were among his pupils. While his permanent fame rests upon his classical scholarship, he rendered notable service to the study of medicine by his translations of Galen's treatises. In 1518, he assisted in founding the College of Physicians, of which he became president.

Lincoln, Abraham (1809-1865), American statesman and 16th president of the United States, was born February 12, 1809, near Nolin Creek and Hodgenville, Kentucky, where his grandfather had settled after leaving his former home in Virginia. His family was descended from Samuel Lincoln, who emigrated from Norfolk, England, and settled at Hingham, Mass., in 1637. Abraham's father, Thomas, was a carpenter and farmer; his mother, Nancy Hanks, was a woman of humble birth but of keen intellect and considerable force of character.

Education and Early Life. Lincoln was born in a log cabin on Sinking Spring farm, a tract of 348 acres which his father had acquired in 1808 for $200. His school attendance was very limited, amounting probably in all to less than one year. Nevertheless, in his early years, he read and became intimately familiar with the Bible, Shakespeare, Æsop's *Fables*, *Robinson Crusoe*, *Pilgrim's Progress*, a history of the United States, and Weems's *Washington*. He developed also great physical strength, became a powerful wrestler, runner, and lifter of weights, and grew to be 6 feet, 4 inches in height.

When Lincoln was in his eighth year, his father removed to southern Indiana, settling near the present village of Gentryville. Here, in a rude frontier cabin, at first scarcely more comfortable than a shed, the boy grew to manhood, knowing only the primitive manners, conversation, and ambitions of a sparsely settled backwoods community. About two years after coming to Indiana, Lincoln's mother died. A year later, his father married Mrs. Sarah Bush Johnston, a thrifty widow, who exerted a great influence over her stepson. Schools were scarce and poor, but Lincoln's mother had taught him to read and his stepmother urged him to study.

When Lincoln was 21 years of age, he went with his father to settle in Illinois, where he performed the various tasks of a pioneer, such as clearing the bush and splitting rails. In 1831, he took a flatboat to New Orleans, on which occasion he had an opportunity of observing the nature of slavery. The following year, he was chosen captain of a volunteer company for service in the Black Hawk War. The company saw no fighting.

After an unsuccessful candidacy for the state legislature, he formed a partnership for operating a small store. Its failure and the flight of his partner left Lincoln with a debt, which he scrupulously discharged in the course of the next 17 years. In 1832, he began to study law by himself; the following year, he received an appointment as postmaster; and, in 1834, he was elected to the legislature of Illinois.

Political Life. Lincoln was re-elected to the legislature in 1836 on a platform favoring privileges of government for all who bore the burdens of government, "by no means excluding females." When the legislature proposed to pass a resolution deprecating antislavery agitation, he presented a protest, averring that the Federal government, while not interfering with the individual states, might, in the event of a popular approval, abolish slavery in the District of Columbia. In this manner, Lincoln first placed on record his antislavery views, which, by their moderation, bespoke his careful statesmanship.

In 1837, Lincoln was admitted to the bar. When Springfield was made the capital of Illinois in 1839, he went there and continued practicing law until his election to the presidency. In 1844, he was elected to Congress, but, at the end of his term, declined to be a candidate for re-election.

The slavery issue became acute in 1854, when Stephen A. Douglas offered a bill in Congress proposing to establish a territorial government in Nebraska. Lincoln opposed the extension of slavery in the territory and delivered a strong antislavery speech at the state convention in Bloomington, 1856, when the Republican party in Illinois was organized.

In 1858, in a speech accepting the Republican nomination for United States senator, Lincoln said: " 'A house divided against itself cannot stand.' I believe this government cannot endure permanently half slave and half free. I do not expect the Union to be dissolved, I do not expect the house to fall, but I do expect it will cease to be divided." This became famous as the "house-divided-against-self speech."

During the ensuing campaign, Lincoln met Douglas, his Democratic opponent, in a series of memorable debates on slavery. The struggle over the whole question was at its height. Public interest had been intensified by the Dred Scott decision, so that the debate drew the attention of the whole country. Douglas's continual assumptions of superiority and sneers at his antagonist's early poverty and occupations were met with humorous retorts, with sharp exposures of sophistry, and with masterly arguments stated with great clearness and force.

With all the resources of an experienced debater, Douglas endeavored to defend an intermediate position that would satisfy both the supporters and the opponents of slavery. But Lincoln finally compelled Douglas to take ground against the Dred Scott decision and forced him to make other admissions, which later led to disruption in the Democratic party and destroyed Douglas's hopes of the presidency. Yet Douglas won temporarily. Receiving a scant majority in the legislature, he was elected by that body to the Senate. But Lincoln, though defeated, had received the greatest number of popular votes and was now a figure of national importance. Two years later, the Republican party in its national convention at Chicago, 1860, nominated him as presidential candidate.

Presidency. Lincoln was elected, but before his inauguration, seven states had formally seceded from the Union and inaugurated a president of their own. There was danger that seven other states would follow, four of which ultimately did. Within six weeks of Lincoln's inauguration, the Civil War broke out with the capture of Fort Sumter by the Confederate forces.

The earlier operations of the war were unfavorable to the Northern forces, but Lincoln shrank from no act which he judged necessary for the preservation of the Union. Following the battle of Antietam, September 1862, he issued a proclamation stating that on January 1 following, as an act justified by military necessity, he would declare all slaves in states or parts of states then in rebellion thenceforth free. On January 1, 1863, he issued the formal Emancipation Proclamation.

This measure at once tended to deprive the South of an advantage it enjoyed and consolidated the antislavery element in the North in favor of the war. The crisis of the war was passed with the battle of Gettysburg, the field of which was dedicated as a National Cemetery on November 19, 1863. At this dedication, Lincoln delivered his Gettysburg speech, which ranks among the most famous orations of all literature.

Lincoln was re-elected president in 1864. He insisted upon three things: (1) restoration of the national authority throughout all the states; (2) no receding from the position of the national executive on the subject of slavery; (3) no cessation of hostilities short of an end of the war and the disbanding of the forces hostile to the government. Ultimate success crowned his labors, and the war ended.

Death. On the evening of April 14, 1865, Lincoln visited Ford's Theater, Washington, and during the performance he was shot by John Wilkes Booth, an obscure actor. He died the next day, on April 15, 1865. His body was laid to rest in Oak Ridge Cemetery near Springfield, Illinois. His unique position among the presidents of the United States is signalized in the beautiful Lincoln Memorial Building at Washington, D. C. A second national memorial to him is Abraham Lincoln National Park near Hodgenville, Ky. The feature of this 110-acre park is a building of classic style which covers the log cabin in which the president was born. Lincoln was elected to the American Hall of Fame in 1900.

Lind, Jenny (1820-1887), (Madame Otto Goldschmidt), Swedish singer, was born in Stockholm. At the age of nine years her wonderful voice was discovered by an actress, who secured her admission to the Stockholm Conservatory of Music. In 1838, she made her operatic debut as Agathe in *Der Freischütz*. Jenny Lind began in 1844 a series of tours in Continental Europe, England, and America, singing with unparalleled success and becoming popularly known as "the Swedish nightingale." In 1849, she withdrew from the operatic stage and devoted herself exclusively to concert singing. At Boston, in 1852, she was married to Otto Goldschmidt, a musical conductor and composer, and, after a few years' residence at Dresden, settled permanently in London. Her last public appearance was at Düsseldorf in 1870.

Lindbergh, Anne Morrow (1906-), American writer, aviator, and explorer, has had a remarkably varied and adventurous career. She was born in New Jersey, daughter of Dwight Morrow, a banker who served as an outstanding U. S. ambassador to Mexico. She gave early evidence of a brilliant and sensitive intellect at Smith College. She married Charles Lindbergh in 1929, and accompanied him on a series of hazardous, trail-blazing flights, during which she acted as navigator and co-pilot. For this work, she has won many high aviation awards never before given to women. Among Anne Morrow's books are *North to the Orient*, an exciting description of aerial adventure; *The Steep Ascent*; and *Gift from the Sea*. Her prose is marked by a lyric beauty and simplicity.

Lindbergh, Charles Augustus (1902-), American aviator, was born in Detroit, Mich., of Swedish-Irish descent. He was taken as a child to Little Falls, Minn., from which state his father was elected to Congress in 1907. He entered the University of Wisconsin in 1921, but left the next year to learn aviation.

After a period of flying in the Army and as chief pilot on the Chicago-St. Louis air mail route, he became famous almost overnight by a daring transatlantic flight in 1927. Setting out on May 20 from Roosevelt Field, near New York City, he flew unattended to Le Bourget, near Paris, a distance of 3610 miles in 33 hours, 29½ minutes. This was the first non-stop flight between the United States and Europe and the first solo transatlantic flight. The flight was made in the plane, *Spirit of St. Louis*, built at San Diego according to his own specifications. The success of the trip was due in large measure to his careful planning as well as to the skill and courage with which he carried it through. His achievement was greeted by world-wide acclaim. He was made a colonel in the U. S. officers reserve corps.

In 1927-28, he made a good-will flight to Mexico City and the capitals of Central American countries, two South American countries, and the West Indies, covering a total of 9390 miles. He received the Woodrow Wilson peace award for 1928, amounting to $25,000, and a Congressional medal. He accepted the general managership of Transcontinental Air Transport, Inc., and was appointed technical adviser on aeronautics to the U. S. Department of Commerce. In 1929, he married Anne, the daughter of Dwight Morrow. Their infant son was kidnapped and murdered in 1932. Thereafter he lived in England for several years. Prior to World War II, he inspected the air power of leading European countries and warned of German superiority. He publicly advocated in 1940 American isolation from Europe, thereby incurring considerable unpopularity. In 1954 he was made a brigadier general in the Air Force Reserve.

Among other scientific inventions, Lindbergh devised, with Dr. Alexis Carrel, the "robot heart," a machine in which organs may be kept alive after being taken from the body.

Lindenthal (*lĭn'dĕn-tăl*), **Gustav (1850-1935),** American bridge builder, was born in Brünn, Austria. He was educated in his native city and at Vienna and came to America in 1874, where he was first employed in the construction of buildings for the Centennial Exhibition held at Philadelphia in 1876. From the following year, he was engaged in the designing of bridges, including many of the largest in America. In 1902-03, he was commissioner of bridges in New York City. He planned Little Hell Gate Bridge, in East River, which, when completed in 1917 at a cost of 15 million dollars, had the longest steel arch in the world. He was engineer also for the Washington Memorial Bridge, New York, which has a suspension span of 3500 feet over the Hudson River.

Lindsay, Nicholas Vachel (1879-1931), American poet, was born at Springfield, Ill. After being graduated from the Springfield High School in 1897, he attended Hiram College, Ohio, 1897-1900, and studied art in Chicago and New York. He also made long tours afoot, somewhat in the manner of the medieval troubadors, paying his way by reciting and selling his poems. In the summer of 1912 he walked from Illinois to New Mexico, distributing his poems and speaking in behalf of the "gospel of beauty." His poems include "General William Booth Enters Heaven," "The Congo," and "The Chinese Nightingale," all remarkable for their rhythm and phonetic effects. He wrote also *Johnny Appleseed*, *The Art of the Moving Picture*, and *The Litany of Washington Street*.

Lindsey, Benjamin Barr (1869-1943), American jurist and reformer, was born in Jackson, Tenn. He was educated in the public schools, studied law, and was admitted to the bar. In 1894, he began the practice of law in Denver, Colo. He was largely instrumental in having established the juvenile court there, which served as a model for many in other states. He presided over it from 1901 to 1927, securing meanwhile many changes in the law relating to juvenile offenders, including the practice of punishing adults who contribute to juvenile delinquency. *The Companionate Marriage*, published by him in 1927, aroused much controversy and gave wide currency to that phrase. His other publications include *The Beast*, *Children in Bondage*, *The Revolt of Modern Youth*, and the autobiographical *Dangerous Life*.

Linnæus (*lĭ-nē'ŭs*), **Carolus (1707-1778),** Swedish botanist and naturalist, was born at Rashult, Sweden. This name is a Latinized form of Carl von Linné.

In 1927, he studied medicine and botany at the University of Lund; the next year, he transferred to the University of Upsala. There, in 1730, the famous Dr. Anders Celsius made him assistant curator of the botanic gardens.

Career and Chief Works. Linnæus obtained his medical degree from the University of Harderwijk, the Netherlands, in 1735. To this year belongs his *System of Nature*, which contains his classification of animals. While in the Netherlands, Linnæus became botanical director and naturalist at the countryseat of George Clifford. In 1736, he inspected the gardens of England at the expense of Clifford and published his *Elements of Botany*.

In 1737, Linnæus visited France and finished his *Genera of Plants*, in which he developed fully his theory of the sexual system of plants. In the following year, he returned to Sweden and established himself as a physician in Stockholm. In 1739, he married Sara Moræus and, in 1741, became professor of medicine at the University of Upsala. Within twelve months, he was transferred to the chair of botany at Upsala and found himself in the long coveted situation of director of the Botanic Gardens. These he laid out on a new plan. Within six years, to the original 50 exotic plants he had added 1100 new specimens, besides examples of the species in Sweden itself. His collections became unrivaled.

The efforts of Linnæus extended the fame of the university, increased the number of students, and won for him the appointment of rector. To this period of activity belong *his Botanical Science* and *Species of Plants*, published in 1751 and 1753 respectively. The latter laid the foundation for the modern system of plant nomenclature.

Honors. Gustavus III, the Swedish sovereign, exalted Linnæus by creating him a knight of the Polar Star in 1753 and, in 1761, issued a patent of nobility in his honor. In 1773, he was appointed to assist in making a new translation of the Bible into Swedish.

Place in History of Science. Linnæus found biology a chaos, but he left it a cosmos. His grounds for classification have not always proved adequate, but he bears the credit of first enunciating the true principles of classifying plants. To him is due also the credit of establishing the binomial name to indicate genus and species, a contribution which immensely advanced the study of systematic botany and zoology. He imbued his pupils with his own intense acquisitiveness and enthusiasm, trained them to close and accurate observation, and then dispatched them to various parts of the globe, where they furthered his influence as the reformer of botany and one of the world's greatest promoters of natural history studies.

Lin Yutang (1895-), Chinese essayist, was born in Fulkien Province. After being graduated from St. John's College, Shanghai, he left China and obtained degrees at Harvard, Jena, and Leipzig universities. He lectured at Peking National University and then participated for a time in the Chinese revolutionary government. Taking up residence in the United States, he began writing books, chiefly in English, on popular philosophy which met with wide favor. Their attraction lay in the common sense way in which he criticized many Western habits and his engaging suggestions for the greater enjoyment of life. His position was unique also as an interpreter of China in terms understandable to English-speaking readers. In 1954-55 he was head of Nanyang University for free Chinese in Singapore. His publications include *Letters of a Chinese Amazon*, *The Importance of Living*, *Wisdom of Confucius*, *Moment in Peking*, and *The Vigil of a Nation*.

Lippi (*lēp'pē*), **Fra Filippo (1406-1469)**, Italian painter, was born in Florence. His parents died in his early childhood and he was placed in a Carmelite Monastery in Florence, where he remained until 1432. He studied the works of Masaccio in a neighboring chapel and, about 1430, executed some paintings at the monastery. In 1456, he was made prior of Santa Margherita at Prato, where, according to Vasari, he first met the beautiful Lucrezia Buti, mother of his son Filippino Lippi (1460-1504), also a famous painter.

In skill Fra Filippo was superior to any of his predecessors, blending the idealism of Fra Angelico with the realism of Masaccio. His paintings are noted for dignity of composition, pleasing human faces, and fine golden color. Among his best works are the frescoes in the cathedral at Prato and the "Coronation of the Virgin" now in the Academy at Florence.

Lippmann (*lĕp 'măn'*), **Gabriel (1845-1921)**, French physicist, was born at Hallerich in Luxemburg. He was educated at the Ecole Normale in Paris and studied physics and chemistry in Germany. In 1883, he became professor in the University of Paris and director of the Physical Laboratory in the Sorbonne. He made important discoveries in electricity and in color photography and enunciated the principle of the conservation of electricity. In 1891, he discovered a process of photographing in colors by the interferential method. He received, in 1908, the Nobel prize for physics. His publications include *Course in Thermodynamics*, *Electrical Unities*, and *Teaching Mathematics*.

Lippmann, Walter (1889-), American political philosopher and columnist, was born in New York City and was educated at Harvard (1909). He has exerted an important influence on public thought since the publication of his book, *A Preface to Politics*, in 1913. Lippmann was an aide to the American delegation to the Paris Peace Conference in 1918-19. He worked on the *New Republic* magazine and on the old New York *World*, and then began a career as a news analyst for the New York *Herald-Tribune* syndicate. An early and enthusiastic supporter of Franklin Roosevelt's "New Deal" social policies, Lippmann has become a thoughtful conservative. His writings are noted for their clarity and careful consideration, and his views are respected because of his breadth of experience. *A Preface to Morals* is his most famous book. He has also written *Public Opinion* (1922), *The Good Society* (1937), and *The Cold War* (1947), which supplied an apt description of relations between the Western Powers and Russia.

Lipton, Sir Thomas Johnstone (1850-1931), British merchant and yachtsman, of Irish parentage, was born in Glasgow. He began life as a retail merchant, acquired extensive tea, coffee, cocoa, and rubber estates in India and Ceylon, and accumulated a large fortune. He became president of the Lipton Company and also acquired large interests in business enterprises in the United States and Canada. He organized Lipton, Limited, the largest commercial establishment in the United Kingdom, controlling more than 400 stores and capitalized at 200 million dollars. An enthusiastic yachtsman, he challenged for the America cup a number of times but failed to capture it. He founded the Alexandra Trust Fund for providing the poor with cheap, wholesome meals.

Lister, Joseph, Baron (1827-1912), English surgeon, was born at Upton. He was graduated at London University in 1847 and received his degree in medicine in 1852. He was successively lecturer on surgery, Edinburgh, professor of surgery, Glasgow, professor of clinical surgery, Edinburgh, professor of clinical surgery, King's College Hospital, London, and surgeon extraordinary to Queen Victoria. He introduced the antiseptic system, which revolutionized modern surgery. He received many foreign honors, was made a baronet in 1883, and a peer in 1897.

Liszt (*lĭst*), **Franz (1811-1886)**, Hungarian pianist and composer, was born at Raiding, near Odenburg. He made his first appearance at a concert in his ninth year. Later, he studied under Czerny and Salieri at Vienna, and, from 1839 to 1847, he traveled throughout Europe as a virtuoso. In 1849, he became conductor of the Court Theater at Weimar. Here, in 1850, he conducted the first performance of Wagner's *Lohengrin*. In 1865, he took minor orders and was subsequently known as the Abbé Liszt.

In 1875, Liszt was made president of the Hungarian Academy of Music at Budapest and divided the remaining years of his life among that city, Weimar, and Rome. One of his two daughters married Richard Wagner, his lifelong friend. Though Liszt's fame as a pianist overshadows his name as a composer, yet he was the creator of the symphonic poem, and his *Hungarian Rhapsodies* for the piano are unrivaled.

Littleton, Sir Thomas (1402-1481), English jurist and legal writer, was born in Worcestershire. He was recorder of Coventry in 1450, king's sergeant in 1455, judge of common pleas in 1466, and knight of the bath in 1475. His reputation rests on his treatise *The Tenures*, written in law French and translated into English about 1500. Coke commented on this text in his celebrated *Coke upon Littleton*, published in 1628. With or without commentary, *The Tenures* constituted a part of legal education for more than three centuries, and it is still cited as authoritative on the feudal law of real estate.

Littre (*lē'trā'*), **Maximilien Paul Emile (1801-1881)**, French philosopher and lexicographer, was born in Paris. He studied at the Lycée Louis-le-Grand, then was graduated in medicine, and finally turned to philology. His translation of Hippocrates procured, in 1839, his election to the Academy of Inscriptions. His *La poésie homerique et l'ancienne poésie française* was an attempt to render the first book of the *Iliad* in the style of the Trouvères. In 1854, he became editor of the *Journal des Savants*. His *Dictionnaire de la langue française*, one of the greatest modern French dictionaries, appeared, 1863-72. In 1871, Gambetta appointed him professor of history and geography at the Ecole Polytechnique, Paris. He was one of the foremost linguists of the 19th century.

Litvinov, Maxim Maximovitch (1876-1951), Russian statesman, was born at Bialystok, Poland. His true name was Moysheev Vallakh. While a volunteer in the army, he became interested in Marxism and, after joining a revolutionary party, was imprisoned for over a year. He escaped and carried on revolutionary work mainly from abroad until the Russian Revolution in 1917. The Soviet government appointed him its diplomatic agent in England and later made him commissar for foreign affairs.

Litvinov worked consistently for disarmament at European conferences. At the London Economic Conference of 1933, he negotiated a treaty of non-aggression with Poland Rumania, Turkey, Iran, Afghanistan, Estonia, and Latvia, which was noteworthy as the first treaty to define aggression. He secured recognition of the Soviet Republic by the United States and its acceptance into the League of Nations. His dismissal in 1939 presaged a reversal of Russian policy, culminating in a semi-alliance with Germany. When war broke out with Germany in 1941, he was recalled from retirement. He was ambassador to the United States from 1941 to 1943; was recalled to serve as deputy minister of foreign affairs; and "released" from this position in August 1946.

Livingston, Edward (1764-1836), American jurist and statesman was born at Clermont, N. Y. He was graduated at Princeton in 1781, studied law, and, in 1785, was admitted to the bar. He was a member of Congress from 1795 to 1801, when he became Federal attorney and mayor of New York. In the second war with England he was aide-de-camp and secretary to General Jackson, 1814-15.

In 1821, Livingston was commissioned by the legislature to prepare a code of civil procedure for Louisiana. While never adopted by the state, his code was published as *A System of Penal Law* and gave him great fame throughout America and Europe. He was again member of Congress, 1823-29, was United States senator from Louisiana, 1829-31, and secretary of state, 1831-33. While serving as minister to France, 1833-35, he supported the demand of the United States government for $5,000,000 indemnity on account of French spoliations and succeeded in securing its payment.

Livingstone (*lĭv'ĭng-stŭn*), **David (1813-1873)**, African explorer and missionary, was born at Blantyre, in Lanarkshire, Scotland. During childhood and youth he worked in a cotton mill, but educated himself by private study and by attending night schools. In 1840, he was sent to southern Africa by the London Missionary Society. He resided for several years near the Limpopo, discovered Lake Ngami in 1849, and penetrated to the Makololo country in 1851.

In 1853-54, he crossed Africa from the Zambezi to the Congo and, in 1854-56, made his way from Loanda to Quilimane, following the course of the Zambezi and discovering the Victoria falls. He returned to England, 1856, and published *Missionary Travels*, 1857. Proceeding anew to Africa as consul at Kilimane in 1858, he explored the country north of the Zambezi from 1856 to 1864, dis-

covering lakes Shirwa and Nyasa. In 1865, he published *The Zambesi and Its Tributaries*, a narrative of the discoveries. He undertook in 1866 his third expedition and spent the remainder of his life endeavoring to ascertain whether the Zambezi joins the Nile or is a tributary of the Congo.

In 1871, after suffering great privations, Livingstone was found at Ujiji by H. M. Stanley's relief party. He continued his explorations, endeavoring to solve the Nile-Congo problem, but, exhausted by continued hardships, died on the shore of Lake Bangweolo. In 1874 his body was taken to England and buried in Westminster Abbey.

Livy (*liv'i*),or **Titus Livius** **(59 B.C.-17 A.D.)**, Roman historian, was born at Patavium (Padua), in the north of Italy. *The Annals of the Roman People*, as Livy styles his history, begins with the foundation of the city and ends with the death of Drusus, the younger brother of the emperor Tiberius, 9 B. C. It was written partly at Rome and partly at Naples, under the patronage of the emperor Augustus. The work consisted originally of 142 books, but only 35 have come down to us, and some of these are in a very imperfect state. Of all but two, however, we possess fragments, with short epitomes from another hand.

Livy's history is distinguished for the animation of its narrative and for the purity of its style, though the accuracy of the statements is sometimes prejudiced by the author's desire for rhetorical effect and by his patriotism. He was not an investigator, and it was his purpose to write an inspiring rather than a critical history of his country.

Lloyd, (John) Selwyn (Brooke), (1904-), English statesman, was born at West Kirby, Cheshire, England, and was educated at Edinburgh and Cambridge. Called to the bar in 1930, he practiced law in Liverpool until the outbreak of World War II. During the war, he rose to the rank of brigadier, and served as a general staff officer of the British Second Army. A conservative in politics, he was elected to Parliament in 1945. In 1951 he was appointed Minister of State in the Foreign Office, and in 1954 became Minister of Supply. He achieved cabinet rank in December 1955, when he was made Secretary of State for Foreign Affairs.

Lloyd George of Dwyfor, David Lloyd George, Earl (1863-1945), British statesman was born of Welsh parentage in Manchester. He was educated at a Church School and privately. Deciding to study law, he was articled to a firm of solicitors at the age of 14 and, in 1884, qualified for practice. He was elected to Parliament in 1890. During the Boer war, he vigorously opposed the policy of the Conservative government.

In 1905, Lloyd George was made member of the Liberal ministry as president of the board of trade. In 1908, he became chancellor of the exchequer. He was the author of the Old-Age Pension law of 1908 and of the Workingmen's Insurance act of 1912. He vigorously advocated the Minimum-wage law of 1912, which settled by intervention of the government the great coal strike of that year. His financial policy finally resulted in the bill to destroy the veto power of the House of Lords.

After the outbreak of World War I, Lloyd George became minister of munitions in Asquith's coalition cabinet. He succeeded Kitchener as secretary of state for war in June 1916 and, in the following December, was made prime minister. He then formed a new coalition cabinet and was granted practically dictatorial powers. In this post of gravest responsibility he served the British nation with great ability, devotion, and skill. Following the successful termination of the war, his ministry was returned in the Parliamentary elections of 1918.

In 1919, Lloyd George headed the British delegation to the Peace Conference of Versailles. In 1921, he brought about the conference with the Irish leaders which later resulted in the establishment of the Irish Free State. His government was defeated in 1922, but he continued to lead a section of the Liberal party. He was raised to the peerage in 1945.

Locke, John (1632-1704), English philosopher, was born at Wrington, England. In 1646, he was sent to Westminster School. Six years later, he entered Christ Church, Oxford, where he took his bachelor's degree in 1655 and his master's degree in 1658. Despite an inclination toward experimental science, he decided to study medicine. In 1665, he went to Berlin as secretary to the British ambassador there. Subsequently, he returned to Oxford to continue his studies, but apparently he never obtained a degree in medicine.

A particularly acute diagnosis which Locke made of a disease afflicting Lord Ashley in 1666 led to their lifelong friendship. He now entered Lord Ashley's family as physician, tutor, and confidential adviser. In 1672, Locke was appointed secretary of presentations and, in the following year, secretary to the council of trade and plantations. In 1675, failing health obliged him to take up residence at Montpellier in the south of France; but he resumed his tutorial life at Oxford in 1679. Following the disgrace of Lord Shaftesbury (formerly Lord Ashley) in 1682, he went to the Netherlands. By an act of Charles II, Locke was expelled from Oxford. After the revolution of 1688, he returned to England and rendered services of great value in the cause of toleration and in maintaining the principles of the revolution. He took an active part in the establishment of the Bank of England, the abolition of the censorship of the press, reform of the coinage, and the promotion of Irish linen manufacture.

His *Adversariorum Methodus* was published in 1686, and, four years later, his famous *Essay Concerning Human Understanding* attained extensive celebrity. To this period belong various letters on toleration and his treatises on government. In 1693, he published *Thoughts on Education* and, in 1695, *The Reasonableness of Christianity*. The latter was written to promote King William's scheme of a comprehension of all Christian sects in one national church.

In 1696, Locke received a reappointment as commissioner of trade and plantations, but failing health compelled him to resign his office and quit London. He spent the remainder of his life in Essex, at the seat of Sir Francis Masham.

Great as were Locke's services to his country and to the cause of civil and religious liberty, his fame rests chiefly on the *Essay Concerning Human Understanding*. He rejected the Cartesian doctrine of the reason as the source of knowledge and maintained the derivation of all knowledge from experience through the senses. His principles of philosophy and psychology affected the general modes of thought in many countries and led to the critical philosophy of Kant.

Locke, William John (1863-1930), English novelist, was born in Barbados. He was an architect by profession, but turned to novel writing about 1895. *The Morals of Marcus Ordeyne* gave him wide popularity. This story, as also *The Beloved Vagabond*, was dramatized with great success. Both are typical of Locke's gift for depicting whimsical, eccentric characters. His novels include *Derelicts*, *Where Love Is*, *Simon the Jester*, *The House of Baltazar*, and *The Tale of Triona*. He wrote also the plays *Mr. Cynic*, *The Lost Legion*, and *An Adventure of Aristide Pujol*.

Lockhart, John Gibson (1794-1854), Scottish biographer, was born in Lanarkshire. He was graduated at Oxford, studied law at Edinburgh, and, in 1816, was admitted to the Scottish bar. He soon adopted the profession of letters. For a long period Lockhart and John Wilson were the chief editors of *Blackwood's Magazine*. This connection led to Lockhart's acquaintance with Sir Walter Scott, whose daughter Sophia he married in 1820. In 1821-24, he wrote the novels *Valerius*, *Adam Blair*, *Reginald Dalton*, and *Matthew Wald*. In 1825, he became editor of the *Quarterly Review*, a place which he held for more than 10 years. His *Life of Burns* and *History of Napoleon* were followed, 1836-38, by *The Life of Scott*, which, with the exception of Boswell's *Johnson*, is generally regarded as the most noted biography in the English language.

Lockwood, Belva Ann Bennett (1830-1917), American lawyer, was born at Royalton, N. Y. In 1848, she was married to Uriah H. McNall, who died in 1853. She was graduated at Genesee College, Lima, N. Y., in 1857. After teaching 11 years, she was married to Dr. Ezekiel Lockwood. Soon afterward she began the study of law in Washington. She was graduated at the National University Law School in 1873 and was admitted to the District of Columbia bar. She was active in securing the passage, in 1879, of an act admitting women to the United States Supreme Court and was herself admitted under it the same year. She was engaged in many important law cases, of which several came before the United States Supreme Court. She became prominent in temperance, peace, and woman suffrage movements and was a prolific writer on political and social subjects. In 1884 and in 1888, she was nominated for president by the Equal Rights party. She was a delegate to the International Peace congresses at London in 1908 and Rome in 1911, and, in 1913, became a member of the International Peace Bureau at Brussels.

Lockyer (*lŏk'yĕr*), **Sir Joseph Norman (1836-1920)**, English astronomer, was born at Rugby. In 1857, he became a clerk in the war office, devoting his leisure time to astronomy. In 1870, he was appointed lecturer on astronomy at the Normal School of Sciences at South Kensington. From 1885 to 1913, he was director of the Solar Physics Observatory at South Kensington. He was the first to use the spectroscope to study the sun and by means of it he discovered the element helium in the sun. He gave the name chromosphere to the sun's gaseous envelope. His writings include *The Spectroscope*, *The Chemistry of the Sun*, and *The Dawn of Astronomy*.

Lodge, Henry Cabot (1850-1924), American statesman and author, was born in Boston, Mass. Educated at Harvard University, he was editor of the *North American Review* in 1873-76 and university lecturer on American history at Harvard in 1876-79. He was member of Congress from

1887 to 1893 and thereafter was elected United States senator for six consecutive terms, 1893-1929.

In both houses of Congress, Lodge served with marked ability and distinction. He led the group of senators who opposed, and finally wrecked, President Wilson's plans for American membership in the League of Nations. In 1921, he was commissioner plenipotentiary for the United States at the International Conference on the Limitation of Armamemts held at Washington.

Among his numerous writings are *Life and Letters of George Cabot, Short History of the English Colonies in America, Life of Daniel Webster, Life of Washington, Story of the Revolution, The Democracy of the Constitution,* and *The Senate and the League of Nations.* He was elected, in 1908, a member of the American Academy of Arts and Letters.

Lodge, Henry Cabot, Jr. (**1902-**), American statesman, was born at Nahant, Mass., the grandson of Senator Henry Cabot Lodge. After he was graduated from Harvard in 1924, he was a journalist in Boston and New York. Following two terms as a representative in the Massachusetts legislature, he was elected to the U. S. senate in 1936, and was re-elected in 1942. He resigned in 1943 to join the U. S. army. Re-elected to the Senate in 1946, he was defeated in 1952. In 1953 President Eisenhower appointed him U. S. representative to the United Nations.

Lodge, Sir Oliver Joseph (**1851-1940**), British educator and physicist, was born at Penkhull, Staffordshire. He was educated at Newport Grammar School and at first planned for a business career. Becoming attracted to science, he entered University College, London, in 1872, and was graduated at the University of London in 1877. He taught natural science in Bedford College for Women from 1877 to 1879 and applied mathematics at University College from 1879 to 1881. From 1881 to 1900, he was professor of physics in University College, Liverpool, and, from 1900 to 1919, he was principal of Birmingham University.

In addition to making important discoveries in electricity, notably in connection with the development of wireless telegraphy, he interested himself in educational reforms and devoted much attention to psychic research. He publicly affirmed his belief in a life after death and his expectation that eventually communication would be possible between living persons and the spirits of the dead.

His numerous writings include *Lightning Conductors and Lightning Guards, Signalling Without Wires, Modern Views of Electricity, Pioneers of Science, Life and Matter, Electrons, The Ether of Space, The Substance of Faith, Man and the Universe, The Survival of Man, Reason and Belief,* and also *Christopher: a Study in Human Personality.*

Loeb (*lōb*), **Jacques** (**1859-1924**), physiologist and biologist, was born in Germany. He was educated in the universities of Berlin, Munich, Strasbourg, and Leipzig. Removing to America, he was associate professor of biology at Bryn Mawr College in 1891-92. Between 1892 and 1902, he was successively assistant, associate, and full professor of physiology and experimental biology in the University of Chicago. He was professor of physiology in the University of California from 1902 until 1910, when he was made head of the department of Experimental Biology at Rockefeller Institute, New York.

Loeb conducted extensive researches to demonstrate that life processes are functions of chemistry. He succeeded in fertilizing the female cell of a sea urchin without a male cell. Among his writings are *The Heliotropism of Animals, Dynamics of Living Matter, Mechanistic Conception of Life, Artificial Parthenogenesis and Fertilization,* and *The Organism as a Whole.*

Loeb, James (**1867-1933**), American banker and philanthropist, was born in New York, N. Y. After being graduated from Harvard University, he entered the investment firm of Kuhn, Loeb & Co., founded by his father, but retired in 1901, living thereafter chiefly in Europe. He founded the Institute of Musical Art, New York, later part of the Julliard Foundation. In Munich, Germany, he founded an Institute for Experimental Psychiatry, later part of the Kaiser-Wilhelm Institute. His name is perpetuated in the Loeb Classical Library, an edition of all Greek and Latin literature published attractively with original text and English translation on facing pages. He left this enterprise to Harvard University on his death.

Loeffler (*lĕf'lĕr*), **Charles Martin Turnov** (**1861-1935**), composer, was born at Mulhouse, Alsace, France, and was educated in Switzerland, Germany, and France, becoming a violinist of distinguished ability. He came to the United States in 1881. His numerous compositions include the symphonic poems *The Death of Tintagiles, A Pagan Poem, La Bonne Chanson, La Villanelle du Diable,* and *Memories of My Childhood in Russia;* also the symphony *Hora Mystica,* and the choral compositions *By the Waters of Babylon* and *The Canticle of the Sun.* He was elected to the American Academy of Arts and Letters in 1931.

Loeffler, Friedrich (**1852-1915**), German bacteriologist, was born at Frankfort on the Oder. He was educated at the universities of Würzburg and Berlin. In 1879, he became assistant in the Imperial Health Office; in 1884, he was made staff physician in Friedrich Wilhelm Institute in Berlin; and, in 1888, he was appointed professor in the University of Greifswald. He made important researches on the bacterial origin of contagious diseases. With Schütz, he discovered the bacillus of glanders in 1882, and, in 1884, he isolated and described the Klebs-Loeffler bacillus of diphtheria, first detected by Klebs in 1883.

Loewy, Raymond (**1893-**), American industrial designer, was born in Paris and won high honors as captain in the French army in World War I. When he came to America to engage in engineering work he first made his living as a fashion artist in New York, then turned his attention to industrial design. Stressing the desirability of esthetic qualities, even in the most practical of everyday products, he seeks to achieve these effects by the use of simple lines rather than ornamentation. His ideas have been expressed in such widely different products as automobiles, refrigerators, stoves, packages, and office equipment, as well as in more ambitious creations like stratoliners, passenger trains, bus terminals, and streamlined ships.

Lombroso (*lŏm-brō'zō*), **Cesare** (**1836-1909**), Italian alienist and criminologist, was born at Venice. He was educated at Padua, Vienna, and Paris. In 1862, he became professor of mental diseases at the University of Pavia, and later he was professor of medical law and psychiatry at Turin. Lombroso propounded the theory that criminals constitute a distinguishable type. Although now discredited, the theory led to the scientific study of insanity and criminology and to great reforms in the treatment of criminal classes in Europe and elsewhere. He discovered the cause of pellagra. He was also a noted linguist and a keen student of the occult.

London, Jack (**1876-1916**), American author and socialistic lecturer, was born in San Francisco, Cal. He attended the University of California but left his course unfinished to go to the Klondike. He traveled widely at various times and partially completed a seven years' cruise around the world in a 50-foot yacht. He possessed a forceful, vivid style, and many of his books became widely popular.

Among his numerous writings are *The Son of the Wolf, A Daughter of the Snows, The Call of the Wild, The Faith of Men, The Sea Wolf, War of the Classes, Before Adam, Love of Life, John Barleycorn,* and *The Valley of the Moon.*

Long, Crawford Williamson (**1815-1878**), American surgeon, was born in Danielsville, Ga. He was graduated in medicine at the University of Pennsylvania in 1839. He was probably the first to employ ether as an anesthetic in surgery. In March 1842, he administered ether to a patient and during the ensuing period of unconsciousness removed a tumor from the neck. Between this date and 1845 he operated upon several other patients under ether, but did not announce his observations. While Long was still hesitating, Dr. W. T. G. Morton of Boston, at Dr. C. T. Jackson's suggestion, made, in 1846, his first public demonstration. Long published an account of his anesthetical work in 1849. A statue of him was unveiled in Statuary Hall in 1926.

Longfellow, Henry Wadsworth (**1807-1882**), American poet, was born at Portland, Me. He was graduated from Bowdoin at 18, began his poetical career while in college, and at 19 was made professor of modern languages and literature in his alma mater. After three years spent in further preparation in Europe, he held this chair from 1830 until 1835. At 26, he translated the Spanish elegy of *Coplas de Manrique.*

Following the publication of *Outre-Mer* and another year of study in Europe, he filled the chair of modern languages and literature at Harvard with increasing distinction from 1836 to 1854. During this period he published *Hyperion, Voices of the Night, The Spanish Student, The Belfry of Bruges, Evangeline, The Seaside and the Fireside, Kavanagh,* and *The Golden Legend.*

Upon resigning from Harvard, Longfellow continued his literary career. New volumes appeared at frequent intervals for nearly 30 years. His later works include *The Song of Hiawatha, The Courtship of Miles Standish, Tales of a Wayside Inn, Flower-de-Luce, New England Tragedies, Three Books of Song, Aftermath, The Hanging of the Crane, The Masque of Pandora, Keramos, Ultima Thule,* and *In the Harbor.* He also published a translation of Dante's *Divine Comedy.*

Longfellow is justly popular as the American poet who, above all others, expressed the simple, natural affections and sentiments with unvarying kindliness, moral elevation, and fine artistic sense. He was elected to the American Hall of Fame, 1900. See *Literary Plots, Characters, and Allusions* under names of his chief works.

Longstreet, James (**1821-1904**), American general, was born in Edgefield District, S. C. He was graduated at West Point in 1842 and was on duty on the Mexican frontier until 1846. He was in the Mexican War, 1846-48, serving with distinction at Contreras, Churubusco, Molino

del Rey, and also at Chapultepec, at the storming of which he was severely wounded.

In 1861, he resigned his commission as major to take part with the South in the Civil War. He commanded a brigade under Beauregard, fought brilliantly at the battle of Bull Run, and was made major general in 1862. He commanded with increasing distinction in the Seven Days' battles, in the second battle of Bull Run, and at Fredericksburg, after which he was made lieutenant general. He commanded the right wing of Lee's army at Gettysburg. At Chickamauga his opportune attack was decisive. In the campaign of the Wilderness in 1864 he was severely wounded, but recovered in time to direct the defense of Petersburg. He surrendered with General Lee in April 1865, and labored zealously for the restoration of harmony between the two sections.

Longstreet was one of the greatest fighters of the Confederacy, although the controversy over the failure at Gettysburg injured his popularity in the South. President Grant appointed him surveyor of the port of New Orleans, and, during 1880-81, he served as minister to Turkey. He was United States marshal, 1881-84, and United States railroad commissioner from 1898 until his death.

Lope de Vega, Felix. See *Vega Carpio, Lope Felix de.*

Lorentz (*lôr'rĕnts*), **Hendrik Antoon (1853-1928),** Dutch physicist, was born at Arnheim. He was educated at the University of Leiden, where he was professor of physics from 1877 to 1923. He did notable work as one of the developers of Maxwell's theory of the ether and of Thomson's theory of electrons. With Lorenz of Copenhagen he discovered the so-called Lorenz-Lorentz formula for refraction. While working with his pupil Zeeman, he foretold and, in 1896, explained the "Zeeman effect" by showing that the radiating centers were electrons. For these important researches the Nobel prize for physics in 1902 was divided between him and Pieter Zeeman. His publications include *Maxwell's Electromagnetic Theory, Textbook of Physics,* and *The Theory of Electrons.*

Lorenzo de' Medici. See *Medici, Lorenzo de'.*

Lorimer (*lôr'ĭ-mĕr*), **George Horace (1868-1937),** American journalist and writer, was born at Louisville, Ky. He was educated at Colby College and at Yale University and entered journalism. Served as literary editor and as managing editor, and, from 1899 to 1937, as editor in chief of the *Saturday Evening Post.* He was vice president of Curtis Publishing Company, 1927-1932, and in 1932 was made president. His best-known work is *Letters from a Self-Made Merchant to His Son.*

Lossing (*lŏs'ĭng*), **Benson John (1813-1891),** American historian, was born at Beekman, N. Y. He edited magazines and prepared several illustrated works, among which are an *Outline History of the Fine Arts, Lives of the Signers of the Declaration of Independence,* and *Pictorial Field-Book of the Revolution.* The last is the result of journeys to every place of note connected with the American war for independence. Its popularity caused the author afterward to prepare along similar lines the *Pictorial Field-Book of the War of 1812.* He also published a *History of the United States, The Civil War in America,* biographies of several distinguished Americans, and a *Cyclopedia of United States History.*

Loti, Pierre. See *Viaud, Louis Marie Julien.*

Lotze (*lôt'sĕ*), **Rudolf Hermann (1817-1881),** German philosopher, was born in Bautzen, Saxony. He was educated at Leipzig, where he studied medicine and philosophy, and was appointed to a professorship there in 1842. From 1844 to 1881 he occupied the chair of philosophy at Göttingen and in the latter year was transferred to the University of Berlin. His philosophy is dominated by two interests, one in science and the other in art and religion. He attempted to show that a scientific explanation of phenomena by efficient causation does not exclude purpose but requires the idea of a personal deity acting through natural laws. Among his works are *Metaphysics, Universal Pathology, Logic, On the Idea of Beauty, Medical Psychology, Microcosmus, Ideas for a History of Nature,* and *System of Philosophy.*

Louis IX (*lōō'ĭs, lōō'ĭ*; F., *lōō'e'*), or **Saint Louis, (1214-1270),** king of France, was born in Poissy, and succeeded his father, Louis VIII, in 1226. When he attained his majority, he became involved in a war with Henry III of England, and, finally, in 1242, defeated the English at Saintes. In 1244, during a dangerous illness, he made a vow that if he recovered he in person would join the crusaders.

In 1248, having appointed his mother regent, Louis sailed with a large army to Cyprus. In the following year, he proceeded to Egypt, planning by the conquest of that country to open the way to Palestine. He took Damietta, but at Mansura he was defeated and taken prisoner by the Mohammedans. Procuring release in 1250 by the payment of an enormous ransom, he proceeded to Palestine with the survivors of his army. There he fought with the crusaders until 1254.

Louis then returned to France, where he ruled his kingdom with justice and ability. In 1270, he set out upon a new crusade but on arriving at Tunis was stricken with the plague. Fearless in battle, heroic in adversity, energetic, firm, and unswervingly just, Saint Louis was the ideal king of the middle ages.

Louis XII (1462-1515), king of France, succeeded Charles VIII in 1498. He laid claim to the kingdom of Naples and the duchy of Milan. In 1499, he invaded Italy and gained possession of Milan. With the assistance of Ferdinand of Aragon, he conquered Naples in 1500, but, having quarreled with his ally, was expelled in 1503. In 1508, he united with Ferdinand, Pope Julius II, and the Emperor Maximilian in the league of Cambrai against the Venetians. In 1509, he won the battle of Agnadello, which crushed the power of Venice.

In 1511 Ferdinand joined Julius in the Holy League against the French, who, notwithstanding their victory at Ravenna in 1512, were finally driven out of Italy in 1513. At the same time, Henry VIII invaded France and was successful at Guinegate. At the conclusion of peace in 1514, Louis took for his third wife Mary Tudor, sister of Henry VIII of England. By his good government he earned the title of "father of his people."

Louis XIII (1601-1643), king of France, was born at Fontainebleau. When his father, Henry IV, was assassinated in 1610, Louis succeeded to the throne, but during his youth his mother, Marie de' Medici, was regent. The Huguenots rose against her alliances with the pope and Spain, but concluded a peace in 1614. When the king was declared of age, he confirmed the edict of Nantes and summoned the States-General, for the last time until the reign of Louis XVI. Under the guidance of his great minister Richelieu, the king gradually increased the power of the monarchy at the expense of the Protestant nobles and eventually overthrew the Huguenots by the capture of La Rochelle in 1628. In the Thirty Years' War, Louis sided with Gustavus Adolphus against Spain and Austria.

Louis XIV (1638-1715), king of France, was the son and successor of Louis XIII. The first years of his reign, which began in 1643, were under the regency of his mother, who was guided in all matters of state by her favorite, Cardinal Mazarin. From his father he inherited the war with Spain, and this was followed by the civil war of the Fronde, which lasted from 1648 to 1653.

During the life of Mazarin, Louis interfered little with public affairs, but, after Mazarin's death in 1661, he resolved to become his own minister. He changed the feudal monarchy of France into an absolute one, and his favorite motto, *L'etat c'est moi,* "I am the state," was at once the expression of the ruling principles of his life and a description of his policy.

On the death of Philip IV, the father of his queen, Louis laid claim to the Netherlands, which he invaded; but this led to the alliance of England, Sweden, and the Netherlands, usually called "the triple alliance," against him and Louis was speedily compelled to make peace. In 1672, he made an attack upon the Netherlands, having engaged on his side Charles II of England. But, at this juncture, William of Orange who had been raised to the stadtholdership, revived the drooping spirits of his countrymen, and the Netherlands was evacuated as fast as it had been overrun.

Several other wars followed, notably the war of the Spanish succession, in which Louis sought to secure the Spanish monarchy for his grandson the Duke of Anjou. This war began in 1701, convulsed Europe for nearly 13 years, and was terminated by the peace of Utrecht in 1713. Many of the most famous names in French literature belong to the 73-year reign of Louis XIV.

Louis XV (1710-1774), king of France, was born at Versailles and succeeded to the throne at the age of five in 1715. During his minority the Duke of Orleans was regent. In 1723, Louis was declared of age, and two years later married Maria Leszczynska, daughter of Stanislas, the dethroned king of Poland. On the death of Augustus, king of Poland, in 1733, Louis supported the claims of his father-in-law to the vacant throne and was opposed by the emperor of Germany, who upheld the claims of the elector of Saxony.

On the death of the emperor Charles VI in 1740, new dissensions arose, and Louis, who had guaranteed the succession of Maria Theresa, dishonorably united with Prussia and Poland to place the Duke of Bavaria on the throne. This led to the War of the Austrian Succession, which was terminated by the Treaty of Aix la Chapelle in 1748.

In 1756, a new war arose between England and France in regard to their colonial empires. By the Treaty of Paris in 1763, France ceded to England Canada and other North American colonies. During his later years, Louis suffered himself to be governed wholly by favorites, among whom were Marchioness de Pompadour and

Madame Du Barry. Financial difficulties and social ferment prepared the way for the French Revolution.

Louis XVI (1754-1793), king of France, was born at Versailles. He was the grandson of Louis XV, whom he succeeded in 1774. He had already, in 1770, married Marie Antoinette of Austria, daughter of Maria Theresa and sister of the emperor Joseph.

The first acts of Louis, after his accession, endeared him to his people, for he gave them immunities to which they had been hitherto unaccustomed and effected many reforms in the administration; but he soon became embarrassed by financial difficulties and was not fortunate in his choice of ministers.

Necker, his comptroller-general, advised the summoning of the States-General, which had not been summoned since 1614. It was convoked in May 1789, and in June was superseded by the National Assembly, which assumed the whole legislative authority. His abrupt dismissal of Necker was followed by the destruction of the Bastille, the declaration of the rights of man, and an attack of an armed mob, chiefly women, on the palace at Versailles in October. The king and the queen were then forcibly removed by Lafayette to Paris.

The revolution thus begun culminated, as far as the king was concerned, in the insurrection of 1792, the storming of the Tuileries, the abolition of the monarchy, the declaration of the republic, and the execution of the king on the scaffold.

Louis XVIII (1755-1824), king of France, a younger brother of Louis XVI, was born at Versailles. In 1791, he fled from Paris on the same night as the king, Louis XVI, and reached the Belgian frontier in safety. From his retreat he issued from time to time declarations against the Revolutionists, which damaged the king, who had been captured and brought back to Paris. After the execution of his brother, he proclaimed the dauphin king, under the title of Louis XVII, and, in 1795, assumed the title of king himself.

The fall of Napoleon opened his way to the French throne, and, in 1814, he landed at Calais after 23 years of exile. He ruled by the "divine right of kings" in the pre-Revolutionary tradition. On Napoleon's return from Elba, Louis again went into exile until after the battle of Waterloo. He was restored to the throne by the allied powers in 1815 and ruled until his death at Paris.

Louise Auguste Wilhelmine Amalie (1776-1810), queen of Prussia, was born at Hanover, where her father, Duke Karl of Mecklenburg Strelitz, was commandant. In 1793, she was married to the crown prince of Prussia, afterward Frederick William III, and was the mother of Frederick William IV and of William I, who was later emperor. She endeared herself to her people by her spirit and energy during the period of national calamity that followed the battle of Jena, and especially by her patriotic and self-denying efforts to obtain concessions from Napoleon at Tilsit.

Louis Philippe (*lōō'ē' fē'lēp'*) **(1773-1850),** king of France, eldest son of Louis Philippe Joseph, duke of Orleans, was born in Paris. During the French Revolution he first sought security in Switzerland; later he traveled in northern Europe; from 1796 to 1800, he resided in the United States; and afterward he located in England. On the fall of Napoleon he hastened to Paris, where he was received with distrust by Louis XVIII. He was very popular in Paris, but kept aloof from political intrigues. The revolution of 1830 resulted in his appointment as lieutenant general of the kingdom, from which office he proceeded to the acceptance of a constitutional throne.

The country prospered under the government of Louis Philippe, but demands for reform in the electoral system became loud and general. These were unwisely opposed by the king and the Guizot ministry. Insurrectionary movements in the streets of Paris ensued in February 1848, and the "citizen king" saw with alarm that the national guard could not be expected to support him. On February 24, Louis Philippe, deserted by his courtiers, abandoned his throne and fled to England.

Low, Seth (1850-1916), American educator and publicist, was born in Brooklyn, N. Y. He was graduated at Columbia in 1870 and entered his father's tea importing house, from which he withdrew, in 1888, with a large fortune. He was mayor of Brooklyn, 1882-86, and his administration was noted for his application of the civil-service system to city offices. In 1890, he was elected president of Columbia College, which, under his constructive leadership, was transformed into a great modern university. In 1895, he erected for the university the Low Memorial Library at the cost of $1,000,000.

In 1897, he resigned as president of Columbia University to become an independent candidate for mayor of New York. He was defeated, but later was elected for the term 1902-03 upon a fusion ticket. He received many honorary degrees and, in 1914, was appointed by President Wilson a member of the Colorado Miners' Strike Commission.

Low, Will Hicok (1853-1932), American illustrator and painter, was born at Albany, N. Y. In 1870, he began making illustrations for New York magazines, and, in 1873, he went to Paris, where he studied under Gérome and Carolus-Duran. He was also influenced by his association with Millet and other painters of the Barbizon group. He returned to America in 1877 and soon attained prominence. He is most widely known for his illustrations, mural decorations, and stained-glass work. Among his paintings are "May Blossoms," "My Lady," "Aurora," "The Orange Vendor," and "Christmas Morn." His best-known mural decorations are panels in the County Courthouse, Newark, N. J., in the Federal Building, Cleveland, and in the New York State Educational Building at Albany. He is the author of *A Chronicle of Friendships* and *A Painter's Progress.*

Lowell, Abbott Lawrence (1856-1943), American educator and writer, was born in Boston, Mass. Graduating at Harvard Law School, he practiced law in Boston from 1880 to 1897, and then became connected with Harvard University. He was lecturer on government, 1897-99, and professor of the science of government from 1900 to 1909, when he was elected president of the university succeeding Charles W. Eliot. He retired in 1933.

Lowell became an authority in the field of government and comparative politics. His writings include *The Influence of Party Upon Legislation in England and America, The Government of England,* and *Conflicts of Principle.* In 1910, he was elected member of the American Academy of Arts and Letters.

Lowell, Amy (1874-1925), American poet, essayist, and critic, sister of Abbott Lawrence Lowell, was born at Brookline, Mass. She was privately educated and devoted herself to literary study. In 1912, she published *A Dome of Many-Colored Glass,* which was followed by *Sword Blades and Poppy Seed* and *Six French Poets.* By her essays and poems she became a prominent advocate of "vers libre" and other modern tendencies in American poetry, although her poetic genius never allowed itself to be dominated by these formulas. Her later writings include *Men, Women and Ghosts*; *Tendencies in Modern American Poetry*; *Pictures of the Floating World*; and, with Florence Ayscough, *Fir-Flower Tablets—Poems Translated from the Chinese.* She wrote also a biography of Keats, which embodied her views on the nature of poetry. Her *What's O'clock?* was awarded the Pulitzer prize for the best book of poems published in 1925, the announcement being made after her death in that year.

Lowell, James Russell (1819-1891), American poet, essayist, and diplomat, was born in Cambridge, Mass. He was educated at Harvard University and, at graduation in 1838, was poet of his class. He then spent several years abroad studying languages. His *Legend of Brittany* appeared in 1844, and, in 1845, he published a prose work entitled *Conversations on Some of the Old Poets.* In 1846 appeared the first of a satirical series of *Bigelow Papers.*

In 1855, Lowell succeeded H. W. Longfellow as professor of modern languages at Harvard and held the chair until 1877. From 1857 to 1862 he was editor of the *Atlantic Monthly,* and from 1864 to 1872 he was editor of the *North American Review.* He was United States minister to Spain, 1877-80, and to Great Britain, 1880-85.

His writings during the period when he was professor and diplomat include *Under the Willows, and Other Poems*; *The Cathedral,* an epic; *Among My Books,* a collection of essays; *My Study Windows*; *Democracy; Political Essays*; *Heartsease and Rue*; and *The Old English Dramatists.*

Lowell possessed a many-sided genius, and, although an uneven writer, produced some of the best verse in American literature. Among his finest poems are *The Vision of Sir Launfal, She Came and Went, The First Snowfall, After the Burial,* and the *Commemoration Ode.*

He excelled as a prose writer rather than as a poet. His descriptive sketches, political lectures, and critical essays rank among the first in American letters. In brilliancy, suggestiveness, and force, his best prose has seldom been surpassed. Elected to the American Hall of Fame, 1905.

Lowell, Percival (1855-1916), author and astronomer, brother of Abbott Lawrence Lowell, was born in Boston, Mass. He was graduated at Harvard in 1876. In 1833, he went to Japan and lived there at different times until 1893. He established the Lowell Observatory at Flagstaff, Ariz., in 1894. For his observations and writings on what he regarded as canals and other indications of life on the planet Mars, Lowell became widely known. In 1904, he received the Janssen medal of the French Astronomical Society and, in 1908, he was awarded the gold medal of the Astronomical Society of Mexico. The planet Pluto, the position of which he had predicted in 1915, was discovered in 1930.

Lowie, Robert Harry (1883-), American anthropologist, was born in Vienna, Austria. Brought to America at the age of 10, he was educated at Columbia University and was appointed to the staff of the American Museum of

Natural History in 1908. He was associate curator of anthropology from 1913 to 1921 and then joined the staff of the University of California becoming professor of anthropology in 1925. By studying Indian tribes on the great plains, he became the leading authority on the social life which they developed.

Loyola (*lō-yō'lä*; *loi-ō'lä*), **Saint Ignatius de (1491-1556)**, Spanish reformer and founder of the Society of Jesus, was born at the ancestral castle of Loyola in the Basque province of Guipuzcoa, Spain. His original Spanish name was Ingio de Loyola y Balda, Ignatius having been assumed in later life.

Early Life. Loyola was sent, at the age of 14, to the court of Ferdinand V to learn the rudiments of war and gallantry. Having been wounded at the defense of Pamplona in 1521, he read some biographies of the saints and other devotional books to relieve his weariness in convalescence. His thoughts were thus directed into a new channel, and he resolved to devote himself to the Church. On March 24, 1522, he made a vow to perform a pilgrimage barefoot to Jerusalem. Receiving the papal benediction from Adrian VI in Rome, he proceeded in 1523 to Venice and there embarked for the Holy Land.

Loyola returned to Venice and Barcelona in 1524. Feeling his literary acquirements to be insufficient, he studied at the universities of Alcala and Salamanca in 1526-27. He assimilated a considerable fund of knowledge and directed his energies to personal intercourse with those about him. Having been imprisoned during the inquisition at Salamanca, he sought a wider and safer field for his exertions in France, arriving at Paris in February 1528.

Society of Jesus. He continued his studies at the University of Paris, where he received his degree of master of arts in 1535. Here he gathered the first members of his "company of Jesus," which, later incorporated as the Society of Jesus and known popularly as Jesuits, exercised an extensive influence upon the religious condition of the modern world. In 1534, Loyola and six disciples met formally in the Chapel of Montmarte at Paris and took vows to make a pilgrimage to the Holy Land or, failing in that, to offer their lives to the service of the pope.

In 1537, the rule of the proposed society was submitted to the pope, Paul III. They adopted the motto, "To God's greater glory." In addition to the vows of chastity, poverty, and obedience, they bound themselves to go as missionaries to any country that the pope might indicate to them. The new rule was approved by a bull in 1540.

The association was practically inaugurated at Rome in 1541 by the election of Loyola as its first general, with tenure for life and with absolute powers. The disciples were sent on various missions into different parts of Europe. Loyola remained at Rome, devoted himself to many offices of piety, and spent all possible leisure on composing the *Constitutions of the Society* and his famous *Spiritual Exercises*, published in 1541.

Influence of The Society. While Loyola enjoined mental prayer, frequent self-examination, and religious retirement, he urged his disciples also to use every exertion for the instruction and sanctification of the rest of mankind. The progress of the Society of Jesus surpassed in rapidity all that is recorded of the infancy of the older establishments, and, with a high degree of zeal, learning, and skill, the Jesuits spread their influence to every quarter of the world. Loyola died at Rome, July 31, 1556, and was canonized in 1622 by Gregory XV. See *Jesuits, Jesuit Schools, Educational Reformers.*

Lubbock, Sir John. See *Avebury, John Lubbock, Baron.*

Luce, Clare Boothe (1903-), playwright and diplomat, was born in New York City. She attended private schools. From 1930 to 1934 she was on the editorial staff of *Vogue* and of *Vanity Fair*, and was also a newspaper columnist. In 1935 she married Henry R. Luce, editor-in-chief of *Time*, *Life*, and *Fortune*. Her first successful play was *The Woman*, produced in 1937. This was followed by *Kiss the Boys Goodbye* and *Margin for Error*. Her book of European war-time observations, *Europe in the Spring*, was published in 1940. She was twice elected to Congress from Connecticut, serving from 1943 to 1947, and then declined to run again. From 1953 to 1956 she was ambassador to Italy.

Lucretius (*lū-krē'shĭ-ŭs*), or **Titus Lucretius Carus (c. 99 B. C.-c. 55 B. C.)**, Roman poet. His principal work, *De Rerum Natura*, a philosophical didactic poem, appeared in 56. He was a follower of Epicurus, and his great poem is largely an exposition of the tenets, physical and moral, of that philosopher. It is inspired throughout, however, with intense moral earnestness and supports the thesis of the mechanistic nature of life with a fervor seldom exceeded by exponents of the more orthodox types of religion. It is doubtful, moreover, if a scientific theme has ever been presented with such a powerful appeal to the sense of beauty. This work stands in a class by itself in Latin literature and ranks perhaps as the world's greatest didactic poem.

According to tradition, Lucretius committed suicide in a fit of madness, this affection having been caused by a love potion which his wife administered to him in order to render his attentions to her more ardent.

Lucullus (*lū-kŭl'ŭs*), **Lucius Licinius (c. 110 B. C.-c. 57 B. C.)**, Roman general. He commanded the fleet in the first Mithridatic War. As consul in 74 B. C., he defeated Mithridates, and introduced financial reforms in the administration of Asia Minor, thus incurring the enmity of interests in Rome which profited by the old order. He twice defeated Tigranes of Armenia; but Lucullus' legions became mutinous, and he was superseded by Pompey in 66 B. C. He attempted to check Pompey's power and was one of those who brought about the coalition known as the First Triumvirate, but soon withdrew from politics. He spent the rest of his life enjoying his great wealth in the company of artists, poets, and philosophers, and exhibiting a luxury which became proverbial.

Ludendorff (*lū'dĕn-dôrf*), **Erich von (1865-1937)**, German general, was born at Kruszevnia, near Posen, Prussia. He entered the army, completed his military training at the War Academy in 1895, and soon afterward was made member of the general staff at Berlin.

Shortly after the outbreak of World War I, in 1914, Ludendorff was sent to East Prussia as chief of staff of Hindenburg's army. The victories of Tannenburg and the Masurian Lakes gave Hindenburg and Ludendorff great fame in Germany. In 1916, after the German failure at Verdun, Ludendorff was made chief quartermaster-general and directed the last bid for victory in 1918.

As a military organizer and as a resourceful man of action in the field, Ludendorff had few equals since Napoleon. His ruthless methods, however, were largely responsible for bringing the United States into the war and for aligning nearly the entire world against Germany.

When the German armies were being driven out of France in October 1918, Ludendorff was forced to resign his high command. After the Armistice, he took refuge in Sweden. In 1919, he returned to Germany and joined Hitler in the abortive beer hall uprising in 1923. He participated in anti-Semitic propaganda and advocated a revival of the ancient German paganism. In 1925, he ran for the presidency of Germany, but received less than 1 per cent of the votes cast.

Ludwig, Emil (1881-1948), German biographer, was born at Breslau of a Jewish family named Cohn. He practiced law and had some business experience, but soon turned to the writing of plays in prose and verse, taking up his residence first in England and then Switzerland. In 1920, he began a series of biographies of historical characters, which revealed the true bent of his genius—psychological interpretation of historic characters expressed in a vivid and stimulating style. His works of this type include *Goethe, Wagner, Bismarck, Napoleon, William II, Lincoln, Cleopatra, Hindenburg*, and *Roosevelt*. He wrote also *Genius and Character, Gifts of Life*, and *The Nile*, a "biography" of the river.

Lully (*lü'lē'*), **Jean Baptiste (1633-1687)**, composer and founder of French opera, was born at Florence, Italy. At the age of 14 he went to Paris, where he found employment as a servant. He taught himself to play the violin and became attached as a musician to the service of the king. He soon began to compose successfully, became superintendent of court music, and finally was made director of the Royal Academy of Music, founded in 1669. His compositions include operas, ballets, and miscellaneous music. He made simplicity and directness the basis of the French School of Opera. Among his chief compositions are *Alceste, Thésée, Persée*, and *Armide*.

Lummis (*lŭm'ĭs*), **Charles Fletcher (1859-1928)**, American author and explorer, was born at Lynn, Mass. He studied at Harvard and, during 1881-83, edited a newspaper in Ohio. In 1884, he walked from Cincinnati to Los Angeles by a roundabout route, purely for pleasure, 3507 miles in 143 days. He lived five years in the Indian pueblo of Isleta, New Mexico, studying Indian languages and customs. He traveled extensively on horseback from Canada to Chile.

From 1894 to 1909, he was editor of the *Out West Magazine*, and, from 1905 to 1910, he was librarian of the Los Angeles Public Library. In 1895, he founded the Landmarks' Club to preserve historical landmarks. This has preserved the remains of the Pala, San Juan Capistrano, and San Fernando missions in California. In 1902, he organized the Sequoya League for the improvement of the Indians. In 1917, he established the Institute of the West to found local museums throughout the Southwest.

Luther, Martin (1483-1546), German religious reformer and translator of the Bible, was born at Eisleben in Prussian Saxony. He was graduated at the University of Erfurt with a master's degree in 1505 and then entered the monastery of the hermits of Saint Augustine. In 1507, he was ordained a priest, and, in the following year, he removed to Wittenberg, where he lectured at first

on dialectics and physics and, later, on the Holy Scriptures. In 1511 Luther was sent on a mission to Rome, where for the first tine he came into contact with the authority of the Roman Church. His recollections of this trip were used some years later in his attacks on the Roman Church.

THE NINETY-FIVE THESES. In the decade preceding 1517 Luther evolved his doctrine of salvation by faith rather than by faith and good works. In 1517, when John Tetzel, a Dominican monk, was commissioned by Albert, Archbishop of Brandenburg, to preach the doctrine of indulgences following the publication of the Papal Bull of Julian II on indulgences. Luther nailed his 95 theses to the door of the Castle Church at Wittenberg. These theses attacked the abuses of the time which crept into the matter of giving indulgences; although it is commonly admitted that Luther had not had in mind a declaration of war but simply an academic challenge to a disputation. This debate marked the beginning of a popular movement destined to have the most far-reaching consequences for Christianity. Among the influential friends attracted to him were Bucer, Melanchthon, Erasmus, and Hutten.

THE DIET OF WORMS. Luther entered into a public debate with Dr. Eck in 1519 at Leipzig, where he called into question the authority of the pope and of the general council, setting up in their place the authority of the Scriptures as interpreted by the individual's reason. Pope Leo X issued a bull of excommunication against Luther, June 15, 1520, if he should not recant within 60 days; Luther's reply was publicly to burn the bull. His cause was tried at Worms by the secular authority. He was put under the ban of the Empire, but his seizure by his enemies was prevented by friends, who concealed him in a castle at Wartburg for a year. During this period, he made a translation of the New Testament, which was published in 1522.

THE LUTHERAN CHURCH. In 1522, Luther returned to Wittenberg and set about organizing his new church. His doctrines included a rejection of asceticism and of the monastic life, and, in 1525, he married Katharina von Bora, who had been a nun but repudiated her vow of celibacy in accordance with the new doctrine. The translation of the Bible occupied large portions of his time, while commentaries, hymns, and other works also came from his pen. At the diet of Augsburg in 1530, the Confession of Augsburg was adopted, and Protestantism, despite all obstacles, was firmly established among the German states.

CHARACTER AND ACCOMPLISHMENTS. Luther was a Titan in intellectual robustness. He was not, however, an exponent of reason or toleration nor a social reformer. He insisted on the Scriptures, privately interpreted, as an authority in the Christian religion. The religious movement that he initiated changed the face of Europe and effectively divided Christendom into two great sections.

Lutyens, Sir Edwin Landseer (1869-1944), English architect, was born in London. After brief training, he began designing small houses, later making plans for large estates, complete with furnishings and gardens. He showed great skill in evolving original designs within the framework of traditional English domestic architecture. He designed the British Embassy in Washington, D. C. His greatest monument is the new section of Delhi, which became the capital of India in 1911. Here Lutyens laid out a garden city larger than Washington, D. C., and constructed buildings of unified design on a scale unmatched in recent times. The residences are long, low, white buildings with classic porticoes, while the governor's palace combined the Greek style of architecture with that of India.

Lycurgus (*lī-kûr'gŭs*), lawgiver of Sparta, flourished in the 9th century B. C. He was uncle of the young king Charilaus, and governed wisely during his nephew's infancy. He traveled in Crete, Ionia, and Egypt. On his return, finding Sparta in anarchy, he redivided property and remodeled the constitution, giving the city its characteristic institutions, which were designed to produce hardy warriors. Lycurgus was afterward honored at Sparta as a god. Laws attributed to him remained in force nearly 1000 years.

Lyell, Sir Charles (1797-1875), British geologist, was born in Kinnordy, Scotland. He was graduated at Oxford and studied law, but left his practice for the study of geology.

Lyell was the ablest early advocate of the theory of uniformitarianism and was successful in securing its universal adoption by geologists. This theory assumes that the great geologic changes which the earth has undergone are the cumulative results of slow-working but persistent processes rather than of transformations due to sudden catastrophic agencies.

For his notable work in establishing this great fundamental conception, Lyell has been called the father of modern geology. He was influential also in securing the recognition of Darwin's theory of evolution. His works include *Elements of Geology*, *Travels in North America*, and *The Antiquity of Man*.

Lyon, Mary (1797-1840), American educator, founder of Mount Holyoke College, was born at Buckland, Mass. By great effort and perseverance she gained a good education and for several years taught in the public schools of the state. In 1837, she founded a famous seminary, now Mount Holyoke College at South Hadley, Mass., upon the plan of uniting domestic service with intellectual culture. Her success as president of this institution caused many similar schools to be established throughout the country, and the name of Mary Lyon became a household word among all friends of the education and the elevation of women. Her writings include an account of the seminary and a book entitled *The Missionary Offering*. Elected to the American Hall of Fame, 1905.

Lytton (*lĭt'ŭn*), **Edward George Earle Lytton Bulwer-Lytton, Baron (1803-1873),** English novelist, was born in London. In 1826, he was graduated at Cambridge, and, in 1827, he published his first novel, *Falkland*. In 1828, his *Pelham* appeared. This work placed him at once in the first rank of contemporary writers of fiction. Thenceforward his literary career was one of great brilliancy, and for a quarter of a century he reigned as the master of English fiction.

Among his other novels are *The Disowned*, *Paul Clifford*, *The Pilgrims of the Rhine*, *The Last Days of Pompeii*, *The Last of the Barons*, *Lucretia*, *Harold*, *The Caxtons*, *The Coming Race*, and *Kenelm Chillingly*. He wrote also the poems *The New Timon* and *King Arthur*. He was created a peer in 1866.

His son, Edward Robert Bulwer-Lytton, Earl of Lytton, "Owen Meredith," (1831-1891) was viceroy of India from 1876 to 1880. His best known work is *Lucile*.

McAdam (*măk-ăd'ăm*), **John Loudon (1756-1836),** Scottish engineer, was born at Ayr, 1756. At the age of 14, he was sent to an uncle in New York, where he remained until the close of the Revolutionary War, acquiring a comfortable fortune as agent for the sale of war prizes. He returned to Britain and, in 1815, was appointed surveyor-general of Bristol roads, where he effected notable improvements in road building by the use of crushed stone. His name soon became synonymous with his valuable invention and macadamized roads were rapidly introduced throughout the civilized world.

McAdoo (*măk'ă-dōō*), **William Gibbs (1863-1941),** American lawyer, railway official, and cabinet officer, was born near Marietta, Ga., and was educated at the University of Tennessee. He practiced at Chattanooga and, in 1892, removed to New York. In 1902, he was elected president of the Hudson and Manhattan railroad. He was secretary of the treasury during 1913-18. In 1914, he married Eleanor Wilson, the youngest daughter of President Wilson. He served, 1917-19, as director general of the railways. At the Democratic national convention, 1924, he failed of the necessary two-thirds votes for presidential candidacy. He was elected to the Senate, 1933-39.

MacArthur, Douglas (1880-), American general, was born in Arkansas. Graduating from West Point in 1903, he served in the Philippines and in Mexico, and was on duty in Japan and on the Pacific Coast. In World War I he commanded the "Rainbow" division and was in action at St. Mihiel and Sedan. Made a major general in 1925, he served for several years in the Philippines. In 1930 he was commissioned general, and from 1930 to 1935 was chief of staff of the United States Army.

Sent back to the Philippines in 1935 as director general of national defense, he organized the Philippine army. He was commander in chief when the Japanese invading forces struck in 1941. In the face of overwhelming odds, he withdrew his forces into Bataan Peninsula. In March 1942 he was ordered to Australia to command the Allied forces. In August 1942, the American return began with the occupation of Guadalcanal. MacArthur's forces landed on Leyte in October 1944; in February, promoted to General of the Army, he entered Manila. On September 2, 1945, as Allied Supreme Commander, he received the surrender of Japan, and entered upon its administration. In 1950, when Southern Korea was invaded by Northern Korea communists, General MacArthur was placed in command of the opposing forces—the first commander in chief under the flag of the United Nations. In 1951 President Truman removed him for making public statements critical of Washington policy. In 1952 he accepted the chairmanship of the board of Remington Rand.

Macaulay (*mă-kô'lĭ*), **Thomas Babington Macaulay, Baron (1800-1859),** British historian and statesman, was born at Rothley Temple, Leicestershire. He entered Trinity College, Cambridge, at the age of 18 and acquired a brilliant reputation both as a scholar and as a debater. He began his literary career by contributing to periodicals, his earlier ones including *The Spanish Armada*, *Moncontour*, and *The Battle of Ivry*, besides essays and critiques. In 1825, he contributed to the *Edinburgh Review* an essay on Milton which became a classic. He was a member of Parliament, 1830-34; member of the supreme

council in India, 1834-38; and war secretary, 1839-41. His martial ballads entitled *Lays of Ancient Rome* appeared in 1842. In 1843, he published his *Essays*, in three volumes. In 1848 appeared the first two volumes of his celebrated *History of England from the Accession of James II*. These created great interest and met with an enormous sale. The third and fourth volumes were published in 1855. On account of rapidly failing health, he was unable to complete his great history. It has been characterized as "a great Whig pamphlet," and some passages have been attacked with telling criticism; but as a literary and historical reviewer, Macaulay stands unchallenged. He was elevated to the peerage as baron in 1857. He was buried in Westminster Abbey.

McBurney, Charles (1845-1913), American surgeon, was born in Roxbury, Mass. He was graduated at Harvard, 1866, and from the College of Physicians and Surgeons, New York, 1870. He then began practice as a surgeon in New York and was professor of clinical surgery at the College of Physicians and Surgeons in 1892-1907. His reputation as a skillful operative surgeon and as a teacher of surgery was world-wide. He became an authority on appendicitis and discovered "McBurney's point," which is of great value in diagnosing that disease. He was consulting surgeon to President McKinley after the president was shot.

McCarthy, Justin (1830-1912), Irish historian and political leader, was born at Cork. He engaged in journalism successively in Cork, Liverpool, and London. In the last named city, he became editor of the *Morning Star* in 1864 and editorial writer for the *Daily News* in 1870. From 1879 to 1900, he was a member of Parliament. He became prominent in the Irish Home Rule party and was chairman of the Irish Parliamentary party in 1890-96.

Novels from his pen include *Miss Misanthrope, Donna Quixote, Maid of Athens,* and *Mononia*. His reputation as a historian rests on his *History of Our Own Times*. Among his other works are *A History of the Four Georges, Epoch of Reform, Life of Pope Leo XIII, The Story of Mr. Gladstone's Life, Modern England, The Reign of Queen Anne,* and *The Story of an Irishman*.

McClellan, George Brinton (1826-1885), American general, was born at Philadelphia, Pa. He was graduated at West Point, 1846, and distinguished himself in the Mexican War.

After four years spent in railroad development, he was, in 1861, commissioned major general of the United States army and was appointed to the command of the department of the Ohio. He subsequently commanded the army of the Potomac, in the organization and training of which he showed great vigor and skill. After the costly Seven Days' battles, he was superseded by General Halleck. Following General Pope's defeat in the second battle of Bull Run, McClellan was again placed in command of the army of the Potomac and fought with Lee the indecisive battle of Antietam, 1862. McClellan's failure vigorously to pursue Lee's retreating army led to his removal. In 1864, as a Democrat, he was the unsuccessful opponent of Lincoln for the presidency. He was elected governor of New Jersey in 1877.

McCloskey (*mă-klŏs'kĭ*), **John (1810-1885),** American Roman Catholic prelate, was born at Brooklyn, N. Y. After pursuing a collegiate and theological course at Mount Saint Mary's College, Emmitsburg, Maryland, he was ordained priest at Saint Patrick's Cathedral, New York, 1834. He was the first president of Saint John's College, now Fordham University, Fordham, N. Y., 1841-42; was consecrated bishop of Albany in 1847; became archbishop of New York in 1864; and, in 1875, was created cardinal, the first in America. He built the Cathedral at Albany and the Theological Seminary at Troy, and, besides being an effective preacher, was an able executive.

McCollum, Elmer Verner (1879-), American physiological chemist, was born near Fort Scott, Kans. He was educated at the University of Kansas and Yale University. In 1907, he was appointed on the faculty of the University of Wisconsin, where he became professor of agricultural chemistry in 1913. Four years later, he went to Johns Hopkins University as professor of biochemistry. He discovered Vitamin A, announcing the discovery in 1912, and took a leading part in the identification of other vitamins. His publications include *The Newer Knowledge of Nutrition, The American Home Diet,* and *Foods, Nutrition, and Health*.

McConnell, Francis John (1871-), American prelate and educator, was born at Trinway, Ohio. He was educated at Ohio Wesleyan University and Boston University. In 1894, he was ordained to the ministry of the Methodist Episcopal Church and, at different times, held important pastorates in Massachusetts and New York. He was made president of De Pauw University in 1909 and, three years later, was elected bishop, serving in Mexico and later in Pittsburgh. Appointed to a governmental commission to study a steel strike in 1919, he was largely responsible for a report that led to the abolition of the 12-hour day in that industry. His published works include *Religious Certainty, The Preacher and the People, Christianity and Coercion,* and *John Wesley*.

McCormack (*mă-kôr'măk*), **John (1884-1945),** Irish singer, was born at Athlone, Ireland. He received his first vocal training in the choir of Dublin Cathedral in 1903. In 1905, he studied under Sabatini in Milan. At London, in 1907, he made his first appearance as a concert singer and also his operatic debut as Turiddu in *Cavalleria Rusticana*. Engaged by Hammerstein, he achieved immense popularity at the Manhattan Opera House, New York, in 1909. He later sang with the Chicago Opera Company and with other operatic organizations and made many concert tours, in which he won notable success by his rendition of Irish songs. He was one of the finest lyric tenors of his time. He became an American citizen in 1919.

McCormick (*mă-kôr'mĭk*), **Cyrus Hall (1809-1884),** American inventor and manufacturer, was born in Virginia. In 1831, he invented a reaping machine, which he patented and later perfected with further improvements. However, all of the essential elements of modern harvesting machines—the reel, the divider, the reciprocating knife, and the platform—were embodied in his original invention of 1831. In 1847, he removed to Chicago, where he formed a partnership with his brother Leander James McCormick and established a reaping machine plant, which became the most extensive manufactory of harvesting machines in the world. He contributed liberally to education and endowed a chair in Washington and Lee University.

McCormick, John W. (1891-), American Democratic politician, was born at Boston, Mass., where he was educated in the public schools. He was admitted to the Massachusetts bar in 1913 and practiced law in Boston. He was a member of the Massachusetts House of Representatives, 1920-22, and the Massachusetts Senate, 1923-26. A member of Congress since 1927, he has been majority leader of many sessions.

McCormick, Joseph Medill (1877-1925), American politician, was born at Chicago. He was educated at Yale University and became publisher and editor of the Chicago *Tribune*, which, under his direction, became one of the most influential papers in the United States. He was twice elected to the Illinois general assembly and became a member of Congress in 1917. Two years later, he was elected to the United States Senate. His wife, Ruth (1880-1944), daughter of Mark Hanna, was elected to the House of Representatives for the term 1929-31.

McCormick, Robert Rutherford (1880-1955), American publisher, was born in Chicago. He was educated at Yale and Northwestern universities and, taking up the practice of law in Chicago, was active in civic circles from 1904 to 1910. In the latter year, he became, with his cousin Joseph Medill Patterson, coeditor and publisher of the Chicago *Tribune*. The *Tribune's* circulation became the greatest of any newspaper in the United States except that of the New York *Daily News*, a "tabloid" founded by them in 1921. They founded, in 1924, *Liberty*, a weekly magazine which attained immediate success.

McCrae, John David (1872-1918), Canadian physician and poet, was born at Guelph, Ont. He was educated at the University of Toronto and studied also at McGill University, where he became a lecturer in pathology and medicine; was appointed surgeon to the Alexandra Hospital in Montreal; and contributed to Osler and McCrae's *System of Medicine*.

He served as a lieutenant in the Boer War and, in World War I, was second in command of the medical unit provided by McGill University. During the battle of Ypres, he wrote the famous lyric, "In Flanders' Fields," for which he is chiefly remembered.

McCutcheon (*mă-kŭch'ĕn*), **George Barr (1866-1928),** American author, was born in Tippecanoe County, Indiana, and was educated at Purdue University. He entered journalism, becoming city editor of the Lafayette *Courier* in 1893. Later devoting himself to the writing of short stories and novels, he produced many popular works, including *Graustark*, a tale of adventure in "Graustark," an imaginary petty kingdom of Europe. His other works include *Brewster's Millions, A Fool and His Money, The Light That Lies, West Wind Drift,* and *Oliver October*.

McCutcheon, John Tinney (1870-1949), American cartoonist, brother of George Barr McCutcheon, was born near South Raub, Ind. He was graduated at Purdue University in 1889 and, from that time, was connected with leading Chicago newspapers. His cartoons first became famous in the presidential campaign of 1896. He set out for a trip around the world on the dispatch boat *McCulloch* in 1898 and, in the interest of his paper, visited the Philippine Islands, various other parts of the Orient, and South Africa, where he joined the Boers. In 1909-10, he visited Africa; went to Mexico in 1914; was with the Belgian and German armies later the same year; and spent much of

1915 and 1916 in France and the Balkan Peninsula. He won the Pulitzer prize for cartoons in 1931. Among other works, he published *Filipino Warfare*; *Congressman Pumphrey, the People's Friend*; *T. R. in Cartoons*; and *The Restless Age*.

Macdonald, James Alexander (1862-1923), Canadian clergyman and journalist, was born in Middlesex County, Ont. He was graduated at Knox College, Toronto, 1887; was ordained to the ministry of the Presbyterian Church; and became pastor of Knox Church, Saint Thomas, Ont., 1891. He resigned his pastorate in 1896 and removed to Toronto to become first editor of *The Westminster*, a religious monthly magazine which was later consolidated with other similar periodicals as *The Presbyterian*. He was principal of the Presbyterian Ladies' College, 1896-1901. From 1902 to 1916, he was editor in chief of the Toronto *Globe*. He became widely known as a vigorous editorial writer and a forceful lecturer.

MacDonald, James Ramsay (1866-1937), British politician, labor leader, and Socialist writer, was born at Lossiemouth, Scotland. Except for brief attendance at board schools, he was practically self-educated. At 19, he went to London and soon afterward engaged in secretarial work. In 1891, he threw himself into the Socialist movement, soon attaining prominence as an organizer and as a writer. From 1900 to 1911, he was secretary of the Labor party, and, in 1905, he became editor of the *Socialist Library*.

Turning his attention to public affairs, MacDonald, from 1906 to 1918, was elected continuously to Parliament as a Labor member. In 1911, he was made leader of the Labor party. His record as a consistent and outspoken pacifist cost him his seat in Parliament in 1918. With the success of the Labor party in the elections of 1923, MacDonald again came into prominence as a political leader. Early in 1924 he was made prime minister. Although his government fell later in the same year, he had the distinction of heading the first Labor administration in Great Britain. Again returned to power in 1929, he retained his leadership during a critical election in 1931 only by deserting his party and heading a coalition government. As prime minister he visited the United States in 1929 and 1933. In 1935 he resigned as prime minister and accepted a cabinet position under Stanley Baldwin.

MacDonald, Jeanette (1907-), American singer and film actress, was born at Philadelphia, Pa. One of the first and greatest of the screen's singing stars, she made her stage debut in a revue while in her early teens. Her first New York appearance was as a chorus girl in a Broadway musical in 1921. Discovered by a Hollywood "talent scout" during the early years of sound film, she signed a screen contract in 1929, and made her name in *The Love Parade* with Maurice Chevalier. She quickly became a popular star, appearing in many films. Her first role with Nelson Eddy was in *Naughty Marietta*, produced in 1935. Among the numerous films in which she has appeared were *Love Me Tonight* (1932), *The Merry Widow* (1934), *Rose Marie* (1936), *Maytime* (1937), *The Firefly* (1937), *The Girl of the Golden West* (1938), *Sweethearts* (1938), *I Married an Angel* (1939), *New Moon* (1940), and *Three Daring Daughters* (1950). Jeanette MacDonald has made a number of concert tours of the United States, and has sung in opera. She is married to Gene Raymond, movie actor.

Macdonald, Sir John Alexander (1815-1891), Canadian statesman, was born in Glasgow, Scotland. His parents settled in Upper Canada during his childhood. After attending Kingston Grammar School, he studied law and was admitted to the bar in 1836. He entered the Legislative Assembly of Upper Canada in 1844; became receiver-general, 1847; attorney general, 1854-57; prime minister, 1857; and government leader in the Assembly, 1864-67. He was chairman of the London Colonial Conference of 1866-67 and, more than any other person, was responsible for the federation of provinces to form the Dominion of Canada. After its establishment, he took a leading part in the new Dominion government as minister of justice and attorney general, 1867-73, and as premier from 1878 until his death.

MacDowell (*măk-dou'ĕl*), **Edward Alexander (1861-1908),** American composer, was born in New York City. His first important teacher was Teresa Carreño. He entered the Paris Conservatory in 1876; in 1878, he went to Germany, where he studied at Wiesbaden under Ehlert and at Frankfort under Heymann and Raff. In 1882, he met Liszt, who brought about the public performance of his *First Modern Suite*. In 1888, he located in Boston, where he soon rose to fame as a performer and as a composer of orchestral numbers. In 1896, he was made the first professor of music in Columbia University. He was one of the seven original members of the American Academy of Arts and Letters.

MacDowell's music displays the most striking originality attained by an American composer. In the smaller forms of composition, he is ranked with Schumann and Grieg. Among his works are the symphonic poems *Hamlet*, *The Saracens*, and *Lovely Alda*; four sonatas for the piano, *Tragica*, *Eroica*, *Norse*, and *Keltic*; and lesser compositions for the piano, including *Woodland Sketches* and *Sea Pieces*.

McGill, James (1744-1813), merchant, was born in Glasgow, Scotland. About 1770, he went to Canada and engaged in the fur trade at Montreal, accumulating a substantial fortune. He became a member of Parliament and served as brigadier general of militia in the War of 1812. Upon his death, he left £10,000, together with certain lands, for a college to be named for him. Such a college was founded and, in 1821, received a royal charter, incorporating it under the name of McGill University, now one of the leading institutions of higher learning in Canada.

MacGowan, Kenneth (1888-), American dramatic critic and theatrical producer, was born at Winthrop, Mass. After he was graduated from Harvard University, he reported on the drama and motion pictures for the Boston *Transcript* and later for Philadelphia and New York papers. He edited the *Theater Arts Magazine*, 1919-25, and directed the Provincetown Players and Greenwich Village Theater, 1924-27. He later began producing motion picture plays, including *Little Women*, *Lloyds of London*, and *Stanley and Livingstone*. Besides observing and using developments in stagecraft abroad, MacGowan contributed toward them, in productions that were most successful. He wrote *The Theatre of Tomorrow*, *Continental Stagecraft*, and *Footlights Across America*, a study of the "little theater" movement, in which he took a prominent part. He has been professor of Theater Arts at the University of California since 1947.

Machiavelli (*mä'kyä-vĕl'lē*), **Niccolò (1469-1527),** Italian statesman and author, son of a jurist of noble family, was born in Florence. He was secretary of the Ten at Florence from 1498 to 1512; went on several important missions; but was deprived of office and exiled by the Medici. Subsequently he retired to a country estate near San Casciano and devoted himself to literary pursuits. His chief works are *The Prince*, *Discourses*, *History of Florence*, *The Art of War*, comedies, and poems.

In *The Prince* and the *Discourses*, Machiavelli set forth views which may be said to have initiated the modern study of political science. Isolating political elements from all others, he described the means by which an individual and a nation might achieve and maintain power. His separation of political from ethical considerations gives rise to the term "machiavellian" to describe unscrupulous means to ends. His purpose was patriotic, to show how Italy might become powerful by extricating itself from the welter of papal and imperial rivalry which divided its strength.

McIntyre, James Francis Aloysius (1886-), was born in New York City, where he attended public schools. From 1899 to 1915 he worked in the financial district, first as a runner, lastly as office manager of a brokerage house. He attended Cathedral College and St. Joseph's Seminary from 1915 until 1921, when he was ordained a priest in the Roman Catholic Church. Entering the chancery office in 1923, he was made chancellor in 1934; domestic prelate in 1936; auxiliary bishop of New York in 1946, and archbishop of Los Angeles in 1948. In 1953 he was created a cardinal.

Mack, Connie (1862-1955), a contraction of the formidable Cornelius McGillicuddy, is one of the immortals of American baseball. He was born at East Brookfield, Mass., and his long and active life spanned a period from the beginning of big-league baseball to the inception of televised games. During his playing days, Connie Mack was a catcher for the Washington Senators and the Pittsburgh Pirates. His fame resulted from his management and ownership of the Philadelphia Athletics, a team that he led to nine American League pennants and five world series championships, the last in 1930. Elected to the Baseball Hall of Fame in 1937, Connie Mack managed his team until 1950, when he was 80. Tall, silver-haired, and immaculate, wearing a high stiff collar in broiling summertime, he was a beloved figure to generations of baseball fans. His autobiography, *My 60 Years in the Big League*, was published in 1950.

McKay, Douglas (1893-), business man and politician, was born in Portland, Oregon. He was graduated from Oregon State College in 1917. Following World War I, during which he was wounded while serving as an infantry officer overseas, he became an automobile salesman in Portland. In 1927, he opened his own agency in Salem, Oregon, of which city he was mayor in 1933-34. In 1935, he was chosen state senator, serving in that office until elected governor in 1948. He was appointed Secretary of the Interior in 1953. He resigned from the Eisenhower cabinet in 1956 to run for the U. S. Senate, but failed of election.

McKay, Gordon (1821-1903), American inventor and manufacturer, was born at Pittsfield, Mass. In 1860, he perfected and brought into practical use a shoe sewing machine originally invented by L. R. Blake. Later he invented the heeler, the lasting machine, and the nailing

machine which revolutionized the boot and shoe industry and contributed largely to American leadership in shoe manufacturing. During the Civil War, he leased his machines to more than 60 firms and, in a short time, became a millionaire. In 1876, he organized the McKay Sewing Machine Association, which had a virtual monopoly and collected commissions on all American shoes made by the assistance of his inventions. In 1893, he donated a trust fund of $4,000,000 to Harvard University, to which he later left most of his fortune.

Mackaye (*mă-kī'*), **Percy (1875-1956)**, American dramatist and poet, was born in New York City. He was graduated from Harvard, 1897, and continued literary studies at Leipzig. After residing successively in Rome, Switzerland, and London, he returned to New York and engaged in teaching. Upon joining a literary colony at Cornish, N. H., in 1904, he devoted himself mainly to dramatic work, making notable contributions to American poetic drama. He composed operas and produced several community masques written by himself. His works include *The Canterbury Pilgrims, Fenris the Wolf, Jeanne d'Arc, Sappho and Phaon, Anti-Matrimony, The Civic Theatre, Caliban by the Yellow Sands, Rip Van Winkle,* and *Poog's Pasture.*

Mackenzie, Alexander (1822-1892), Canadian statesman, was born near Dunkeld, Scotland. He removed to Canada in 1842 and was a contractor and journalist until 1861. He was elected to the Assembly of Upper Canada in 1861 and, beginning in 1867, was a member of the Dominion Parliament for 25 years. Upon the resignation of Sir John Macdonald in 1873, he became the first Liberal premier of the Dominion and continued at the head of the government until the election of a Conservative majority to Parliament in 1878. His administration was responsible, among other important measures, for the introduction of vote by ballot, the creation of the Supreme Court of Canada, and the institution of the rule by which the governor-general was bound to act on instructions from the Dominion government.

Mackenzie, Sir William (1849-1923), Canadian financier and railroad builder, was born at Kirkfield, Ont., and was educated in the public schools. He taught school but soon left that occupation to engage in the lumber business. His first experience in railroad building was the construction of a section of the Grand Trunk line in Ontario; later he built part of the mountain division of the Canadian Pacific Railroad; and, in 1886, formed a partnership with Sir Donald Mann for the building of the Canadian Northern Railway, a transcontinental line that was subsequently incorporated in the Canadian National System. He was knighted in 1911.

McKim, Charles Follen (1847-1909), American architect, was born in Chester County, Pa. He was educated at Lawrence Scientific School, Harvard, and the Ecole des Beaux-Arts, Paris. He began practice in 1872 and was joined in partnership by William R. Mead in 1877 and by Stanford White in 1879, the firm then becoming McKim, Mead, and White.

He made the designs for the Boston Public Library; the Columbia University Library and the Morgan Library, New York; the Agricultural Building at the World's Columbian Exposition, Chicago; and the great Pennsylvania Railway Station, New York, completed after his death. With D. H. Burnham and F. L. Olmsted, Jr., he planned the scheme for the improvement of the city of Washington. He had a part also in the plans for Washington Arch, for the Library and Hall of Fame of the University of New York, and for Madison Square Garden in New York. By his skill in producing monumental effects and by his refined taste, he contributed greatly to architectural progress in the United States. He was elected a member of the American Academy of Arts and Letters in 1905.

McKinley, William (1843-1901), 25th president of the United States, was born in Niles, Ohio. He was educated at Poland Academy and Allegheny College, though he never finished his course in the latter institution. In 1861, he volunteered in the Union army and entered the Ohio infantry as a private. He served four years, rising by merit to the captaincy of his company and to the rank of major when mustered out in 1865.

He then began the study of law; was admitted to the bar in 1867; and commenced practice at Canton, Ohio. In 1869, he was elected prosecuting attorney for Stark County, where his success attracted local attention. Entering politics as a Republican, he was elected to Congress in 1876, and was re-elected for six successive terms. In 1882, his election was contested and he was unseated, but he was returned at the next election. In 1890, a Democratic legislature grossly gerrymandered his district, making it easy to defeat him for re-election.

His reputation in Congress rests chiefly on the tariff bill that bears his name. This bill and his able advocacy of it before the House distinguished him as the leader of the Republican party on the tariff question. The Republican party went before the country in 1892 almost solely on the issue raised by the McKinley tariff. The high rates, however, resulted in loss of revenue. A reaction set in, and Cleveland was elected.

In 1891, McKinley was elected governor of Ohio by a large plurality and was re-elected in 1893. In 1895, a systematic canvass in McKinley's behalf for the presidential nomination was instituted by his supporters and was continued until the convention of 1896. He was nominated, and, after an extremely bitter campaign on the issue of the gold standard versus free coinage of silver, was elected as champion of the gold standard.

President McKinley's first term is memorable chiefly for the occurrence of the Spanish-American War. That his policy during 1896-1900 was acceptable was shown by his unanimous renomination and by his re-election in 1900 by an electoral majority of 137. His second term began most auspiciously but ended tragically. On September 5, 1901, he visited the Pan-American Exposition in Buffalo, that day having been set apart in his honor and called "the president's day." On the afternoon of the following day, while holding a public reception in the Temple of Music, he was shot twice by Leon Czolgosz. The wounded president was removed to the residence of John G. Milburn, president of the exposition, and he died there, September 14. His remains lay in state in the Capitol at Washington on the 17th and were taken to his home city, Canton, Ohio, where they were interred on the 18th.

Maclaren, Ian. See *Watson, John.*

MacLeish, Archibald (1892-), American poet, was born at Glencoe, Ill. A graduate of Yale and Harvard universities, he served in World War I and devoted his time thereafter until 1939 to the writing of poetry and dramas. In 1939 President Roosevelt appointed him Librarian of Congress. He was director of the Office of Facts and Figures 1941-42 and Assistant Secretary of State, 1944-45. His works include *The Happy Marriage, Panic, Air Raid,* and *Cone of Silence.* He has won the Pulitzer prize twice, in 1933 with his narrative poem *Conquistador,* and in 1953 with his *Collected Poems.*

MacLeod (*măk-loud'*), **John James Rickard (1876-1935)**, physiologist, was born at Cluny, Scotland; was graduated at Aberdeen University and the University of Leipzig; and, in 1901, became professor of physiology at the University of Aberdeen. He lectured at Western Reserve University, Cleveland, 1903-18, and then went to the University of Toronto as head of the department of physiology. He carried on investigations there with Dr. F. G. Banting on diabetes, and, for their joint discovery of insulin as a means of combating this disease, they were awarded the Nobel prize for medicine in 1923. He was professor of physiology at Aberdeen University, 1928-35.

McMaster, John Bach (1852-1932), American historian and educator, was born in Brooklyn, N. Y. He was graduated at the College of the City of New York, 1872. After practicing as a civil engineer, he was instructor in civil engineering at Princeton, 1877-83, and professor of American history in the University of Pennsylvania, 1883-1920.

His *History of the People of the United States,* covering the period 1783 to 1861 and valuable for its treatment of social and economic conditions, is a standard work. Among his other writings are *Daniel Webster* and *The United States in the World War.*

MacMillan, Donald Baxter (1874-), American explorer, was born at Provincetown, Mass. Educated at Bowdoin College and Harvard University, he taught school from 1898 to 1908. Then he went as assistant on Peary's polar expedition of 1908-09. Thereafter MacMillan engaged almost continuously in arctic exploration and ethnological research, using a small motor ship. He brought back about 40,000 plants from trips to Baffin Land and Greenland in 1937-38. His expeditions, extending from Labrador to the northernmost limits of land, resulted in rectification of the maps and more accurate information on resources and inhabitants. He wrote *Four Years in the White North, Etah, Kabdah,* and *How Peary Reached the Pole.*

McMillan, Edwin Mattison, (1907-) American physicist, was born at Redondo Beach, Calif. One of the atomic era's foremost pioneers, he was educated at the California Institute of Technology and received his doctorate from Princeton University in 1932. Since then he has done his research at the University of California, where he teaches physics. McMillan's scientific versatility is remarkable. He was codiscoverer in 1940 of element 93, neptunium, and his research helped in the discovery of element 94, plutonium. During World War II, he worked to perfect radar and sonar detection systems. In 1951, he and Glenn T. Seaborg were awarded the Nobel prize in chemistry for their discovery of plutonium.

Macmillan, Harold (1894-), British statesman, son of Maurice Macmillan, the English book publisher, and his American wife, Helen Belles of Indiana. He was educated at Eton and Balloil College, Oxford. He served in the Grenadier Guards during World War I, and was wounded three times. In 1919 he went to Canada as aide de camp to the ninth Duke of Devonshire, who was then Governor General, and the following year married one of the duke's daughters, Lady Dorothy Cavendish.

Except for a single brief interval, Macmillan has been a member of Parliament since 1924. During World War II he was Parliamentary Secretary of the Minister of Supply, Under Secretary of State, Minister Resident at Allied Headquarters in French North Africa, and Secretary for Air. Since the return of the Conservatives to power in 1951, he has been Minister of Housing and Local Government, Minister of Defense, Foreign Secretary, and Chancellor of the Exchequer. On January 10, 1957 Queen Elizabeth named him Prime Minister to succeed Sir Anthony Eden.

MacMonnies (*măk-mŭn'ĭz*), **Frederick William (1863-1937)**, American sculptor, was born in Brooklyn, N. Y. He studied under Saint-Gaudens in New York, under Falguière in Paris, and also in Munich. In 1886, he received the *prix d'atelier*, the highest prize open to foreigners, and, in 1887, established his own studio in Paris.

Among his numerous works are statues of Nathan Hale, City Hall Park, New York, and J. S. T. Stranahan, Prospect Park, Brooklyn; "Pan of Rohallon"; "Faun with Heron"; a statue of Sir Henry Vane, Boston Public Library; a colossal fountain at the World's Columbian Exposition, Chicago; "Bacchante with Infant Faun," Metropolitan Museum of Art, New York, and Luxembourg Gallery, Paris; "Venus and Adonis"; "Cupid"; the figure of Victory for the Battle Monument, West Point; the central bronze doors and the statue of Shakespeare in the Congressional Library; the army and navy groups for the Soldiers' and Sailors' Arch, Prospect Park, Brooklyn; and the colossal group entitled "Civic Virtue" in New York City. He was elected a member of the American Academy of Arts and Letters in 1915. See *Sculpture*.

McMurry, Frank Morton (1862-1936), American educator, was born at Crawfordsville, Ind. He received his education at the University of Michigan, at Halle, and at Jena. He studied also in Geneva and Paris. He was professor of pedagogy at the University of Illinois, 1893-94; became principal of Franklin School, Buffalo, in 1894; was dean of Teachers College at the University of Buffalo, 1895-98; and professor of elementary education at Teachers College, Columbia University, from 1898 to 1926. He was among the early advocates of Herbartian principles in education in the United States. With his brother, Charles Alexander McMurry, he published *The Method of the Recitation* and with R. S. Tarr the *Tarr and McMurry Common School Geographies*.

MacNeil, Hermon Atkins (1866-1947), American sculptor, was born at Chelsea, Mass. He received his art training largely in Paris, where he attended the Ecole des Beaux-Arts. Returning to America, he taught three years at Cornell University and three years in the Chicago Art Institute. He did important decorative work for the World expositions at Chicago, Paris, Buffalo, Saint Louis, and San Francisco. Much of his sculpture deals with Indian subjects, such as the "Coming of the White Man" at City Park, Portland, Oreg. His "Soldiers' and Sailors' memorial" at Albany, N. Y., "Physical and Intellectual Development" at Northwestern University and the east pediment group in the Supreme Court Building, Washington, D. C., represent other aspects of his genius. Elected to the American Academy of Arts and Letters in 1926.

McNicholas, John T. (1877-1950), American churchman, was born at Kiltimagh, Ireland. Brought to America at four years of age, he was educated in Roman Catholic schools and was ordained a priest in 1901. He was professor in Dominican houses of studies at Somerset, Ohio, in 1904 and at Washington, D. C., 1905-09, thereafter going to New York, N. Y., as pastor of a church there. He spent eight years in organizing work for the Holy Name Society, an anti-profanity organization which now has a membership of over 3,000,000. He was consecrated bishop of Duluth in 1918 and archbishop of Cincinnati, 1925.

McNutt, Paul Vories (1891-1955), American educator and politician, was born at Franklin, Ind. He was graduated from Indiana and Harvard universities and began the practice of law in 1914, lecturing meanwhile at the University of Indiana. After service as a field artillery officer in World War I, he was made professor of law at Indiana University, becoming dean of the law school in 1925. His active interest in public affairs led to his nomination and election as governor of Indiana as a Democrat in 1933. A second term being forbidden by law, he was appointed high commissioner to the Philippines from 1937 to 1939. He was placed in charge of mobilizing civilian manpower in 1942. In 1945 he was again appointed high commissioner to the Philippines, and in 1946 became the first American ambassador to the new Republic, resigning the next year.

McReynolds, James Clark (1862-1946), American cabinet officer and jurist, was born at Elkton, Ky. He was graduated at Vanderbilt University and at the University of Virginia. He began practice in Nashville, Tenn., and became professor of law in Vanderbilt University, 1900. From 1903 to 1907, he was assistant attorney general of the United States and, in 1913, was made attorney general by President Wilson. In securing the enforcement of the Sherman Anti-trust Law, he had direction of the dissolution suits against several large corporations. From 1914 to 1941, he was Associate Justice of the United States Supreme Court. A conservative jurist, he opposed interpretations which would extend Congressional authority.

Madden, Joseph Warren (1890-), American lawyer and administrator, was born at Damascus, Illinois. Educated at Illinois and Chicago universities, he taught law at Oklahoma University, 1914-16, Ohio State University, 1917-21, the University of West Virginia, 1921-27, and the University of Pittsburgh, 1927-35. He had meanwhile specialized on the law of domestic relations and had acted as arbitrator in labor disputes.

In 1935, Madden was appointed chairman of the National Labor Relations Board, an agency set up by Congress that year to protect by sanctions the right of labor to organize and bargain collectively. The novelty of this law, abridging somewhat the right of employers to hire and fire at will, evoked bitter opposition. Madden defended the law's constitutionality before the Supreme Court in the historic Jones and Laughlin case in which the Court, in 1937, upheld the law in terms recognizing for the first time the authority of Congress to regulate manufacturing industry. Under his chairmanship the board established numerous precedents which profoundly affected the entire body of labor law, the decisions being upheld on appeal to the courts in nearly all instances. Because of the strength of his critics in Congress, Madden was not renominated on the expiry of his second term in 1940. The law, however, which he had done most to make an instrument of new industrial practices had been firmly established. He was made a judge of the Court of Claims in 1941.

Madison, James (1751-1836), fourth president of the United States, was born at Port Conway, Va. He was graduated at Princeton, 1771, and studied law. In 1776, he was a member of the Virginia convention, and, though too modest for an orator, he became one of the most eminent, accomplished, and respected of American statesmen.

He was sent to the Federal Congress, 1780, and, in 1784, to the legislature of Virginia, in which he supported the measures of Jefferson in the revision of the laws and in placing all religious denominations on an equality of freedom without state support. As a member of the convention of 1787, which framed the Federal Constitution, Madison took complete notes in shorthand, thus producing the only record of its proceedings and debates. With Jay and Hamilton, he wrote the *Federalist* in order to induce New York to adopt the Federal Constitution. He supported the adoption of the Constitution but opposed the financial policy of Hamilton and became a leader of the Republican, or Jeffersonian, party. In 1792, he became the leader of the Republican party in Congress, and wrote the Kentucky resolutions of 1798, which contain the basis of the State Rights doctrines. In 1801, Jefferson having been elected president, Madison was made secretary of state, which post he held during the eight years of Jefferson's administration.

In 1809, Madison became president of the United States. The European wars of that period, with their blockades and orders in council, were destructive of American commerce. The claim of the English government to impress seamen from American vessels was violently resisted. Madison vainly endeavored to avoid a war with England, which, nevertheless, was declared in 1812 and continued for over two years. He was elected for a second term, during which he approved the establishment of a national bank as a financial necessity—a measure he had previously opposed and vetoed. In 1817, he retired to his seat at Montpelier, Va., where he served as a rector of the University of Virginia. He was elected to the American Hall of Fame in 1905.

Mæcenas (*mê-sē'năs*), **Gaius Cilnius (c. 70 B. C.-8 B. C.)**, Roman statesman. He was the friend of Virgil and Horace and was celebrated for his patronage of letters. He had a talent for private diplomacy and was employed mainly in that capacity. In 36, he was in Sicily, helping Octavian. Five years later, when the latter was fighting the great sea battle of Actium with his rival Antony and the Egyptian Cleopatra, Mæcenas proved an able and vigilant governor of Rome by crushing a conspiracy of the younger Lepidus, thereby preventing a second civil war.

Maeterlinck (Du., *mä'tĕr-lĭngk*; F., *mä'tĕr'lăN'*), **Maurice (1862-1949)**, Belgian poet and dramatist, was born at Ghent. He was educated for the law, but early turned his attention to writing. In 1896, he located in Paris and devoted himself entirely to literature, producing, besides many plays and poems, a number of philosophical works, which have been widely translated. The best known of these are *Wisdom and Destiny*, *The Treasure of the Humble*, *The Buried Temple*, and *The Life of the Bee*.

Among his dramatic works are *The Blind*, *The Intruder*, *The Seven Princesses*, *Alladine and Palomides*, *Sister Beatrice*, *Monna Vanna*, *Joyzelle*, *The Bluebird*, *Mary Magdalene*, and *The Betrothal*. Several of Maeterlinck's plays have been presented on the American stage, *Monna Vanna* and especially *The Bluebird* having become well known. In 1911, he was awarded the Nobel prize for literature. He took refuge in America in 1940 when Germany conquered Belgium. See *Bluebird, Pelléas et Mélisande*.

Magellan, or **Magalhaens, Ferdinand (c. 1480-1521)**, Portuguese navigator. He served his country in the East Indies and Morocco, but, becoming dissatisfied with King Manuel's treatment of him, he offered his services to Spain.

Under Charles V's patronage, Magellan set out in 1519 to reach the Moluccas by the west. Early in 1520, he had reached the Rio de la Plata and, after some months' delay, he passed through the strait called by him Todos los Santos but later renamed, in his honor, the Strait of Magellan. He then sailed across the ocean named by him the Pacific and reached the Philippine Islands. Since, on a previous voyage, he had sailed from Europe farther east than these islands, he had by this time actually circumnavigated the globe. He did not, however, complete his last voyage, but, having become involved in military operations in the Philippine Islands, he was killed in action. His ship, the *Vittoria*, under the command of Sebastian del Cano, arrived in Spain the next year, after completing the first trip around the world.

Magsaysay (*mäg-sī-sī*), **Ramón (1907-1957)**, who rose from a village lad to become president of the Philippine Republic, was born at Iba, Zambeles Province, Luzon. He attended the University of Manila, and during World War II was active in the organization of the guerrilla forces in Western Luzon. He became commanding officer in Zambeles, clearing the Japanese from that area to make way for the return of General Douglas MacArthur. Pending the liberation of the Islands, he was military governor of the district. Elected as a Liberal to the Philippine Congress in 1946, he was re-elected in 1949, and, as a result of his campaign against the Huk guerrilas, he was made Secretary of National Defense. In 1953 he defeated Elpidio Quirino for the presidency. Died in a plane accident.

Mahan (*mä-hăn'*), **Alfred Thayer (1840-1914)**, American naval officer and writer, was born at West Point, N. Y. He was graduated at the United States Naval Academy, 1859; served in the Civil War; was president of the Naval War College, 1886-89 and 1892-93; and visited Europe in command of the *Chicago*, 1893-95, receiving many honors, including degrees from both Oxford and Cambridge. He was retired at his own request in 1896. During the war with Spain, he was a member of the Naval Board of Strategy.

By his *Influence of Sea Power Upon History*, Mahan gave the clearest statement made at any time on the effect of the command of the seas and one which, with necessary modifications, would probably apply also to the command of the air. His other works include *Life of Admiral Farragut*, *Life of Nelson*, *The Interests of the United States in Sea Power*, and *Armaments and Arbitration*. He was elected to the American Academy of Arts and Letters in 1905.

Mahler, Gustav (1860-1911), Bohemian composer and conductor, was born in Bohemia, and studied at the University of Vienna. He was a daring innovator in composition and also acted as a brilliant interpreter of music during his career as conductor of the world's greatest symphony orchestras. At the age of 28, Mahler conducted the Hungarian Royal Opera Orchestra. He went on to lead the Imperial Opera of Vienna, the New York Metropolitan Opera Orchestra and the New York Philharmonic. Mahler wrote nine symphonies, one of which, *Symphony of the Thousand*, was written for one thousand voices. He is the subject of several biographies, one by the noted conductor Bruno Walter. Mahler died in Vienna.

Malenkov (*mä-lyĕn-kôv'*), **Georgi Maximilianovich (1902-)**, Russian leader, succeeded Josef Stalin as premier of the Soviet Union on the latter's death in March 1953. Born in Orenburg (now Chkalov) on the Ural River, Malenkov volunteered for service in the Red Army following the revolution of 1917. He was made a political commissar, and in 1920 joined the Communist party. His abilities were soon recognized and he was summoned to Moscow for special training. In 1925 he attracted the attention of Stalin, who made him his personal deputy in the secretariat. As a protegé of Stalin, Malenkov rose through a succession of posts to a position of great influence in the Communist hierarchy. He achieved the premiership by his ruthless driving power and his ability to produce results in the fields of politics and industry, but was succeeded by Nikolai Bulganin in 1955.

Malibran (*mä'lē'brăN'*; E., *măl'ĭ-brăn*), **Maria Felicita (1808-1836)**, Spanish operatic singer, daughter of Manuel Garcia, was born at Paris. Possessed of a mezzo-soprano voice, she very early showed extraordinary talent and made her debut in Italian opera, in London, 1825. Shortly afterward, her father attempted to establish Italian opera in New York, but without success. There she married M. Malibran, a French banker. After her husband's failure in business, she returned to the stage. She was received with great enthusiasm and became one of the most popular and successful prima donnas of modern times.

She divorced M. Malibran and, in 1836, married Charles de Bériot, a famous violinist. In September of that year, however, she died at Manchester, England. A statue was erected to her memory in Brussels, where she last resided.

Malory, Sir Thomas, English author, flourished about 1470. Nothing is positively known concerning his life except the statements in the preface and at the end of his prose epic *Morte D'Arthur*. This work, material for which was drawn from French sources, was completed in 1469 or 1470 and was delivered to Caxton, who printed it in 1485. It contains the great stories of the King Arthur legend—the tales of Lancelot and Guinevere, Tristan and Isolt, and other famous knights and ladies that appear in Tennyson's *Idylls of the King*. See *Morte D'Arthur, Round Table*.

Malpighi (*măl-pē'gē*), **Marcello (1628-1694)**, Italian anatomist, was born near Bologna. He lectured in Bologna, Pisa, and other places and wrote works on the anatomy of plants, the physiology of the silkworm, and medical subjects. He discovered capillary circulation of the blood, described the structure of the lungs, and showed how a chick develops from an egg. In 1691, he became physician to Pope Innocent XII.

Malthus (*măl'thŭs*), **Thomas Robert (1766-1834)**, English economist, was born near Guildford, Surrey. He was graduated at Cambridge, 1788, and was for some time fellow of Jesus College. In 1798, he published *Essay on Population*, in which he maintained that population tends to increase out of proportion to the increase of means of subsistence. He predicted a period of overpopulation on the earth and advocated moral restraint in order to check the birth rate. The influence of Malthus on economics, sociology, and biology has been extraordinarily far-reaching.

Beginning in 1807, Malthus held, throughout the remainder of his life, the professorship of history and political economy in the East India Company's College, Haileybury. Others of his works are *The Nature and Progress of Rent* and *Political Economy*.

Manet (*mä'nĕ'*) **Edouard (1832-1883)**, pioneer French impressionist painter, was born at Paris. In 1850, he began a period of five years' study with Couture, after which he traveled in the Netherlands, Germany, Italy, and Spain, where he was influenced by the work of Velasquez. He later developed a style which proved highly successful in modern painting. The chief tenet of the school practicing this style is that "things should be represented, not as experience teaches us they are, but as they appear to the eye of the painter." While his principles of art were ably defended by his friend Zola, the importance of his work was not fully realized until after his death.

Mann, Horace (1796-1859), American educational reformer and statesman, was born at Franklin, Mass. He was graduated at Brown University, 1819; studied law; and was admitted to the bar, 1823. He was a member of the Massachusetts legislature, 1827-37 and, in the latter year, became secretary of the Massachusetts Board of Education, continuing to act until 1848, when he was elected to Congress. He sat as a member until 1853 and was then made president of Antioch College, Ohio. He wrote *Report of an Educational Tour of Germany, Great Britain, and Ireland;* and *On the Study of Physiology in Schools*.

Horace Mann was untiring in his efforts in the cause of educational reform, in the suppression of slavery, and in the promotion of temperance. By his effective championship of modern educational ideas, he inspired the whole teaching body, and his numerous reports have become classics of educational literature. It was through his efforts that the first Normal School in the United States was established, 1839, at Lexington (now Framingham), Mass. He has been called the father of the American free public school of today. He was elected to the American Hall of Fame in 1900. See *Educational Reformers*.

Mann, Thomas (1875-1955), German author, was born at Lübeck, the son of a wealthy merchant and a Creole lady of Portuguese descent. He entered the insurance business, but soon abandoned that occupation for a more or less nomadic career made possible by the financial success of his writings. His early works include *Die Buddenbrooks*, *Der Tod in Venedig*, *Tonio Kröger*, and *Königliche Hoheit*. These and other novels, short stories, and essays entitle

Mann to a foremost place among Germany's prose writers of the 20th century. His style is leisurely, but the details are chosen with an unerring eye to their effect. He received the Nobel prize in literature for 1929. He left Germany, where his books were banned as decadent by the Hitler regime, and accepted a lectureship at Princeton University in 1938.

Mannerheim, Carl Gustav Emil, Baron (1867-1951), Finnish general and statesman, was born while Finland was part of Russia. He was educated for the army and saw action in the Russo-Japanese War and World War I, being made lieutenant general during the latter conflict. After the Russian revolution and the granting of Finnish independence, he resigned his command and led a counter-revolutionary army against the Soviet government.

He was made regent of Finland in 1918, resigning in 1919 when a republican constitution was adopted. He remained, however, the most powerful citizen of Finland, being known as the "Liberator." In 1939, Finland refused to follow the example of other Baltic states in giving air and military bases to Russia. In the war which followed and again in the second Russian war of 1941-44, Mannerheim commanded the Finnish army, but finally had to yield to overwhelming force. He resigned as commander in chief in 1944 to become president of Finland, 1944-46.

Manning, Henry Edward (1808-1892), English prelate, was born at Totteridge. He was graduated at Oxford in 1830; studied theology; was appointed rector of Lavington with Graffham, Sussex, 1834, and archdeacon of Chichester, 1841. In 1851, he withdrew from the Church of England and joined the Roman Catholic Church; was ordained a priest in the same year; was nominated archbishop of Westminster, 1865; and was created cardinal in 1875. He founded a Roman Catholic College at Kensington, 1863, and took an active part in the Vatican Council, vigorously defending the dogma of papal infallibility. His controversial writings are voluminous.

Manship, Paul (1885-), American sculptor, was born at Saint Paul, Minn. He received his education in art at the Pennsylvania Academy of Fine Arts and the American Academy at Rome. His work exhibits a classic precision combined with a Western virility and sense of reality. The element of design is prominent in his figures, and he has adopted many suggestions of Greek sculpture, accommodating them to his modern decorative themes. Among the products of his art are "The Awakening of Spring," "Salome," "Playfulness," "Portrait of a Baby Three Weeks Old," and "Centaur and Dryad," "Dancing Girl and Fauns," "Little Brother," and the central fountain for Rockefeller Center, New York, featuring "Prometheus." He was elected to the American Academy of Arts and Letters in 1922.

Mantegna (*măn-tän'yä*), **Andrea (1431-1560),** Italian painter, chief master of the Paduan School, was born at Vicenza. He was the favorite pupil and adopted son of Squarcione, the tailor-painter. A precocious genius, he set up a studio of his own when only 17 years old. About 1460, he was induced by Lodovico Gonzaga, Duke of Mantua, to settle in that city. There he spent the remainder of his life with the exception of a visit to Rome, 1488-90, to paint a series of frescoes for Pope Innocent VIII.

Mantegna's greatest works produced at Mantua include nine tempera pictures representing the "Triumph of Cæsar," now at Hampton Court, England. Mantegna was also the greatest engraver of northern Italy. His *Entombment* had a deeper effect on art than did any other engraving ever executed, its composition being adopted later by Raphael, Holbein, and Dürer.

Manutius (*mä-nū'shĭ-ŭs*), **Aldus (1450-1515),** became one of the world's first great publishers through his desire to put the Greek and Latin classics into the hands of poor scholars at low cost and in handy form. A tutor to nobility, Manutius got patronage to start his Venetian printery which became immortal as the Aldine Press, and whose insigne is an intertwined dolphin and anchor. The graceful *italic* was introduced by Manutius; he ordered a typeface based on the Italian cursive script, and it first appeared in 1501. On his death, his work was carried on by a son and a grandson.

Manzoni (*măn-dzō'nē*), **Alessandro (1785-1873),** Italian novelist and poet, was born at Milan. His first tragedy, *Il Conte di Carmagnola,* published in 1820, was warmly praised by Goethe; but the work which gave him European fame is his historical novel, *I Promessi Sposi,* a Milanese story of the 17th century and probably the greatest novel in all Italian literature. His noble ode *Il Cinque Maggio* was inspired by the death of Napoleon. Although a devout Catholic, he was a strong advocate of a united Italy. He died at Milan, leaving a memory of a great writer and a singularly noble man. For his funeral, Verdi composed the celebrated *Manzoni Requiem.*

Mao Tse-tung (*mä'ô dzŭ'dōŏng*) **(1893-),** Chinese Communist leader, was born in Hunan Province. Becoming interested in the "anti-foreign capital" movement, then in Marxian literature, Mao progressed by gradual stages along the road toward Communism. In 1927 his leadership of the "First Peasants and Workers Army" was prophetic of his later prominence in the ranks of the "agrarian" Communists. By the time of the Japanese War against China, Mao had further strengthened his faith in Communist ideology and had improved his technique in the handling of guerrilla bands. Shrewdly taking advantage of war-weariness among the Chinese people and of incompetence or dissension among Chiang Kai-shek's followers, he utilized captured equipment and Russian support to become the leader in a crushing defeat of the Nationalist forces. In 1950 he sent his armies into Korea in support of the Communist cause there, fighting the United Nations forces.

March, Peyton Conway (1864-1955), American general, son of Francis Andrew March, the philologist, was born at Easton, Pa. He was graduated at Lafayette College, 1884, at the United States Military Academy, West Point, 1888, and at the Artillery School, Fort Monroe, 1898. He served with distinction in the Philippines, 1898-1901, rising from the rank of second lieutenant to that of lieutenant colonel. From 1903 to 1907, he was a member of the general staff and, in 1904, was military attaché to observe the Japanese army in the Russo-Japanese War. In 1917, he was army artillery commander of the American expeditionary forces in France and was promoted to the rank of major general. In 1918, he was appointed chief of staff with the rank of general of the United States army. At his own request, he was retired from active service in 1921.

Marconi (*mär-kō'nē*), **Guglielmo (1874-1937),** electrical engineer and inventor, was born at Bologna. His father was Italian and his mother was Irish. He was educated at Leghorn and Bologna universities.

On his father's estate, 1890, he began experiments to test the theory that the Hertzian electrical waves are capable of passing through any substance and, if started in any given direction, of following an undeviating course without need of a wire or other conductor. These experiments led to the invention of an apparatus for wireless telegraphy, which attracted the attention of Sir William Henry Preece and successfully stood a test conducted by him in England.

Marconi soon afterward succeeded in sending messages from Spezia to a steamer fifteen kilometers distant. He came to the United States, 1899; used his method in reporting the election, 1900; and succeeded, 1902, in establishing wireless telegraphic communication across the Atlantic Ocean. A daily ocean news service by wireless telegraphy was inaugurated by him on transatlantic liners in 1904.

He invented a directive method of wireless telegraphy, 1905; devised a persistent-wave system, 1906; and, in 1907, began a public service of wireless telegraphy across the Atlantic. In 1910, he brought out a new receiver and other improvements, by which the Marconi Company's station in Argentina was enabled to receive signals from Nova Scotia and from Ireland, a distance of 5600 miles. When Italy entered World War I, Marconi assumed charge of his government's wireless service. With Ferdinand Braun, he was awarded the Nobel prize for physics, 1909. Among later improvements in radio due to him is the beam system, which enables airplanes to fly blind. See *Radiotelegraphy.*

Marcus Aurelius, surnamed **Antoninus (121-180),** Roman emperor and philosopher, was born at Rome. His qualities attracted the notice of the emperor Hadrian, who conferred high honors on him even while a child. When 17 years of age, he was adopted, with Commodus, by Antoninus Pius, the successor to Hadrian; and Faustina, daughter of Pius, was selected to be his wife. He was made consul in 140, and from this period to the death of Pius, 161, he continued to discharge the duties of his various offices with the greatest promptitude and fidelity.

On his accession to the throne, he illustrated the magnanimity of his character by sharing the government with young Commodus, who henceforth bore the name of Lucius Verus and to whom he gave his daughter Lucilla in marriage. Lucius died in 169, leaving Marcus Aurelius the sole ruler.

Although devoted to peace, the emperor was compelled to engage in wars throughout the whole of his reign. He was successful in repelling invasions of the barbarians on the northern and the eastern frontiers and in crushing insurrections in the East. His administration was vigorous and able.

As a thinker, Aurelius was the flower of the Stoic philosophy, and his love of learning was insatiable. His range of studies was extensive, embracing morals, metaphysics, mathematics, jurisprudence, music, poetry, and painting. He was the author of an elevated ethical work known as the *Meditations.* Though gentle and tolerant by nature and creed, he was actively hostile to Christianity, which, at that time, was threatening the culture and thought to which he was devoted. His death was felt to be a national

calamity; he was deified, and for more than a hundred years his image was found among the household gods of the Romans.

Marcy, William Learned (1786-1857), American statesman, was born at Southbridge, Mass. Following his graduation from Brown University in 1808, he studied and practiced law in Troy, N. Y. After serving in the War of 1812, he entered politics and became prominent in the Albany Regency. In 1831, he was elected United States senator, resigning to become governor of New York, to which office he was elected by the Democrats in 1832, 1834, and 1836. In 1845, he was made Secretary of War under Polk, serving throughout the trying period of the Mexican War and taking an influential part in settling the Oregon Boundary Question. He entered Pierce's cabinet as Secretary of State in 1853 and handled with marked ability such problems as the Mexican Boundary Dispute, the Canadian Reciprocity Treaty, the British Fishery Question, and the Koszta Affair. See *Albany Regency, Koszta Incident.*

Margaret of Angoulême (*ăn'gōō'lâm'*) **(1492-1549),** queen of Navarre and daughter of Charles of Orleans. In 1527, she was married to Henri d'Albret, king of Navarre, to whom she bore a daughter, Jeanne d'Albret, mother of the great French monarch Henry IV. She encouraged the arts and learning. To a certain extent she embraced the cause of the Reformation, and she never ceased to act with a courageous generosity toward the Reformers, who always found an asylum and a welcome in Navarre. She is the author of the *Heptameron,* a narrative poem descriptive of the world's creation.

Maria Theresa (*mà-rī'à tĕ-rē'sà*) **(1717-1780),** ruler of Austria, daughter of the emperor Charles VI of Germany, was born at Vienna. In 1736, she married Francis of Lorraine, afterward grand duke of Tuscany; at her father's death, in 1740, she became queen of Hungary and Bohemia and archduchess of Austria.

At her accession, the monarchy was exhausted, the people were discontented, and the army was weak, while Prussia, Bavaria, Saxony, and Sardinia, abetted by France, put forward claims to her dominions. The young queen was saved by the chivalrous fidelity of the Hungarians, supported by England. Their aid, however, did not prevent her losing, through the war of the Austrian succession, 1740-48, Silesia to Prussia, Parma and Piacenza to Spain, and some Milanese districts to Sardinia. On the other hand, her rights were admitted, and her husband was recognized as emperor.

The loss of Silesia continued to rankle in her mind; and, with France as an ally, she renewed the contest with the Prussian king. But the issue of the Seven Years' War, 1756-63, was to confirm Frederick in the possession of Silesia. She joined with Russia and Prussia in the first partition of Poland, 1772, securing Galacia and Lodomeria, while from Turkey she obtained Bukowina in 1777. She secured also several districts from Bavaria.

A woman of majestic figure and an undaunted spirit, she combined feminine tact with masculine energy, and raised Austria from a wretched condition to a position of assured power. See *Austrian Succession, War of.*

Marie Antoinette (*mà'rē' ăn'twà'nĕt'*), **Josèphe, Jeanne (1755-1793),** wife of Louis XVI of France, youngest daughter of Francis I, emperor of Germany, was born at Vienna. Her mother was the famous Maria Theresa. At the age of 14, she was betrothed to the Dauphin and was married at Versailles.

Soon after the accession of Louis XVI, libels were circulated by her enemies, accusing her of intrigues in the interests of Austria. From the first hour of the Revolution, she was an object of fanatical hatred to the mob of Paris. At last she resolved on flight. Her husband long refused to abandon his country, and she would not go without him. Finally he consented, and the flight took place on the night of June 20, 1791. The royal fugitives were recognized and captured at Varennes. She was suspected, not unjustly, of inviting an invasion of France by Austrian forces, and, after the storming of the Tuileries, she was confined in the Temple. On October 16, 1793, she was condemned by the Revolutionary tribunal and was guillotined the same day.

Marion, Francis (1732-1795), American general and patriot, was born near Georgetown, S. C. He served in the Cherokee War, 1759-61, and, at the outbreak of the Revolution, was chosen a delegate to the South Carolina congress. He was present at the siege of Charleston, 1780; raised several companies of volunteers among the country lads, or "cowboys," as the British called them; and, with this force, marched to the relief of General Gates, at that time in North Carolina. Marion's men proved of the greatest value through their intimate knowledge of localities and their native shrewdness, which earned for their leader the sobriquet of "Swamp Fox." Among the most noted engagements in which Marion took part were those at Fort Motte, Fort Watson, Parkers Ferry, and Eutaw Springs.

Mariotte (*mà'rē'ŏt'*), **Edmé (c. 1620-1684),** French natural philosopher, was born in Burgundy. He was educated for the Church and became the prior of Saint Martin sous Beaune, near Dijon. Turning his attention to science, he did much to promote experimental research in France and was one of the first members of the French Academy of Sciences, founded in 1666. In his *Treatise on the Nature of Air,* he published, in 1676, the discovery that the volume of a gas varies inversely as the pressure to which it is subject, a principle since known in France as Mariotte's law. This same discovery was made 16 years earlier by Robert Boyle in England, where it is known as Boyle's law. Mariotte published also *Traité du mouvement des eaux.*

Maritain, Jacques (1882-), French philosopher and educator, is best known as an exponent of the "neo-Thomist," or "neo-scholastic" school of contemporary Christian thought. He studied at the Sorbonne and later at Heidelberg, where he came under the instruction of Dr. Hans Driesch. Exiled from France as a result of the German invasion, he continued writing and lecturing in the United States. In his books and lectures he has urged a return to the harmony of faith and reason as exemplified in the philosophy of St. Thomas Aquinas. Among his works are *Introduction to Philosophy, Art and Scholasticism, The Things That Are Not Cæsar's, True Humanism,* and *Scholasticism and Politics.*

Marius (*mā'rĭ-ŭs*), **Gaius (c.156 B.C.-86 B.C.),** Roman general, was born near Arpinium. He served with distinction at Numantia under the younger Scipio Africanus and, in 119, was tribune of the plebs. In 114, he went to Spain as propraetor. He then married Julia, the aunt of Cæsar.

Marius served in Africa during the war against Jugurtha, and, as consul, he closed the Jugurthine war in 106. Meanwhile an immense horde of Cimbri and Teutones had burst into Gaul and repeatedly defeated the Roman forces. After two years' fighting, Marius annihilated the Teutones in a terrible two days' battle near Aix, in Provence, where 100,000 Teutones were slain. Then, turning to the Cimbri in north Italy, he crushed them also near Vercellæ in 101. Marius was declared the savior of the state and the third founder of Rome, and, in 100, was made consul for the sixth time. When Sulla as consul was intrusted with the conduct of the Mithridatic War, Marius, insanely jealous of his patrician rival, attempted to deprive him of the command, and a civil war began in 88. Marius was soon forced to flee, and, after frightful hardships and hairbreadth escapes, he made his way to Africa. Here he remained until a rising of his friends took place under Cinna. He then hurried back to Italy and, with Cinna, marched against Rome, which was compelled to yield. Marius and Cinna were elected consuls for the year 86, but Marius died 17 days after taking office.

Markham, Sir Clements Robert (1830-1916), English traveler, geographer, and author, was born at Stillingfleet. After attending Westminster School, he entered the navy, 1844, and accompanied the expedition sent in search of Sir John Franklin, 1851. In 1859-62, he traveled in Peru, from which country he introduced into British India the cultivations of the quinine-yielding cinchona trees. He was geographer to the British expedition to Ethiopia, 1867-68. He then became editor of the *Geographical Magazine* and later president of the Royal Geographical Society. His works include *Franklin's Footsteps, Travels in Peru and India, A History of the Abyssinian Expedition, Richard III, Quichua Dictionary,* and *The Incas of Peru.*

Markham, (Charles) Edwin (1852-1940), American poet, was born in Oregon City, Oreg. He went to California, 1857, and, during his boyhood, worked at farming and blacksmithing. Earning his way through two Western colleges, he pursued special studies in ancient and modern literature and in Christian sociology. He became a teacher and was principal and superintendent of schools in California until his removal to New York in 1899. In early youth, he began writing poems for California newspapers and later won recognition in Eastern magazines. Some of his poems, notably his "Lincoln" and "The Man with the Hoe," have become widely known. He was elected to the American Academy of Arts and Letters in 1929.

Markova, Alicia (1910-), ballerina, whose inspired performances have thrilled audiences around the world, was born Alicia Marks in London. At the age of fifteen, she appeared with the ballet of the famed choreographer Serge Diaghilev. Later, she formed a ballet company with the dancer Anton Dolin. She has been the prima ballerina of the Ballet Russe de Monte Carlo and the Opera Ballet of the New York Metropolitan Opera house. Alicia Markova has brought a dedication and artistry to the ballet that is unrivalled in its history. She was the subject of a "Profile" in The New Yorker magazine which described in detail the study and the rigors that attend her approach to every dancing role. She lives in England.

Marlborough, John Churchill, Duke of (1650-1722), English general and diplomat. Through the influence of his sister, he obtained a commission with the Duke of York,

and he first served under Turenne. He deserted James II at the Revolution of 1688, but, though created earl and commander in chief by William III, intrigued with his former master. After a period of disgrace, he went to The Hague to organize the Grand Alliance. Under Queen Anne, he was appointed captain general and duke and won the victories of Blenheim, 1704; Ramillies, 1706; Oudenarde, 1708; and Malplaquet, 1709. He was recalled in 1711 and was dismissed on a charge of peculation, but was restored by George I in 1714. Among great military commanders he is one of the few who never lost an important battle and never failed in a campaign.

Marlowe, Christopher (1564-1593), English dramatist, was born at Canterbury. He was graduated at Cambridge, 1583, and took his master's degree there in 1587. His literary associates included Kyd, Nash, Greene, Chapman, Raleigh, and probably Shakespeare. He was the first to attain mastery of the blank verse adopted by the dramatists of his period, using it with great vigor. In English dramatic literature, he is the most important predecessor of Shakespeare. His chief plays are *Tamburlaine*; *Doctor Faustus*, to which Goethe acknowledged his obligations; *The Jew of Malta*; and *Edward the Second*. He was killed in a tavern brawl. See *Faustus*.

Marquand (*mär-kwŏnd*), **John Phillips (1893-),** American novelist noted for his gently satirical studies of New England character, was born in Wilmington, Del. He was educated at Harvard, as were many of his most famous fictional characters. Marquand worked as a newspaperman and advertising copywriter until 1921, when he turned professional writer. Marquand's output is prodigious and varied. Early in his career, he scored success with a series of meticulously-plotted stories featuring an Oriental detective called Mr. Moto. Then, in 1937, *The Late George Apley* established him as a first class literary artist. Marquand, with George Kaufman, adapted *Apley* to the stage, and it won a Pulitzer prize in 1938. Among his other best-selling novels are *H. M. Pulham, Esq.* (1941), *So Little Time* (1943), *Point of No Return* (1949), *Sincerely, Willis Wayde* (1955), and *Stopover: Tokyo* (1957).

Marquette (*mär'kĕt'*), **Jacques (1637-1675),** French Jesuit missionary and American explorer, was born at Laon, France. He founded Sault Sainte Marie and Kaskaskia missions; accompanied Joliet in his exploration of the Mississippi; and died while attempting to establish a mission among the Illinois Indians.

Marryat (*măr'ĭ-ăt*), **Frederick (1792-1848),** English novelist, was born in Westminster. For many years he served in the navy, in which he rose to the rank of post captain. He devised a signal system for the mercantile marine. Retiring in 1830, he produced many novels which opened up a new field to fiction based on his own experiences. His vivacious narrative and vivid portraiture of character make him the chief English novelist between Fielding and Dickens. His works include *Frank Mildmay, The King's Own*, and *Mr. Midshipman Easy*.

Marsh, Othniel Charles (1831-1899), American zoologist and paleontologist, was born at Lockport, N. Y. He attended Phillips Academy, Andover, Mass., and was graduated at Yale in 1860. After a period of study at Berlin, Heidelberg, and London, he was appointed in 1866 to the chair of paleontology at Yale.

At his own expense, Marsh organized and conducted exploring and collecting expeditions involving an outlay of $250,000 for the purpose of obtaining fossil vertebrates. He described several hundred species, including such remarkable types as flying lizards and toothed birds. His discoveries of the fossil ancestors of the horse marked a new era in evolutionary science. Among his publications, embracing 237 titles, some of the most important are *Birds with Teeth, The Gigantic Mammals of the Order Dinocerata*, and *The Dinosaurs of North America*.

Marshall, George Catlett (1880-), American general, was born in Uniontown, Pa. A graduate of Virginia Military Institute and the Army Staff College, he was commissioned a second lieutenant in 1901 and was promoted through grades to major general in 1939. He served in the Philippines and in World War I. After the war he was aide-de-camp to General Pershing and served in China. In 1939 he was appointed chief of staff of the United States army with the rank of general. In this capacity he directed the organization and expansion of the army of the United States. He also planned the American share of Allied strategy. In December 1944, he was advanced to the rank of general of the army. He retired as chief of staff in November 1945, and was made ambassador to China. Appointed secretary of state in 1947, he put forward the "Marshall plan" for the rehabilitation of Europe. He resigned in 1949 and, in 1950-51, was Secretary of Defense. In 1953 he was awarded the Nobel peace prize.

Marshall, John (1755-1835), American jurist, was born in Fauquier County, Va. In 1781, he began to practice law in his native county and soon rose to the head of the Virginia bar. He was a member of the Virginia state legislature and of the state convention that adopted the Constitution. In 1797, he was sent as an envoy to France with Pinckney and Gerry. In 1798, he was elected to Congress and, in 1800, became Secretary of State. He was made chief justice of the United States Supreme Court by President John Adams in 1801.

Marshall's great legal learning and judicial poise dominated the Supreme Court for 34 years, during which his decisions gave the initial impetus to the enlargement of federal power by interpretation of the Constitution. He has perhaps never been excelled by any American jurist in power of analysis, lucidity of statement, and in ability to present a legal proposition from so many different points of view. He was elected to the American Hall of Fame in 1900. See *Federalists*.

Martel, Charles. See *Charles Martel*.

Martin, Glenn L. (1886-1955), American aircraft manufacturer, was born at Macksburg, Iowa, and spent most of his boyhood at Salina, Kansas. His ambition to build and fly a plane of his own was first realized in 1910 at Santa Ana, California, where he was employed as an automobile salesman. A period of exhibition flying followed, and Martin then settled down to the business of manufacturing and developing aircraft. Stages in his progress were marked by the making of a primitive seaplane, the manufacture of armored planes and the "TT" model training plane for the U. S. Army in World War I, the "Martin Bomber." After the war he brought out successive models, chiefly of Navy planes, which were built first at his Cleveland, Ohio, factory and later at his new plant on the Chesapeake near Baltimore.

Martin, Homer Dodge (1836-1897), American landscape painter, was born at Albany, N. Y. He was essentially self-taught; first exhibited at the National Academy in 1857; and, in 1862, located in New York. Beginning with 1881, he spent five years in France, where he came under the influence of Boudin and Corot.

Martin was a leader among the artists of the Hudson River school. With George Inness and Alexander Wyant, he is ranked as one of the three great masters of American landscape. Among his best-known works are "The Old Mill," "Old Manor House," "The Iron Mine," "Newport Neck," "Lighthouse at Honfleur," and "Lake Sandford." His view on the Seine, called by him "Harp of the Winds," and "Sand Dunes, Lake Ontario," are in the Metropolitan Museum, New York.

Martin, Joseph William, Jr. (1884-), American politician, was born at North Attleboro, Mass. where, since 1908, he has been publisher of *The Evening Chronicle*. A Republican congressman since 1925, he has been the party leader in the House of Representatives since 1939, serving also as speaker of a number of Congresses (1947-49, 1953-54).

Martin, Mary (1913-), American stage and screen star, was born at Weatherford, Texas, and was educated at Ward-Belmont School, Nashville, Tenn. She was a singer in the musical comedy *Leave It to Me* in 1938, and from 1939 to 1943 worked for Paramount Pictures in Hollywood. Her pictures include *The Great Victor Herbert, Rhythm on the River, Kiss the Boys Goodbye, Love Thy Neighbor, Birth of the Blues, Star Spangled Rhythm, Happy Go Lucky, True to Life*, and *Night and Day*. She appeared in stage productions of *One Touch of Venus* and *Lute Song*. In 1946-47, she starred in the London production of Noel Coward's musical, *Pacific 1860*, and the following year toured the United States in *Annie Get Your Gun*. She played in New York in *South Pacific*, 1949-51, then in London, 1952. Back in the United States she appeared in *Kind Sir*, 1953-54, *Peter Pan*, 1954-55, and Thornton Wilder's comedy, *The Skin of Our Teeth*, 1955. In private life, she is Mrs. Richard Halliday.

Martin du Gard, Roger (1881-), French novelist, was born at Paris. At the age of 27, he published the first of 11 novels, the last appearing in 1939, which were collected and translated into English under the title *The World of the Thibaults*. This work, for which its author received the 1937 Nobel prize for literature, traces the fortunes of a family from its rise in the 19th century to the tragedy which overtakes it in World War I.

Martineau (*măr'tĭ-nō*), **Harriet (1802-1876),** English writer, of Huguenot descent, was born at Norwich. At 19, she began contributing to magazines to support herself. She became a prolific writer of essays on history, politics, economics, and philosophy and did much to popularize the advanced thinking of her day. Visiting America in 1834, she adhered to the unpopular Abolitionist party. The evolution of religion, she believed, leads to philosophic atheism. Besides *Deerbrook, The Hour and the Man*, and other novels, she wrote many tales for children.

Martineau, James (1805-1900), English theologian, brother of Harriet Martineau, was born at Norwich. He was graduated at Manchester College, 1827, and preached as a Unitarian minister at Dublin and Liverpool. In 1840, he was appointed professor of mental and moral philosophy

at Manchester New College, Liverpool, of which, after its transfer to London, he was principal, 1868-85. He received degrees from Harvard, Oxford, and Edinburgh in recognition of his ability as one of the profoundest thinkers and most effective writers of his day. His works include *The Rationale of Religious Inquiry, Studies of Christianity, Hours of Thought on Sacred Things, A Study of Spinoza,* and *The Seat of Authority in Religion.*

Martinelli (*mär'tĭ-nĕl'ĭ*), **Giovanni (1885-)**, Italian singer, was born near Venice, Italy. Possessed of an operatic tenor voice, he made his debut as Ernani in Milan. Being heard by Puccini at Rome, he was engaged to appear in "The Girl of the Golden West"; sang at Covent Garden, London, in 1912; and, in the following year, became a leading member of the Metropolitan Opera Company, New York.

"Marvel, Ik." See *Mitchell, Donald Grant.*

Marx, Heinrich Karl (1818-1883), German economist and socialist, was born of Jewish parents at Treves. He was educated at Bonn and Berlin; took an active part in the Liberal movement of 1840; and, after the suppression of the *Rheinische Zeitung*, edited by him, went to Paris. Being expelled from Paris and later from Brussels and Cologne, he settled in London, where he engaged in literary work and took an active part in the International Workingmen's Association. He assisted Liebknecht in establishing the Social Democratic Labor Party in 1869. Although obtaining some income as correspondent of the New York *Tribune*, he lived on the verge of destitution, from which he was saved by contributions from his friend and collaborator, Friedrich Engels.

Marx was the founder of the modern socialistic movement in the sense that he created its basis in economic theory. He taught that the coming of socialism is inevitable, devoting his life work to explaining why and how. The "Communist Manifesto," written by him in 1848, is a brief statement of the program and purposes of the movement, but its main basis is found in *Das Kapital*, (*Capital*), which occupied the latter half of Marx's life. This work has had an enormous influence as a guide to socialist and liberal thought. The Russian Revolution, through Lenin, drew its inspiration from this source.

Mary (1516-1558), queen of England, the daughter of Henry VIII and Catherine of Aragon, was born at Greenwich. She succeeded to the throne in 1553 on the death of her half brother, Edward VI, and after the deposition of Lady Jane Grey.

She began her reign by releasing Gardiner, Bonner, Tunstall, Day, and Heath, Catholics who had been confined during the previous reign for their religious opinions, and by imprisoning in their stead Ridley, Latimer, Cranmer, and other Protestants. Soon afterward, she beheaded Northumberland, Sir Thomas Palmer, and Sir John Gates for advocating the cause of Lady Jane Grey; a few months later she beheaded that unfortunate lady and her husband, Lord Guilford Dudley. In 1554, Mary was married to Philip II of Spain. In 1555, having already repealed all the laws enacted in favor of Protestantism and re-established Catholicism, she began persecutions of the Protestants which earned for her the title of "bloody Mary." In 1558, Calais, which had been in the possession of the English since the time of Edward III, a period of 210 years, was taken by the Duke of Guise. This loss to the English nation so distressed Mary that she said the name of Calais would, after death, be found engraven on her heart.

Mary Queen of Scots (1542-1587), daughter of James V and Mary of Lorraine, was born at Linlithgow, Scotland. By her father's death she became queen before she was a week old. In 1548, she was sent to France; was brought up at court with the royal princes; and, in 1558, married the dauphin, who for a year, 1559-60, ruled as King Francis II.

On her husband's death, Mary returned to assume the government of Scotland, now in the throes of the Reformation. Refraining from interference with the Protestant movement, she retained her own Catholic faith, but chose Protestant advisers. Despite all protests, she was married to her cousin Lord Darnley in 1565. Darnley, granted the title of king, tried to force her, in the event of her dying childless, to settle the succession on him and his heirs. Deeming her favorite, Rizzio, to stand in the way, Darnley plotted with the Protestant lords to have him murdered, and Mary was obliged to agree to the demands. Her only son, afterwards James VI, was born three months later. Darnley in turn was murdered by the Earl of Bothwell in February 1567 under circumstances pointing to Mary's connivance, and her marriage with Bothwell in the following May alienated the nobles. They revolted; took the queen prisoner at Carberry Hill in June; and carried her to Edinburgh, then to Lochleven Castle, where they forced her to abdicate in July.

The following year, she fled to England and was a prisoner there for many years. The Catholics formed plots to liberate her and put her in place of Elizabeth on the English throne. Mary was accused of complicity in a conspiracy headed by Babington and was tried, found guilty, and executed in Fotheringay Castle. An interest in Mary has been kept alive by the romantic appeal of her beauty and her dramatic career and by the fact that she was the last hope of the Catholic party in England.

Masaryk (*mä'sä-rĕk*), **Thomas Garrigue (1850-1937)**, Slovak scholar and patriot, was born at Hodonin, Moravia. He began life as a blacksmith; later studied at Vienna and Leipzig; and, in 1882, was made professor in the new Czech University at Prague. He sat in the Austrian Parliament 1891-93, resigning to devote himself entirely to moral education, and became a leader of the so-called realistic movement in philosophy, literature, and politics. Elected deputy in 1907, he vigorously opposed German encroachment upon Austria and combated Austrian aggression in the Balkans. In 1909, he exposed the forgeries upon which Austria based the forced annexation of Bosnia-Herzegovina. At the outbreak of World War I, he went to Italy and thence to England. Later he organized the movement for Czechoslovak independence. In 1918, he was appointed provisional president and, in 1920, was regularly elected president of Czechoslovakia, holding that office until 1935. His publications include *Blaise Pascal, The Problems of Small Nations in the European Crisis,* and *The Spirit of Russia.*

Mascagni (*mäs-kän'yē*), **Pietro (1863-1945)**, Italian composer, was born at Leghorn. He began early to manifest interest in music. He studied at Milan Conservatory for a brief period, but discontinued this pursuit in order to join a touring operatic troupe. He supported himself by conducting traveling opera companies until 1890, when he won world-wide fame with *Cavalleria Rusticana*, a work of great dramatic intensity which gained unprecedented popularity. Without attempting to improve his deficient technique by careful study, he continued to compose unsuccessfully. Later he achieved better results with *Iris, Isobel,* and *Nero.* None of his work fulfilled the promise of his first phenomenal success.

Masefield, John (1875-), English poet and play writer, was born at Ledbury. He ran away from home at the age of 14; became a sailor; and traveled in many lands, spending some time in the United States. Upon returning to England, he devoted his time to writing poems, stories, novels, and plays. Since the appearance of *The Everlasting Mercy*, which won the Polignac prize in 1912, his position as a successful writer has been assured. In 1930, he was appointed poet laureate of England.

Masefield excelled in vigorous narrative poems of striking originality, such as *The Widow in the Bye-Street* and *Dauber*, which express his conception of the tragic and the beautiful. The same originality characterizes his novels *The Street of Today* and *Multitude and Solitude* and his powerful play *The Tragedy of Nan.* He also wrote *Salt Water Ballads, Captain Margaret, The Tragedy of Pompey the Great, The Daffodil Fields,* and *The Tale of Troy.*

Mason, F. van Wyck (1901-), American author, was born in Boston, Mass., and educated at Harvard (1924). After a short period in business, he turned to writing and has produced a long and impressive list of carefully-documented historical novels and exciting murder mysteries. Among his most popular works are *Valley Forge 1777, Rivers of Glory, Eagle in the Sky,* and *Golden Admiral.*

Mason, Walt (1862-1939), American humorist and poet, was born at Columbus, Ont. He was self-educated. Coming to the United States in 1880, he was connected successively with various newspapers. His reputation was established especially by his prose poems, which were published regularly in more than 200 newspapers in the United States and Canada. Written in meter and rime, they were printed as prose, winning wide appeal through their homespun sentiment. Among his works are *Uncle Walt, Horse Sense, Terse Verse,* and *Walt Mason, His Book.*

Massasoit (*măs'ä-soit'*) **(?-1661)**, chief of the Pokanoket, or Wampanoag, Indians, ruled over most of south Massachusetts from Cape Cod to Narragansett Bay in the 17th century. His tribe, once very numerous, was reduced, shortly before the landing of the English, to about 300 by a disease, probably the yellow fever. In 1621, three months after Plymouth had been founded, Massasoit and 60 warriors, armed and painted, came to the settlement and made a treaty of peace. This treaty was kept for 50 years, and Massasoit was always friendly to the settlers. His home was at Sowams within the present town of Warren, R. I., and here he entertained Roger Williams for several weeks when the latter was on his way to Providence after being banished from Massachusetts.

Massenet (*mä's'-nĕ'*), **Jules Emile Frédéric (1842-1912)**, French composer, was born at Montaud. He was educated at the Paris Conservatory under Laurent, Reber, Savard, and Ambroise Thomas. He was professor of composition at the Conservatory, 1878-96. By the excellence of their instrumentation, euphony, and melody, his compositions won wide popularity. His works include the following

operas: *Don César de Bazan, Le roi de Lahore, Le Cid, Le Mage, Thaïs, La Navarraise, Sapho, Cendrillon, Manon,* and *Le jongleur de Notre-Dame.* He also wrote an oratorio, cantatas, overtures, and orchestral suites.

Massey, Raymond (1896-), Canadian-born actor and producer, is most commonly associated with *Abe Lincoln of Illinois,* in which his performance of the title role made stage history. He fought in World War I and was wounded at Ypres, then studied at Balliol College, Oxford. His career in the theater began in the 1920's with the acting of parts in the plays of Eugene O'Neill, George Bernard Shaw, and others. In *The Shining Hour* and *Idiot's Delight* he won widespread recognition as a prelude to his triumph in the Abe Lincoln play. He has appeared in many film plays, among them *The Scarlet Pimpernel, The Hurricane, Arsenic and Old Lace,* and *Action in the North Atlantic.*

Massey, Vincent (1887-), governor general of Canada and brother of Raymond Massey the actor, was born in Toronto. He was educated in St. Andrews and Toronto University and received his M.A. degree from Balliol College, Oxford. From 1926 to 1930 he was Canadian minister to the United States, and from 1935 to 1946 was high Commissioner for Canada in the United Kingdom. In 1947 he was made chancellor of the University of Toronto. He was appointed governor general of Canada in 1952, the first native-born Canadian to hold the position.

Masters, Edgar Lee (1869-1950), American poet, was born at Garnett, Kans. He was graduated at Knox College, Ill., studied law; and was admitted to the bar in 1891. His first volume of poems, entitled *A Book of Verses,* appeared in 1898 and was followed by plays and other productions in verse. In 1915, his *Spoon River Anthology,* containing a frank post-mortem appraisal of character in modern free-verse, created wide interest. His writings also include *Blood of the Prophets, Starved Rock, Nuptial Flight, The New World,* and several biographies, including *Lincoln the Man* and *Mark Twain.*

Mather (*măth'ĕr*), **Cotton (1663-1728),** American colonial divine, was born in Boston. He was very precocious; entered Harvard at 11, was graduated at 15, preached his first sermon at 17, and was minister at Old North Church at 20.

The phenomenon termed "Salem witchcraft" having appeared in the colony, he made investigations and, in 1689, published his *Memorable Providences Relating to Witchcraft and Possessions* and, in 1693, his *Wonders of the Invisible World,* which encouraged the persecutions. Despite his narrow-mindedness, he was a man of extraordinary learning, a remarkably prolific writer, and sincere in his convictions. Nevertheless his connection with the persecutions of witches gave him a sinister reputation which the appreciation of his many good qualities has not fully counterbalanced. The most important of his numerous works are *Magnalia Christi Americana, Poem to the Memory of Urian Oakes,* and *Essays to Do Good.* See *Salem Witchcraft.*

Mather, Increase (1639-1723), American colonial divine, father of Cotton Mather, was born at Dorchester, Mass., 1639. For about 60 years he was pastor of the North Church, Boston. In 1685, he was chosen president of Harvard College. He published a large number of works, the chief of which are *A Brief History of the War with the Indians in New England, Cometographia,* and *An Essay for the Recording of Illustrious Providences.* He wielded a dominant influence both in the Church and in the state. He was sent to England in 1688 and secured a new charter uniting the Massachusetts Bay and Plymouth colonies.

Mathews, Shailer (1863-1941), American educator and theologian, was born at Portland, Me. Educated at Newton Theological Institution and the University of Berlin, he taught at Colby College from 1887 to 1894 and then joined the faculty of the University of Chicago's Divinity School, serving as dean from 1908 to 1933. He retired the latter year, but continued, by his writings, to take a leading part in a reinterpretation of Christianity from a social point of view. His publications include *The Social Teaching of Jesus, The Church and the Changing Order, Patriotism and Religion, The Faith of Modernism,* and *New Faith for Old—An Autobiography.*

Matisse (*mä'tēs'*), **Henri (1869-1955),** French artist, originated a style and displayed a mastery of color that will influence artists far into the future. He was born at Cateau-Cambresis, France, and lived a span of years that was to prove as revolutionary as the period of the Renaissance. Matisse studied law in Paris, gave it up to study painting at the Ecole des Beaux Arts, and exhibited works in the classical fashion in 1896. But he quickly broke with this school and led the "Fauves," or "Young beasts," in a sensational art movement at the turn of the century. Matisse showed his greatest power and originality in his later years. He traveled in Africa, lived on the French Riviera, and his paintings reflect the warm colors found in that part of the world. However, Matisse brought to his style a classical discipline of line that is unsurpassed. His water colors and pen-and-ink drawings that look so simple are, upon analysis, found to be masterful examples of "genius of line." He studied with Rouault, and worked with Derain and Vlaminck, and many other artists. Matisse spent his last years bedridden, but he worked constantly. His last and perhaps his most memorable work was the interior design for the Church of Ste Marie du Rosaire, near Nice. Matisse's so-called "modern" techniques in this church proved to be remarkably classical and moving. The church is now a mecca for tourists.

Matsuoka (*mä-tsōō-ō-kä*), **Yosuke (1880-1946),** Japanese statesman, was born on a farm in Yamgouchi. In 1893, he went to the United States, where, befriended by a Scotch couple, he earned his way to graduation in law at the University of Oregon in 1900. Returning to Japan he entered the diplomatic service. Despite a rapid rise, he left this field and entered politics in 1920, being elected to the Diet. He came into notice at the Institute of Pacific Relations, meeting at Kyoto in 1929, for his able advocacy of Japan's future Manchurian policy. He represented Japan at the League of Nations in 1933 and presented Japan's resignation when the League censured Japan for taking Manchuria. He served for several years as president of the South Manchurian Railway. Called to be foreign minister, in a government increasingly totalitarian in character, he led Japan into an alliance with Germany and Italy.

Matsuoka, leaning heavily on the political advice of army leaders, typified the expansionist forces of the empire in the Chinese war beginning in 1938. He resigned as foreign minister in 1941.

Matthews, James Brander (1852-1929), American author and educator, was born at New Orleans. He was graduated at Columbia College, 1871, and at Columbia Law School, 1873. He was admitted to the New York bar, but soon turned to literature. From 1892 to 1924, he taught literature and drama at Columbia University and also maintained a close and wide acquaintance with writers in America and abroad. As dramatic critic he was a leading figure in the first three decades of the 20th century. His extensive writings include *The Theaters of Paris, The Action and the Word, The Historical Novel, Development of the Drama,* and *Essays on English.* He was elected to the American Academy of Arts and Letters in 1908.

Maugham, William Somerset (1874-), English novelist and dramatist, was born in Paris, France. He was graduated from Heidelberg University and studied medicine in London, but soon turned to literature. His writings display a relentless realism combined with a rare mastery of restraint, suspense, and the artistry of words. His thought penetrates incisively beneath the surface of social appearance and lays bare the essential tragedies, satisfactions, and ironies of life. Among his greatest novels are *Of Human Bondage, The Moon and Sixpence,* and *Cakes and Ale.* His plays include *Our Betters* and *Rain.*

Maupassant (*mō'pä'sän'*), **Henri René Albert Guy de (1850-1893),** French short story writer and novelist, was born at Chateau Miromesnil. After beginning active life as a clerk and serving as a soldier in the Franco-Prussian War, he was patiently trained to story writing by Flaubert, the novelist. His first story, *Boule de suif,* which appeared in 1880, immediately stamped him as a finished and masterly writer of the naturalistic school.

From 1880 to 1890, he produced about 200 short stories, which, though often morbid, sensual, cynical, and unmoral, are, on the whole, in style, art, and deftness of portraiture, the best in French literature, and some are unexcelled in any literature. In form, scope, and artistic completeness, *The Necklace* is by many regarded as the most remarkable short story in world literature. He also wrote volumes of travel and several novels. He became insane in 1892 and died the following year.

Mauriac, François (1885-), French writer, was born in Bordeaux, where he was educated at the university. As a young man he gained recognition in Paris with a book of poems, but he is chiefly known as a leading Roman Catholic novelist. Some of his best known works are *Le Baiser au Lépreaux, Génetrix, Therése,* and *Le Noeud de Vipères.* He has also written several successful plays, and has been leader writer for *Figaro.* He was elected to the Academie Français in 1933, and was awarded the 1952 Nobel Prize in literature.

Maurice (*mō'rĭs*) **(1567-1625),** prince of Orange and count of Nassau, was born at Dillenburg, Prussia, son of William I founder of the Dutch Republic. After his father's assassination in 1584, the provinces of Holland and Zealand and, afterward, Utrech elected him stadholder. A great portion of the Netherlands was still in the hands of the Spaniards, but, under the leadership of Maurice, the Dutch rapidly wrested cities and fortresses from their enemies. In 1597 with the help of English auxiliaries, he defeated the Spaniards at Turnhout and, in 1600, won a splendid victory at Nieuwport. Finally, in 1609, largely through Maurice's generalship, Spain was compelled to agree to a

truce which resulted in the independence of the Dutch. Maurice forcibly suppressed the Remonstrants, of the Arminian anti-Calvinistic sect, in 1618 and brought about the death of their leader, Barneveldt.

Maurois (*mô'rwä'*), **André (1885-)**, French biographer and essayist, was born at Elbeuf. Educated at Rouen, he served during World War I as an interpreter between French and English forces, his experiences being later embodied in *Silences of Colonel Bramble*. He proceeded then to write biographies in fiction form couched in a delicate but direct style. Some of his subjects were English. *Ariel, or the Life of Shelley* was followed by *Disraeli, Byron,* and *Dickens*. He wrote also *Whatever Gods May Be, The Weigher of Souls, The Thought-Reading Machine,* and *Tragedy in France*.

Maury, Matthew Fontaine (1806-1873), American hydrographer, was born in Spottsylvania County, Va. He entered the navy as a midshipman in 1825 but, in 1839, an accident, resulting in lameness, unfitted him for active service. He was placed in charge of charts and instruments, a department from which grew the Naval Observatory and Hydrographic Office. His work there on winds and currents led to an international conference in Brussels in 1853, which was of fundamental importance to navigation. He was given the rank of commander in 1855.

Siding with the South in the Civil War, he headed the harbor defense service and invented a torpedo. After the war, he attempted unsuccessfully to found a Virginian colony in Mexico. The years 1866 to 1868 he spent in England and then accepted the professorship of meteorology at Virginia Military Institute, Lexington, Va. Elected to the American Hall of Fame in 1930.

Mauve (*mouv*), **Anton (1838-1888)**, Dutch landscape and animal painter, was born at Zaandam. Though he studied with the cattle painter Van Os at Haarlem, he was largely self-taught. His paintings are chiefly landscapes with sheep, horses, cattle, or figures of peasants and include also seashore scenes characterized by fine poetic quality and refined, truthful treatment. With Israëls he stands in the foremost rank of modern Dutch painters.

Mawson (*mô'sŭn*), **Sir Douglas (1882-)**, Australian antarctic explorer, was born in Bradford, England, but went at an early age to Australia. He was educated at the universities of Sydney and Adelaide. As a member of the scientific staff of Shackleton's expedition, 1908-09, he reached and determined the location of the south magnetic pole on Victoria Land, in lat. 72° 25′ S., long. 155° 16′ E. He organized and conducted the Australasian expedition to antarctic lands south of Australia, 1911-14. By journeys covering 2400 miles he discovered and explored King George V Land.

As a result of his explorations, he concluded that the continent of Antarctica, an elevated, glacier-covered region, extends without interruption between 86° E. and 150° W. Mawson's discoveries and their results form the most extensive contribution to antarctic exploration during the first quarter of the century.

In 1920, he was appointed to the chair of geology and mineralogy in the University of Adelaide. Besides various scientific papers, he published *The Home of the Blizzard*.

Maxim, Sir Hiram Stevens (1840-1916), Anglo-American inventor, was born at Sangerville, Me. He received a common school education, and obtained his scientific knowledge by private study and by attending lectures. He was for four years an apprentice to a coach builder; worked in various ironworks; patented numerous inventions in the United States; and, in 1881, went to England, where he became a naturalized citizen.

Maxim obtained over 100 international patents for inventions. These include the incandescent lamp and other electrical appliances; the Maxim machine gun, automatically loaded and discharged by the force of the recoil; and cordite, a smokeless powder. He devoted much attention also to aerial navigation. For many years he was a director in the British ordinance firm of Vickers Sons and Maxim.

His son, Hiram Percy Maxim (1869-1936), was an American mechanical engineer and inventor of the Maxim silencer for firearms and mufflers for automobiles.

Maximilian, Ferdinand Joseph (1832-1867), archduke of Austria and emperor of Mexico, was born in Vienna. He was the brother of Francis Joseph, emperor of Austria-Hungary. In 1863, Napoleon III planned to conquer Mexico and set up an empire there. He offered the crown to Maximilian, who went to Mexico in 1864. The country had long been in a state of confusion, and at first the people seemed inclined to welcome him and to look for peace under his rule. But he pleased no one; the people rose against him; and, in 1866, when the French troops left the country, the empire fell to pieces. Maximilian tried to form a native army for his own defense, but he was captured by the Republicans, was tried and shot near Queretaro.

Maxwell, James Clerk (1831-1879), British physicist, was born at Edinburgh. He was educated at the University of Edinburgh and at Cambridge, and, before he was 15, wrote papers of scientific value. In 1856, he became a professor in Marischal College, Aberdeen; in 1860, was appointed to a chair in King's College, London; and, in 1871, was made professor of experimental physics at Cambridge.

In his work *Electricity and Magnetism*, he demonstrated that electromagnetic action travels through space in transverse waves similar to those of light and having the same velocity. His hypothesis that electricity and light are the same in their ultimate nature has been amply confirmed. He was the first to make color sensation the subject of actual measurement.

Mayer (*mī'ĕr*), **Julius Robert von (1814-1878)**, German physicist, was born at Heilbronn. In 1840, he went to Java, where he made researches on the blood and on animal heat, which led him to consider the problems of the conservation and correlation of forces. In 1842, he published the first announcement of the principle underlying the theory of the conservation of energy. Mayer is entitled to the credit of first conceiving this great doctrine. His complete works were produced in *Die Mechanik der Wärme*. See *Conservation of Energy*.

Mayo, Charles Horace (1865-1939), American surgeon, was born at Rochester, Minn. He received his education at Northwestern University and was graduated from Chicago Medical College in 1888. He immediately began practice at Rochester, Minn., where he was made surgeon at Saint Mary's Hospital. He was widely known for successful operations for goiter and, together with his brother W. J. Mayo, achieved world-wide fame, not only for successful operations, but also for the development of a remarkable surgical clinic. With his brother, he donated 1.5 million dollars in 1915 to establish at Rochester, for medical education and research, the Mayo Foundation, now a part of the University of Minnesota.

Mayo, William James (1861-1939), American surgeon, was born at Le Sueur, Minn. He was graduated in medicine at the University of Michigan, 1883, and became a practicing surgeon at Rochester, Minn. Here he served with his brother C. H. Mayo as surgeon of the Mayo Clinic of Saint Mary's Hospital and achieved unusual success in his operations for gallstones and cancer.

Mazarin (F., *mà'zà'răN'*; E., *măz'ă-rēn'*), **Jules (1602-1661)**, prelate and diplomat, was born at Piscina, Italy. Having accompanied a papal legate to the court of France, he became known to Richelieu about 1628. The latter perceived his great political talents and engaged him to maintain the French interests in Italy. In 1639, he openly entered the service of Louis XIII and was naturalized as a Frenchman. In 1641, he received a cardinal's hat through the influence of Richelieu, who, when dying, recommended him to the king as the only person capable of carrying on the latter's political system. Under Mazarin, the influence of France among the nations was increased and, in the internal government of the country, those principles of despotism were established on which Louis XIV afterward acted.

Mazzini (*măt-sē'nē*), **Giuseppe (1805-1872)**, Italian patriot and revolutionist, was born at Genoa. Sentiments of social equality were early instilled into him by parental example. In 1830, his affiliation with the secret society of the Carbonari led him to enter a political career. The organization of a new Liberal league, "Young Italy," was Mazzini's next work. The first fruit of his league was the revolutionary expedition of Savoy, which was organized by Mazzini at Geneva but was defeated by the royal troops.

An association entitled "Young Europe" and based on principles of European rights and enfranchisement was inaugurated by him in Switzerland. In 1837, he quitted Switzerland and finally took up his abode in London. He assisted in organizing Garibaldi's expeditions of 1860, 1862, and 1867. After an ineffective scheme for a Republican uprising in Sicily in 1870, he ventured to enter Italy and was arrested at Gaeta, where he remained a prisoner until Rome was taken by the Italian army.

Mead, Margaret (1901-), American anthropologist, was born in Philadelphia, Pa. After she was graduated from Columbia University in 1924, she undertook an anthropological research project in Samoa which set a new standard of thoroughness in analyzing the life, ways, and motives prevailing in a primitive society. The results were published in *Coming of Age in Samoa*, written after her appointment in 1926 as assistant curator of ethnology, American Museum of Natural History, New York. Other investigations, which laid particular emphasis on education, relations between the sexes, and economic motivation, were made in New Guinea and Bali. Her other publications include *Growing Up in New Guinea, Cultural Stability in Polynesia, The Changing Culture of an Indian Tribe,* and *Sex and Temperament in Three Primitive Societies*. Her *New Lives for Old* appeared in 1956. She married Gregory Bateson of Cambridge, Eng., in 1936.

Mead, William Rutherford (1846-1928), American architect, was born in Brattleboro, Vt. After being graduated at Amherst College in 1867, he studied architecture. In 1872, he formed a partnership with C. F. McKim. Joined by Stanford White in 1879, the firm was thereafter known as McKim, Mead, and White. Mead participated in much of the notable work of the firm, including the designs for the Boston Public Library; Columbia University Library; New York University Library and the American Hall of Fame; Bellevue Hospital; the magnificent Pennsylvania Station, the new Post Office, and the Municipal Office Buildings, New York; the Brooklyn Institute of Arts and Sciences; the Rhode Island Capitol; the Bank of Montreal at Montreal; the War College at Washington; and other important structures. He was elected to the American Academy of Arts and Letters in 1910.

Meade, George Gordon (1815-1872), American general, was born in Cadiz, Spain, where his father was an agent of the United States navy. He was graduated from West Point, 1835, and, after serving one year in the army, resigned to begin practice as a civil engineer. He re-entered military life in 1842, serving with distinction in the Mexican War on the staffs of Taylor and Scott and in the engineer corps.

At the outbreak of the Civil War, he was placed in command of a brigade of volunteers and soon rose to the command of a division. He led his division through the Seven Days' battles; was severely wounded at Frazier's farm; went through the Antietam campaign; and commanded at Fredericksburg, where he particularly distinguished himself. At Chancellorsville, he commanded the fifth corps. When Hooker resigned the command of the army of the Potomac and while the army itself was in hasty movement northward to check Lee's invasion of the North in 1863, Meade was appointed to the command. He accepted it with the greatest reluctance and altogether from a sense of duty. He planned to fight on the line at Pipe Creek, but Reynolds fell into collision with Lee's advance at Gettysburg, and Meade's ensuing victory, July 1-3, 1863, became historical. When Grant assumed general command in 1864, Meade continued to command the army of the Potomac.

Meany, George (1894-), American labor leader, was born in New York City. He became an apprentice plumber at sixteen, and a journeyman plumber at twenty-one. From 1922 to 1934 he was business representative of a local plumbers' union, and from 1934 to 1939 president of the New York State Federation of Labor. Becoming secretary and treasurer of the American Federation of Labor in 1940, he continued in that office until 1952, when he was elected to succeed William Green as president. When the American Federation of Labor and the Congress of Industrial Organizations merged in 1955, Meany became president of AFL-CIO.

Medici (*mā'dē-chē*), **Catherine de'.** See *Catherine de' Medici.*

Medici, Lorenzo de' (1449-1492), surnamed "the Magnificent," was a member of an illustrious Florentine family which for centuries exerted great influence throughout Europe. He was instructed by some of the most learned men of the age. In 1469, he succeeded to the wealth and the power of his father and became the virtual head of the Florentine state.

During his rule he exerted himself in every way to promote the growth of literature and the arts. In 1478, the Pazzi, another distinguished family of Florence, formed a conspiracy against him and his brother Giuliano. The plot very nearly succeeded, Giuliano being assassinated and Lorenzo being wounded. The remainder of Lorenzo's administration was unmarked by any great public events, but his regard for literature was further manifested by his establishment of the printing press in his dominions and by his enlargement of the Laurentian library.

Meighen (*mē'ĭn*), **Arthur (1874-),** Canadian statesman, was born at Anderson, Ont. He was educated at Toronto University. After studying law at Winnipeg, he was admitted to the bar and, in 1902, located at Portage la Prairie, Man. He was elected to the Dominion House of Commons, 1908, as a Conservative member; was re-elected in 1911 and in 1917; was appointed solicitor general of Canada, 1913; was made member of the Imperial war cabinet, 1918; and prime minister in 1920-21 and 1926. He led the Conservative party in the House until 1927. He was minister without portfolio in the Bennett cabinet, 1932-35, and leader of the Conservative party, 1941-42.

Meissonier (*mĕ'sō'nyā'*), **Jean Louis Ernest (1815-1891),** French military painter, was born in Lyons. He first attracted attention by his "Little Messenger" in 1836 and continued to exhibit at the Paris Salon for many years. Among his best pictures are those of the "Napoleon Cycle," containing the widely known "1807," "1814," and "1815." He served in Napoleon III's Italian campaign and the early part of the Franco-Prussian War, and was colonel at the siege of Paris. He painted upward of 500 pictures.

Melanchthon (*mē-lăngk'thŭn; tŭn*), **Philipp (1497-1560),** German theologian, was born at Bretten, Baden. He early decided in favor of the Reformation and brought to the aid of Luther great attainments in learning, unusual acuteness in dialectics and exegesis, a remarkable power both of clear thinking and of clear expression, and withal a gentleness and a moderation that most advantageously tempered Luther's vehemence. In 1521, he published his *Loci Communes Rerum Theologicarum,* the first great Protestant work on dogmatic theology. In 1530, by drafting the Augsburg Confession, he made a most important contribution to the cause of Protestantism.

After Luther's death, he lost, in some measure, the confidence of the Protestants by those concessions to the Roman Catholics which his anxiety for peace led him to make, while the zealous Lutherans were no less displeased because of his approximation to the doctrine of Calvin on the Lord's supper. He sincerely endeavored to bring about Christian unity in an age of fanatical strife and was one of the most judicious and progressive leaders of the Reformation.

Melba, Nellie (1861-1931), nee Helen Porter Mitchell, Australian singer, was born at Burnley, near Melbourne. She studied under Madame Marchesi in Paris and made her stage debut in 1887 in *Rigoletto* at Brussels. In the following year, she appeared as Lucia at Covent Garden, London. She first appeared in the United States in *Lucia di Lammermoor* at the Metropolitan Opera House, New York, 1893. While lacking the dramatic intensity and histrionic ability necessary for the greatest roles, she became known and admired throughout the world for the exceptional purity and beauty of her voice, a dramatic soprano. She was notably successful in grand opera in America and, after some years in concert, returned to opera in 1915-16 as member of the Chicago Grand Opera Company. She wrote *Melodies and Memories.* Melba's stage name is derived from Melbourne, the Australian city.

Mellon, Andrew William (1855-1937), American manufacturer and banker, was born at Pittsburgh, Pa.; was educated in the University of Pittsburgh; and was long engaged in the development of coal, coke, and iron enterprises. He founded the town of Donora, Pa., and established steel mills there. He was an officer or director of many industrial and financial corporations, including the Mellon National Bank, the presidency of which he resigned in 1921 in order to become Secretary of the Treasury for the United States. He served ably. Resigning in 1932, he was ambassador to Great Britain until the following year.

He built up one of the most valuable collections of art in private hands, most of which, together with funds for a gallery, he donated to the United States government. The National Gallery of Art, one of the finest in the world, was opened in Washington, D. C., in 1941.

Melville, Herman (1819-1891), American novelist, was born in New York City. He went to sea in a merchant vessel in 1837. Mistreatment led to his escaping from the ship in Marquesas Islands, where he was captured by a cannibal tribe, the Typees. He was rescued by a whaler a few months later, in 1841. Remaining in the South Seas until the next year, he returned to the United States, where he married the daughter of the chief justice of Massachusetts, Lemuel Shaw, and obtained employment in the New York Customs House.

He wrote a number of books based chiefly on his adventures, which met with some success in his day but made him famous after his death. *White Jacket,* describing barbarities in the treatment of enlisted men by the navy, led to the abolition of flogging. *Typee* describes his first voyage and capture by cannibals. In *Moby Dick,* however, Melville created his masterpiece. Ostensibly the pursuit of a white whale, the book is a parable of fate.

Menander (*mē-năn'dēr*) **(342 B.C.-c.291 B. C.),** Greek comic poet, was born at Athens. His uncle was the poet Alexis. The influence of the latter as well as that of Menander's teacher Theophrastus and of his friend Epicurus is discernible in his style of thought and feeling. He wrote more than 100 comedies, which for wit and grace were held in higher esteem than the works of any other writer of the so-called New Comedy. Many of his plays were adapted for the Roman stage by Plautus and Terence. In the latter part of the 19th century, a fairly complete text of several of Menander's plays was discovered in Egypt. The poet was drowned about 291 B. C.

Mencius (c. 380 B.C.-289 B.C.), Chinese religious philosopher. The name is a Latinized form of Mang-tsze, meaning Mang the Philosopher. Adopting the ideals of practical ethics formulated by Confucius a century earlier, he visited the courts of the rival feudal lords of China, seeking to have each put into practice the principle that the good of the people is the guiding rule of statecraft. He believed that any prince so ordering his affairs would by common consent become the ruler of the entire country. Accepting failure in his mission as the divine will, he

retired and elaborated his views in treatises which his disciples wrote down. They were collected into one of the books of which educated Chinese were required for over two millenniums to have a knowledge. His mother, who was widowed when Mencius was three years of age, was revered in after ages throughout China as the model mother.

Mencken, Henry Louis (1880-1956), American satirist and editor, was born at Baltimore. He was connected in an editorial capacity with the Baltimore *Herald*, the Baltimore *Sun*, and, 1908-23, with the *Smart Set*. In 1924, he founded the *American Mercury* and, as its editor, notably extended his influence as an incisive and iconoclastic critic of many features of American life. He left the *American Mercury* in 1933, returning to the Baltimore *Sun* as part owner. In the following years his influence rapidly waned, many of the positions he advocated having come to be regarded as conservative rather than radical. He wrote *The American Language*, which is regarded as authoritative. His other publications include *The American Credo, Prejudices, Americana, Treatise on the Gods*, and *Happy Days*, an autobiography.

Mendel, Gregor Johann (1822-1884), Austrian botanist, was born at Heinzendorf, Silesia. He was educated at Brünn; became a priest in 1847; continued his studies at Vienna; and later taught at Brünn, where he became abbot. During 15 years devoted to teaching natural science he conducted extensive experiments in hybridization. In 1865, he announced the discovery of a law of heredity now universally known as Mendel's law. It was published by the natural history society of Brünn, but attracted little attention until 1900, when De Vries and other investigators brought it to light. This law, based on Mendel's original experiments with garden peas, has become the working basis of nearly all recent investigations in genetics.

Mendeléev (*měn'dyĕ-lyā'yĕf*), **Dmitri Ivanovitch (1834-1907),** Russian chemist, was born at Tobolsk, Siberia. In 1850, he went to Leningrad to study natural science and, in 1866, was made professor of chemistry at the University of Leningrad. He is best known for the enunciation of the periodic law, under which an arrangement of the chemical elements made possible prediction of the existence and even of the properties of several unknown elements which have since been discovered. He published many scientific papers and several textbooks of which his *Elements of Chemistry* has become a standard work and has been translated into many languages.

Mendelssohn-Bartholdy (*měn'dĕl-sōn-bär'tōl'dē*), **Felix (1809-1847),** German composer, was born of wealthy and cultured Jewish parents at Hamburg. His father became a convert to Christianity and young Felix was brought up in the Lutheran faith. Zelter was his instructor in composition; Ludwig Berger, on the piano.

At the age of nine, Mendelssohn gave his first public concert in Berlin. From this period he began to write compositions of all kinds. At 17, he wrote his well-known overture to *A Midsummer Night's Dream*. In 1825, he went to Paris. He gave concerts there and in Berlin, and later traveled for three years in England, Scotland, France, and Italy. In 1835, he accepted the directorship of the Leipzig concerts. Here, in the center of the musical world of Germany, he was stimulated to his highest and most brilliant efforts. His oratorios *St. Paul* and *Elijah* are his two greatest works, the latter ranking second only to the greatest works of Handel. His *Hymn of Praise, Songs Without Words*, and *Wedding March* are among the most admired of his minor compositions.

Mendes-France, Pierre (1907-) French statesman, was born in Paris. As premier of France for a period in 1954-55, he achieved world fame for the hard realism of his policies, but his uncompromising demands for parliamentary reform, and his decision to withdraw from Indo-China, forced him from power. However, he is still a towering figure both in French politics and in world affairs. Mendes-France, a brilliant and successful lawyer, was first elected to the National Assembly in 1932. During World War II, he escaped from a Vichyite prison and joined General de Gaulle's Free French Air Force. He flew many missions as an aerial gunner. Dark and saturnine, Mendes-France is a phenomenally hard worker whose breadth of intellect gives him authority in every aspect of government and diplomacy.

Menzies, Robert Gordon (1894-), Australian statesman, was born at Jeparit, Victoria, Australia, and was educated at the University of Melbourne. A lawyer by profession, Menzies began practice as a barrister at the Victoria bar in 1918, became king's counsel in 1929, and served as attorney general of the Commonwealth of Australia, 1934-39. He became prime minister in 1939, and led his country into World War II. He resigned in 1941 when the Labor party gained control of the government. He was leader of the opposition from 1943 to 1949, when he again became prime minister, a rank he has since held.

Mercator (*mĕr-kā'tĕr*; *mĕr-kā'tôr*), **Gerardus (1512-1594),** Flemish geographer, was born at Rupelmonde, Flanders. His real name was Kremer, "Merchant," of which Mercator is the Latinized form. He took his degree as bachelor of philosophy at Louvain, but devoted his later years to the study of geography. In 1559, he was appointed cosmographer to the Duke of Cleves. He published several important works, including maps and descriptions of France, Germany, and Great Britain. He did much to establish geographical science upon a secure footing. His name is perpetuated by the projection used in nautical maps, in which the meridians are represented as straight vertical lines and the parallels of latitude as horizontal lines perpendicular to the meridians.

Mercier (*mĕr'syā'*), **Désiré Joseph Cardinal (1851-1926),** Belgian prelate, was born at Braine l'Alleud. He was educated at Malines, Paris, and Leipzig; became a priest in 1874; and taught philosophy at Malines, 1877-82, and later at Rome. In 1906, he was consecrated archbishop of Malines and primate of Belgium, and, in 1907, he was made cardinal. Cardinal Mercier came into world-wide notice through his fearless, patriotic conduct in speaking for the Belgian people during the German occupation of his country from 1914 to 1918. Among his various writings on metaphysics, philosophy, and psychology, the most important is his *Origins of Contenporary Psychology*.

Meredith, George (1828-1909), English poet and novelist, was born in Portsmouth. After studying for some time in Germany, he began his literary career with the publication of a volume of poems. As a novelist he rose to a high position in British letters. His fiction is characterized by much introspection and psychological analysis. Among his numerous writings are *The Ordeal of Richard Feverel, Emilia in England, Rhoda Fleming, Beauchamp's Career, The Tragic Comedians, Diana of the Crossways, Ballads and Poems of Tragic Life, The Amazing Marriage, The Tale of Chloe, The House on the Beach*, and *Last Poems*.

Meredith, Owen. See *Lytton, Edward Robert, Earl of.*

Mergenthaler (*mĕr'gĕn-tä'lĕr*), **Ottmar (1854-1899),** American inventor, was born in Württemberg, Germany. He came to the United States in 1872 and entered the employ of the government at Washington, D. C., where he kept in order clocks and electric bells throughout various government buildings. In 1876, he removed to Baltimore, where he devoted many years to the perfection of a typesetting machine. In its final form this became the linotype machine bearing his name now in common use in printing establishments. See *Composing Machine*.

Mérimée (*mā'rē'mā'*), **Prosper (1803-1870),** French novelist, historian and archeologist, was born at Paris. He studied law; entered the civil service; and, in 1831, was made inspector of archeological and historical monuments in France. While he published various historical and scientific researches, he is best known for his narrative and dramatic fiction. This includes *Colomba*, which is his most popular novel, and *Carmen*, a Spanish gypsy romance. The latter was made the subject of Bizet's noted opera of the same name. He became a member of the French Academy in 1844 and was chosen Senator of the Empire in 1853.

Merle d'Aubigné, (*mĕrl dō'bēn'yā'*), **Jean Henri (1794-1872),** Swiss ecclesiastical historian, was born near Geneva. He studied at Geneva and Berlin and, in 1818, became pastor of the French Protestant Church in Hamburg. In 1823, he was appointed court preacher at Brussels. In 1831, he returned to Geneva; took part in the founding of the new Evangelical College; and filled its chair of Church History for many years. His *History of the Reformation in the 16th Century* enjoyed immense popularity.

Merriam, John Campbell (1869-1945), American paleontologist, was born at Hopkinton, Iowa. He was graduated at Lenox College, Iowa, in 1887 and received the degree of doctor of philosophy from the University of Munich, Germany, in 1893. After serving as instructor from 1894 to 1899, as assistant professor from 1899 to 1905, and as associate professor from 1905 to 1912, he was professor of paleontology and historical geology from 1912 to 1920 at the University of California. In 1920, he was made president of the Carnegie Institution in Washington, serving until 1939. He made extensive researches on the fossil reptiles and on the fossil mammals of western North America. Besides numerous monographs, he wrote *The Emergence of Man, The Living Past*, and *Science and Human Values*.

Merry del Val (*mĕr'rē dĕl vāl'*), **Raphael (1865-1930),** Catholic prelate and diplomat, was born of Spanish parents in London. He was educated at Ushaw College, Durham, England, and at Rome. In 1888, he took orders; in 1892, was made papal chamberlain; and, in 1897, became prelate of the papal household. In 1903, he succeeded Cardinal Rampolla as Papal Secretary of State and was made cardinal. On the accession of Pope Benedict XV, 1914, he was succeeded by Cardinal Ferrata and was appointed Secretary of the Congregation of the Holy Office. It fell to

his lot to advise the papacy during the separation of Church and State in France, 1905, and in the negotiations leading to the restoration of the pope's temporal power in 1929.

Merton, Thomas (1915-), a Trappist monk whose richly imagistic poetry belies the austerity of his chosen life. Born in France he was educated there, and at Clare College, Cambridge, and Columbia University. He was converted to Catholicism, took the Trappist order of silence, and was ordained a priest in 1949. While Merton's poems mark him as a first-class literary figure, he is best known for his two books dealing with his spiritual philosophy, the autobiographical *Seven Story Mountain* and *The Waters of Siloe*. His *The Silent Life* (1957) is a fascinating account of monastic life. Called Father M. Louis, he works at the Trappist Monastery in Gethsemane, Kentucky. He has also written *Sign of Jonas* (1953), *Last of the Fathers* (1954), and *No Man Is an Island* (1955).

Messerschmitt, Willy (1898-), German aircraft designer and manufacturer, is credited with being chiefly responsible for the rapid expansion of the Nazi air force in the 1930's. He was chief engineer for the firm of Messerschmitt, which he founded, and for the Bayerische Flugzeugwerke, which was later merged with the Messerschmitt Company. In 1936 he was made chairman of the German Institute for Research in Aviation. Since the end of the war his engineering ability and the resources of his factory have been utilized in the construction of prefabricated houses.

Mesta, Perle (1891-), American diplomat, was born at Sturgis, Mich., and was educated privately in Galveston, Texas. Inheriting a fortune from her father, William B. Skirvin, an Oklahoma oil magnate, and another fortune from her husband, George Mesta, a Pittsburgh machine-tool manufacturer, she became active in American politics in 1935, first as a Republican, then as a Democrat. Famous as Washington's most important unofficial hostess, Mrs. Mesta was appointed by President Truman minister to the Grand Duchy of Luxembourg in 1949, where she served until 1952. She was the first minister to represent the United States in that country.

Meštrović (*mĕsh'trō-vĭch*), **Ivan (1883-)**, Yugoslav sculptor, was born at Vrpolje, Slavonia. The son of a farmer, who apprenticed him to a stonecutter in 1896, Meštrović succeeded in entering the Vienna Academy, where he studied from 1899 to 1904. Exhibitions in Vienna, London, Venice, and Paris attracted notice as a new note in sculpture. His work shows modern adaptations of archaic Greek and Byzantine effects. He executed numerous portraits in marble and a group memorializing the battle of Kossovo. Examples of his power of expressing sentiment in stone are his "Artist's Mother in Prayer" and "The Widow." His other works include a war memorial for the Canadian government and two Indian equestrian statues in Chicago.

Metaxas (*mĕ-tăk'săs*), **John (1871-1941)**, Greek soldier and statesman, was born in the island of Ithaca. He studied military science in Athens and Berlin and entered the army in 1890. He took part in the war against Turkey in 1897 and the Balkan War of 1912-13. He was a member of the general staff during World War I. Dismissed from the army and exiled for four years, he returned to Greece and, in 1926, was appointed to the cabinet. He organized a fascist-monarchist party in 1934, with the help of which he made himself dictator in 1936. In 1940, Italy suddenly invaded Greece. Metaxas rallied the country and, with British support in sea and air, delivered a staggering defeat to the Italian invaders, which was followed by swift advances into Italian-held Albania.

Metternich (*mĕt'ĕr-nĭĸ*), **Clemens Wenzel, Prince (1773-1859)**, Austrian diplomat and statesman, was born in Coblenz. After a distinguished diplomatic career, he became chief minister of Austria in 1809. After the Congress of Vienna, he was the foremost statesman of Europe, and the period 1815-48 is sometimes styled the "age of Metternich." He was the inspiring genius of the reaction, organizing the Holy Alliance to stem the rising tide of popular government. The revolution of 1848 sent him into exile, from which he returned three years later.

Meunier (*mû'nyā'*), **Constantin (1831-1905)**, Belgian sculptor and painter, was born at Etterbeek. He first painted religious and historical subjects, which he treated in a realistic style. About 1880, he began to study the workers in the mining and factory districts of Belgium, and from that time he devoted his life to what has been styled the "æsthetics of work," producing, after his 50th year, many great sculptures depicting the struggle of man with the earth. Among the finest of these are "The Dock Hand," "The Sower," "The Mine Girl," and "Puddler Resting." His most noted achievement is the "Monument to Labor" in the Brussels Gallery.

Meyer, Adolf (1866-1950), American psychiatrist, was born near Zurich, Switzerland. After studying in the chief universities of Europe, he came to the United States in 1892 as a fellow at the University of Chicago. Specializing in the study of mental diseases, he had a large part in developing the view that insanity is a series of disorders, many of which can be cured or avoided by the proper measures. To preventive measures he applied the term "mental hygiene," which became widely current. Having taught or directed clinics at various medical schools and hospitals, he was made professor of psychiatry at Johns Hopkins University in 1910, retiring in 1941.

Meyerbeer (*mī'ĕr-bār*), **Giacomo (1791-1864)**, German composer, was born of Jewish parents in Berlin. He early displayed musical talent and made his first public appearance at the age of seven. In 1810, he entered the school of Vogler, at Darmstadt, where he formed an intimate friendship with Weber. His opera *Jephthah's Vow* was produceed at Munich in 1813.

He was induced by his friend Salieri to visit Italy, where he became an enthusiastic convert to the new Italian school and began the composition of a series of operas which proved highly popular. His subsequent works include *Romilda e Constanza, Semiramide riconosciuta, Emma di Resburgo, L'esule di Granata, Il Crociato in Egitto, Robert le Diable*, and *Les Huguenots*, in the last of which he reached the climax of his fame. See *Huguenots*.

Michelangelo (*mī'kĕl-ăn'jĕ-lō*), **Buonarroti (1475-1564)**, Italian painter, sculptor, and architect, was born at Caprese near Arezzo in Tuscany, Italy. When only 13 years of age, Michelangelo was apprenticed to the painter Ghirlandajo for three years. Sculpture, however, appears in a short time to have engrossed his attention. Lorenzo de' Medici, attracted by the drawings and models of the young student, gave him some commissions in 1489.

Early Works. After the death of Lorenzo in 1492, Michelangelo received nearly equal attention from Piero de' Medici; but political disturbances soon caused him to take refuge in Bologna. He also visited Venice, but returned to Florence in 1494. Two years later he made his first trip to Rome. He now rapidly distinguished himself in sculpture. Among other works, he finished his colossal "David" in 1504, in which he displayed his characteristic style of form,—a heaviness of the limbs compared with the body.

Monument of Julius II. In 1505, Pope Julius II called the great sculptor to Rome to design for him a sepulchral monument. It was to be a four-sided marble structure decorated with some 40 figures of heroic size. Michelangelo spent 8 months in Carrara superintending the sending of the marble to Rome. The pope suddenly changed his mind and began to consider instead the building of Saint Peter's after the designs of Bramante. In 1545, after the pope's death, the designs for the monument to Julius II were carried out on a much reduced scale, and it was completed in the form now to be seen in the San Pietro in Vincoli. The artist's statue "Moses" was to have formed a part of the monument as originally designed.

Paintings. In 1508, he was ordered to paint the Vatican chambers. He disliked the commission but produced the frescoes of the "Prophets and Sibyls" and the "History of the Creation and Fall of Man." He returned to Florence in October 1512, and, in 1513, his patron, Julius II, died.

During the pontificate of Adrian VI and part of that of Clement VII, beginning about 1524, Michelangelo was engaged on the Laurentian Library and the Medici Chapel in San Lorenzo and on the famous Mausoleum where are the celebrated allegorical figures of "Night" and "Day."

There is no evidence of Michelangelo's presence in Rome between 1513 and 1525. Part of his time was devoted to improving the fortifications of Florence, used against Pope Clement VII in 1529. The city surrendered in 1530, and afterward the artist went to Rome. In 1533 he was commissioned to adorn the Sistine chapel and accordingly began his famous fresco of the "Last Judgment," which was completed in 1541.

Architecture. After this time, Michelangelo produced no great works in painting. He was chiefly employed in architecture, having become architect of Saint Peter's in 1547. By the touch of his genius, this edifice was converted from a mere Saracenic hall into the most superb model of a Christian church.

Cosmo de'Medici made Michelangelo vice president of the Academy of Florence in 1563. The great artist, without remuneration, devoted the remainder of his life to the Church. He carried forward at Rome the Palazzo Farnese, rebuilt an old bridge across the Tiber, converted the baths of Diocletian into the magnificent church of Santa Maria degli Angeli, and superintended the construction of Saint Peter's as far as the dome.

Genius. Whether as painter, sculptor, or architect, he succeeded in uniting magnificence of plan and endless variety of parts with the utmost simplicity and breadth. In his Sistine frescoes, he was the inventor of epic painting. In his "Cartoon of Pisa," he personified motion. His "Last Judgment" exhibits a powerful portrayal of every passion

that sways the human heart. Consummate mastery of artistic expression enabled him to surmount the greatest difficulties with the appearance of perfect ease. His sonnets rank in lyric quality with the poetry of Dante. He was buried at Florence. See *Painting, Sculpture.*

Michelson (*mī'kĕl-sŭn*), **Albert Abraham (1852-1931),** American physicist, was born at Strelno, Germany. He was graduated from Annapolis, 1873, and became midshipman in the United States navy. After teaching in the United States Naval Academy, 1875-79, and serving on the staff of the *Nautical Almanac*, Washington, 1880, he studied at Berlin, Heidelberg, and Paris. After his return, he was professor of physics at the Case School of Applied Science, Cleveland, 1883-89, and at Clark University 1889-92. In 1892, he was made professor and head of the department of physics in the University of Chicago.

Michelson determined the velocity of light with a high degree of accuracy and invented an interferential refractometer, making it possible to express linear standards of measure in terms of wave lengths of light. His echelon spectroscope and improved engine for constructing diffraction gratings were also notable achievements. In 1907, he was awarded the Nobel prize for physics. His writings include *Light Waves and Their Uses.*

Michener, James Albert (1907-), American writer, was born at New York City. After he was graduated from Swarthmore College in 1929, he spent several years studying abroad and then took up teaching. He later worked in the editorial department of a New York book publishing house. During World War II, he served with the U.S.N.R. in the South Pacific. His *Tales of the South Pacific* (1947) won him the Pulitzer prize and was the basis of the Rodgers and Hammerstein musical comedy *South Pacific* (1949). This was followed by *The Fires of Spring* (1949), *Return to Paradise* (1951), *The Voice of Asia* (1951), *The Bridges at Toko-Ri* (1953), *Sayonara* (1954), *Floating World* (1955), and *The Bridge at Andau* (1957).

Miles, Nelson Appleton (1839-1925), American army officer, was born in Westminster, Mass. At the outbreak of the Civil War, he was engaged in mercantile pursuits in Boston, Mass. He entered service as first lieutenant of volunteers in 1861 and distinguished himself at the battles of Fair Oaks and Malvern Hill. In 1862, he was commissioned colonel and led his regiment at Fredericksburg and at Chancellorsville, where he was severely wounded. He commanded a brigade in the Richmond campaign; was promoted brigadier general, 1864; and was brevetted major general for gallantry. At the close of the war, he was commissioned colonel of United States infantry.

Miles succeeded Schofield as commander of the United States army in 1895. In July 1898, he assumed personal command of the army around Santiago, Cuba. On the reorganization of the army in 1901, he was promoted to the grade of lieutenant general. Upon reaching the age limit in 1903, he retired from the army.

Milhaud (*mē' yō'*), **Darius (1892-),** French composer, was born at Aix-en-Provence. He studied at the Paris Conservatory, 1910-15, and then served as cultural attaché at the French legation in Rio de Janeiro under the poet-diplomat Paul Claudel, who subsequently wrote librettos for several of Milhaud's dramatic compositions. Upon his return to Paris, he joined the "modernistic" group known as "Les Six," and soon achieved fame as one of France's greatest creative composers. Compelled to leave France in 1940, he became professor of composition at Mills College, Oakland, Calif., where he has since resided and taught. His numerous works include 4 symphonies, 18 string quartets, 15 ballets, 12 operas, and 8 sonatas, besides many other compositions.

Mill, James (1773-1836), British economist, philosopher, and historian, was born near Montrose, Scotland. Educated at the University of Edinburgh, he became editor of the *Literary Journal* and wrote for various periodicals, chiefly on economics, in which field he became a principal exponent of the utilitarian school. His *History of British India* brought him a permanent position with the East India Company. He wrote *Elements of Political Economy* mainly to educate his son, John Stuart Mill. His older works include *Liberty of the Press, Law of Nations,* and *Analysis of the Human Mind.*

Mill, John Stuart (1806-1873), English philosoper and economist, son of James Mill, was born in London. He was educated at home by his father. In 1820, he went to France, made himself master of the French language, and occasionally attended public lectures on science. In 1823, he entered the India house as a clerk in the examiner's office, where his father was assistant examiner. For 33 years, he continued in the service of this company and rose gradually until he became head of the political department.

His first publications consisted of articles in the *Westminster Review.* He took an active part in the political discussions that followed the revolution of 1830 in France and in the Reform Bill movement in England. From 1836 to 1840, he was editor of the *London and Westminster Review,* in which many of his articles appeared.

Mill established his reputation in 1843 by the publication of *A System of Logic, Ratiocinative and Inductive,* the success of which paved the way for the *Principles of Political Economy.* His later works include *Essay on Liberty, Examination of Sir William Hamilton's Philosophy,* and *The Subjection of Women,* in which he supported what has been popularly termed the "woman's rights movement." His influence was on the side of humanitarianism. He was one of the most successful popularizers of economics of his or later days. He wrote also *Auguste Comte and Positivism, Utility of Religion,* and *Theism.*

Millais (*mĭ-lā'*), **Sir John Everett (1829-1896),** English painter, was born at Southampton. He studied at the Royal Academy, where he won many prizes, including a gold medal in 1847. In 1848, he became associated with Rossetti, Holman Hunt, and others in forming the pre-Raphaelite brotherhood of artists.

His paintings, which include landscapes, portraits, and genre pictures, are vigorous in style and brilliant in color. Among his portraits, which are noted for masterly characterization, are those of Gladstone, Lord Beaconsfield, Carlyle, John Bright, Irving, and Tennyson. His better-known pictures include "Chill October," "The Vale of Rest," "Dew-Drenched Furze," "Eve of St. Agnes," "Effie Deans," "The Blind Girl," all in British galleries; and "Portia" and "The Bride of Lammermoor," in the Metropolitan Museum, New York.

Millay, Edna St. Vincent (1892-1950), American poet, was born at Rockland, Me. Her childhood was spent in Camden, Me. Her ability attracted the attention of a stranger, who sent her to Vassar College. She was graduated in 1917 and then lived in Greenwich Village, New York, writing poetry and taking part in plays. Her first volume of verse, *Renascence and Other Poems,* was published in 1917. *The Harp Weaver and Other Poems* won a Pulitzer prize in 1923. She married Eugen J. de Boissevain the same year. *The King's Henchman,* an opera performed first with great success in 1927, was written by Miss Millay. Her other books of poetry, lyrics of sustained emotional power, include *The Buck in the Snow, Fatal Interview,* and *Conservation at Midnight.* She was elected to the American Academy of Arts and Letters in 1940.

Miller, Hugh (1802-1856), Scottish geologist, was born at Cromarty. From the age of 16 to 31 he worked as a stonemason, devoting the winter months to writing, reading, and natural history. In 1829, he published *Poems Written in the Leisure Hours of a Journeyman Mason,* followed in 1835 by *Scenes and Legends of the North of Scotland.* From 1834 to 1840, he was a bank accountant. He was then invited to Edinburgh to edit the *Witness,* a religious paper through whose influence he became founder, though not a member, of the Free Church of Scotland. In its columns he published a series of popular geological articles afterwards collected as *The Old Red Sandstone* which won him a high scientific reputation. He endeavored to reconcile geology with the Mosaic account of creation. His mind failed, and he took his life.

Miller, Joaquin (1841-1913), pen name of Cincinnatus Heine Miller, American poet, who was born in Indiana. He became a miner in California; lived among the Indians; was an express messenger; practiced law in Oregon; and edited a paper, which was suppressed for disloyalty. From 1866 to 1870, he was a county judge in Oregon. After serving as journalist in Washington, he visited London, where he published his *Songs of the Sierras* in 1871 and became a social celebrity. Finally, he settled at Oakland, Cal., making his home a feature of the city.

Among his numerous writings are *Songs of the Sunlands, Songs of the Mexican Seas, Shadows of Shasta, The Ship in the Desert, Life among the Modocs, The One Fair Woman* and *True Bear Stories.* His play *The Danites,* dramatized from his novel *The Danites in the Sierras,* met with considerable success. In compliance with his desires, his body was cremated and the ashes were taken up into the Sierras and scattered to the winds.

Millerand (*mēl'răN'*), **Alexandre (1859-1943),** French statesman, was born in Paris. Entering politics, he became a Radical Socialist leader and, in 1885, was elected to the Chamber of Deputies. Later he edited *The Voice* and *The Little Republic,* both Socialist organs. Severing his connection with the Socialist party, he served as minister of public works, 1909-10, and as minister of war, 1912-15. Following the retirement of Clemenceau in 1920, he was chosen premier. Upon the resignation of Deschanel, Millerand was elected president of France, Sept. 23, 1920, for the remainder of the unexpired term, 1920-27. He resigned in 1924, however, yielding to criticism of his support of the national *bloc*—an act of partisanship inconsistent with the traditions of the presidency. He was elected senator in 1925.

Milles, Carl (1875-1955), Swedish sculptor, studied under Rodin and became professor of modeling at the Royal Academy in Stockholm. At first meeting with disapproval because of the distortions and grimaces of his gigantic figures, he gradually won recognition as the power and suppressed energy of his statues was appreciated. He took up his residence in America in 1927. Among his works are "The Meeting of the Waters" at St. Louis, Orpheus Fountain in Stockholm, Diana and Triton fountains in Chicago, and a colossal Peace Monument with Indian motif in the St. Paul City Hall.

Millet (*mĭl'ĕt*), **Francis Davis (1846-1912),** American painter, illustrator, and author, was born at Mattapoisett, Mass. He was graduated from Harvard in 1869 and studied art at the Royal Academy at Antwerp and also in France and Italy. As an artist he is most widely known for his mural paintings, the most noted of which is "Evolution of Navigation," in the Customhouse at Baltimore. Other important mural decorations are in the Cleveland Post Office, the Minnesota State Capitol, and the Supreme Court at Madison, Wis. Among his chief easel pictures are "A Cozy Corner" and "An Old-Time Melody," in the Metropolitan Museum, New York; and "Between Two Fires," in the Tate Gallery, London. He was a member of the American Academy of Arts and Letters. His books include *Capillary Crime and Other Stories*, *The Danube*, and *The Expedition to the Philippines*. He was drowned on the *Titanic*.

Millet (*mē'lĕ'*), **Jean François (1814-1875),** French artist, the greatest of all painters of peasant life, was born in the village of Gruchy. He first worked as a farm laborer, but his taste for painting was so evident that he was sent to study with Mouchel, a painter in Cherbourg. Mouchel induced the town authorities to grant his pupil an annuity to help him in his studies. Millet afterward went to Paris and studied with Delaroche. He painted small pictures, portraits, and signboards to support himself.

In 1849, Millet settled in Barbizon near the forest of Fontainebleau. He lived here much like the peasants and began his work of painting the peasant life of France, which he depicted with great simplicity, dignity, and truth. Millet was a friend of Rousseau, Corot, Troyon, Dupré, Daubigny, Diaz, and other noted masters of the Barbizon school, which has exercised a great influence upon modern painting. His most widely known work, "The Angelus," now in the Louvre, Paris, was sold for over $100,000. "The Gleaners," one of his best paintings, and some 20 other works are also in the Louvre.

Among the important works of Millet owned in the United States are "The Sower" and the "Knitting Lesson," in the Metropolitan Museum, New York; "A Shepherdess Seated," "Harvesters Resting," and portrait of himself, Boston Museum of Fine Arts; "Potato Harvest," "Sheepfold," "Breaking the Flax," and others in the Walters Gallery, Baltimore; "Bringing Home the Calf" and "Women Feeding Chickens," Art Institute, Chicago; and the famous "Man with the Hoe," in the San Francisco Museum. See *Painting*.

Millikan, Robert Andrews (1868-1953), American physicist, was born at Morrison, Ill. He was educated at Oberlin College and Columbia, Berlin, and Göttingen Universities. In 1896, he was appointed on the faculty of the University of Chicago and rose by 1910 to the position of professor of physics there. In 1921, he was made director of the laboratory of physics at the California Institute of Technology, Pasadena.

Millikan performed experiments establishing the electrical nature of the electron and he determined its electrical charge with an accuracy that had never before been approached. For his achievements in this field, he was awarded the Nobel prize for physics in 1923. He subsequently detected a cosmic radiation of great penetrating power, named for him the Millikan ray. His interest in reconciliation of science and religion appears in his *Evolution of Science and Religion*.

Miltiades (*mĭl-tī'ă-dēz*), **(c.540 B.C. -489 B.C.),** Athenian general. Forced by Darius to flee from the Chersonese, of which he had become tyrant, he took refuge in his native city, Athens. On the second Persian invasion of Greece, he was chosen one of the ten generals. He particularly distinguished himself by the great victory which he gained over the Persians at Marathon, 490, with a small body of Athenians and 1000 Platæans. For his failure in an expedition which he led against Paros, he was fined 50 talents, which he was unable to pay. He was accordingly thrown into prison, where he died.

Milton, John (1608-1674), English poet and publicist, was born in London. His education, begun under a private tutor of Puritanical opinions, was continued at Saint Paul's School, London, from his 15th year. A love of letters was early instilled into him, and he delighted in poetical reading and the study of both modern and ancient literature. When 16, Milton entered Christ's College, Cambridge, and he received his degree of bachelor of arts in 1629. He composed several odes and elegies in this period, among which stands his noble "Hymn on the Morning of Christ's Nativity."

Early Poems. In 1632, he went to his father's house at Horton, where he lived for five years. Here he studied Spenser and Shakespeare, read the classics, and became a great admirer of Italian poetry. His *Masque of Comus* was acted at Ludlow Castle at Michaelmas, 1634, and, in 1637, "Lycidas" was written, "L'Allegro" and "Il Penseroso," among the most beautiful of descriptive poems, were produced in these years of calm and pleasant solitude.

Life Abroad. In 1638, Milton's father gave him money to visit the continent, where he remained 15 months. In Paris, he made the acquaintance of Grotius, the celebrated founder of international law; in Florence, he passed readily into literary society, where he became known for the skill of his Italian verses; at Arcetri, he visited Galileo; Rome and Tuscany nourished his classic predilections and his sense of beauty in form. News of the outbreak of disturbances in England caused him to return home, and, after some time spent in Geneva, he reached England in August 1639 and took up his residence in London.

Political Tracts. In the following 20 years of civil war and political unrest in England, Milton wrote no poetry, but he contributed keen polemical writings to the struggle. These are singularly able and entitle him to a place among the most eloquent writers of English prose. In 1644, his treatise *Of Education* expressed views tending to utopianism; this same year, he published his greatest prose work, an appeal against all parties in behalf of freedom of the press, entitled *Areopagitica: a Speech for the Liberty of Unlicensed Printing*.

In 1649, Milton was appointed secretary for foreign tongues to the Council of State. He was completing, in 1652, two books in Latin designed for circulation abroad as a defense of the people of England, when he became totally blind. His blindness, though it incapacitated him for regular official business, left him able to perform public duties, and he drew up several controversial treatises for Cromwell during the last years of the Commonwealth.

Later Works. At the Restoration in 1660, two of Milton's books were publicly burned, and his arrest was ordered; but this only consigned him to an obscurity that gave him full leisure to write his *Paradise Lost*. This he completed about 1665, and it immediately commanded a large sale. It has taken its place in literature as the greatest epic poem in the English language. Milton next published his *History of England*, and, in 1671, his *Paradise Regained* and *Sampson Agonistes* appeared. His literary labors closed in 1674 with a treatise *On Logic* and another, *Of True Religion*.

Domestic Life. Milton was thrice married; in 1643, to Mary Powell; in 1656, to Catharine Woodcock; in 1663, to Elizabeth Minshull. His domestic relations were not of the happiest, partly, perhaps, because of his explosive temper and his Puritanical austerities. By his first wife he had three daughters.

Genius. Milton enriched the world with many of its noblest images and sentiments. Like Dante and Virgil, Milton was a prophet of social regeneration. The originality of his *Paradise Lost* and its sublimity of conception become increasingly impressive. Since Dante, there has been no such approach to the ideal epic of humanity. See *Paradise Lost*.

Mirabeau (*mē'rà'bō'*), **Gabriel Honoré Riqueti, Count de (1749-1791),** French orator and statesman, was born at Bignon, near Nemours. He was endowed with an athletic frame and extraordinary mental abilities, but was of a fiery temper and disposed to every kind of excess. When the States-General was convened in 1789, he sought to be elected a representative of the nobles of Province, but was rejected and, like Marius in ancient Rome, left them with the threat that he would overthrow the aristocracy.

He offered himself as a candidate to the Third Estate; was enthusiastically returned both at Aix and at Marseilles; and, by his talents and oratorical powers, soon acquired great influence in the States-General and the National Assembly. To suppress insurrection, he effected, in 1789, the institution of the national guard. In 1790, he was elected president of the club of the Jacobins and, in 1791, of the National Assembly. His bold and brilliant career was cut short by his death.

Mistral (*mēs'tràl'*), **Frédéric (1830-1914),** French poet, was born at Maillane. He attended school at Avignon and began preparation for the law at Aix, but soon decided to devote his growing powers to the creation of a literature in Provençal. In 1859, the appearance of his *Mirèio*, a pastoral poem, brought him national fame. He continued to write lyrics, fantasies, and pastoral and dramatic poems, by which he elevated Provençal to the dignity of a literary language. In 1904, he was awarded the Nobel prize for literature with José Echegaray.

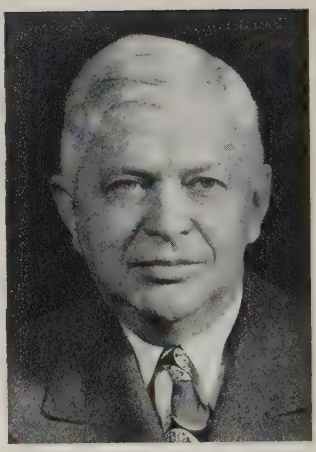
Mitchell, Donald Grant (1822-1908) "Ik Marvel," American novelist and essayist, was born at Norwich, Conn. He was graduated from Yale, 1841, and studied law. He

Winter, East Liverpool, Ohio CHARLES BURCHFIELD
Courtesy The Albright Art Gallery, Buffalo, N. Y.

American Landscape CHARLES SHEELER
Collection of the Museum of Modern Art, New York Gift of Mrs. John D. Rockefeller, Jr.

Thomas J. Watson, Jr., joined the International Business Machine Company in 1937 after graduating from Brown University. Served as a lieutenant colonel in the Air Force during World War II. He is now president of I. B. M.

George Eastman, philanthropist and formerly president of Eastman Kodak Company of Rochester, New York. He is credited with inventing the "kodak." Died in 1932, but during his lifetime donated more than 54 million dollars to the University of Rochester.



Charles E. Wilson joined General Motors Corporation in 1919 as engineer and sales manager. Made executive vice president in 1939 and president in 1941. He resigned the presidency to accept the appointment as Secretary of Defense in 1953.

BUSINESS MEN

Right Juan T. Trippe, a Yale graduate (1920) and a Navy pilot during World War I. He organized the Long Island Airways before 1923. With Cornelius Vanderbilt Whitney founded the New York Airways and in 1927 started Pan American Airways and became president of the system in 1930.

Right below Walter P. Chrysler was president of the Buick Motor Car Company in 1916. He founded the Chrysler Corporation in 1923, when Buick became a part of General Motors.

Below Benjamin F. Fairless, formerly president of United States Steel Corporation. He was graduated from Ohio Northern University in 1912 and was first employed by the Wheeling & Lake Erie Railroad Company as a civil engineer.

was consul at Venice, 1853, and, in 1855, settled on his farm, "Edgewood," near New Haven. His best-known works are the volumes of sentimental essays entitled *Reveries of a Bachelor* and *Dream Life*. These gained his election to the American Academy of Arts and Letters in 1908. See *Reveries of a Bachelor*.

Mitchell, James Paul (1902-), American government official, was born in Elizabeth, New Jersey, where he was graduated from Battin High School. He has had wide experience in the field of personnel management and industrial relations both in private industry and in government work. Before World War II he was personnel and training director of the Western Electric Company's plant in Kearny, New Jersey, and during the war had charge of the industrial personnel division of the U. S. Army Engineering Corps. From 1945 to 1947 he was personnel director of R. H. Macy's department store in New York, and was then made vice president of Bloomingdale's department store. In April 1953 President Eisenhower appointed him assistant secretary of the army in charge of manpower and reserve affairs. Then in October 1953 he was appointed secretary of labor to succeed Martin P. Durkin.

Mitchell, John (1870-1919), American labor leader, was born at Braidwood, Ill. He received a common school education, later read law one year, and privately made a special study of economic questions. He began work in coal mines, 1882, and, as worker or labor leader, continued to be identified with mines and mining.

His official connection with the united mine workers of America began in 1895 and, from 1899 to 1908, he served as president of that organization. He directed the strikes of the anthracite miners in 1900 and 1902 and was a vice president of the American Federation of Labor, 1898-1914.

With Gompers and Morrison, he was involved in the famous Buck Stove case and, in 1908, by virtue of an injunction was adjudged in contempt of court and was sentenced to imprisonment. However, the entire case was dismissed upon appeal to the United States Supreme Court. The outcome began the movement against the employment of injunctions in labor cases which resulted in the Norris-LaGuardia Act of 1932.

Mitchell, Maria (1818-1889), American astronomer, was born at Nantucket, Mass. She assisted her father, William Mitchell, in his work in astronomy and soon became fitted to make investigations herself. In 1847, she was awarded a gold medal by the king of Denmark for the discovery of a comet. She was employed in observations connected with the coast survey and in compiling the *Nautical Almanac*, and was the first woman to become a member of the American Academy of Arts and Sciences. From 1865 to 1888, she was professor of astronomy at Vassar College. She was elected to the American Hall of Fame in 1905.

Mitchell, Margaret (c. 1900-1949), (Mrs. John R. Marsh), American novelist, was born in Atlanta, Ga., where she began her writing career as a reporter and feature writer with the Atlanta *Journal*. Owing to an ankle injury, she gave up journalism and spent ten years writing her only novel, *Gone With the Wind*, which was published in 1936. Dealing with the Civil War and the Reconstruction periods, it became the most successful novel of the present century, selling more than 8 million copies, including translations into many languages. The film version (1939) also proved enormously popular, grossing over $40 million. Margaret Mitchell died of injuries received when she was run down by an automobile.

Mitchell, Silas Weir (1829-1914), American physician, poet, and novelist, was born in Philadelphia, Pa. He was educated at the University of Pennsylvania and was graduated from Jefferson Medical College, 1850. He established a practice in Philadelphia and became prominent as a physiologist and especially as a neurologist, devising a system of rest treatment now widely adopted throughout the world.

During the Civil War, he turned his attention to literature and achieved eminence as a man of letters, producing his literary works are *Hephzibah Guiness*, *Hugh Wynne*, *The Autobiography of a Quack*, *Dr. North and His Friends*, *Youth of Washington*, and *Complete Poems*.

Mitchell, William (General "Billy" Mitchell) (1879-1936), American air force officer, was born at Nice, France, of American parents. He began his military career in 1898 when he enlisted in the U.S. army as an infantry private. He served in the Spanish-American War, in the Philippines, and in World War I, rising to the rank of brigadier general in 1920. During World War I, he was chief of the Air Service of the Allied armies in Europe. A bold advocate of strong air power, his outspoken criticism of the air policy of the U.S. army and navy led to his being court-martialed in 1925 and his suspension from the service for 5 years. He resigned from the army in 1926. Many of General Billy Mitchell's prophesies concerning military aviation came true, and in 1945 Congress posthumously awarded him the Medal of Honor.

Mitropoulos (*mē-trō'pōō-lŏs*), **Dimitri (1896-),** conductor, pianist, and composer, was born in Athens, Greece. He studied music in Greece, Belgium, and Germany, and was guest conductor of many European orchestras before coming to the United States in 1936. He was director and conductor of the Minneapolis Symphony Orchestra from 1937 to 1949, and then joined the New York Philharmonic Symphony Orchestra of which he has been permanent conductor since 1950.

Modigliani, Amadeo (1884-1920), Italian artist, who painted in Paris, was born in Leghorn, Italy, and went to Paris in 1906. Cubism and African art influenced him at first, but then he evolved a style, supported by technical brilliance, that produced timelessly beautiful paintings, especially portraits. Modigliani died of tuberculosis in Paris, and it was only after his death that his aesthetically distorted pictures received any appreciation. At times, Modigliani seems to have used the elongations of El Greco to combine with his serene modern settings.

Modjeska (*mŏ-jĕs'kä*), **Helena (1844-1909),** (Mme. Chlapowski, née Opido), actress, was born in Krakow, Poland. She made her debut in Bochnia, 1861, and soon became a leading actress in her native country. Her first appearance in English drama was in *Adrienne Lecouvreur* at San Francisco, 1877, after which she made a tour of the United States and England. She returned to America and gained foremost rank as a tragic actress.

Modjeski (*mŏ-jĕs'kē*), **Ralph (1861-1940),** American bridge builder, was born at Krakow, Poland, the son of the celebrated actress Modjeska. He changed his name to Modjeski for purposes of naturalization. He came with his mother to America when he was 15 years of age; was educated at Paris and the University of Illinois; and became consulting bridge engineer at Chicago in 1892. The bridges designed by him include the Northern Pacific Railway bridge at Bismarck and the Columbia River bridge at Celilo, Oregon. He was also on the board of engineers for the reconstruction of the Quebec bridge and chief engineer for the Delaware River bridge at Philadelphia.

Mohammed, or **Mahomet (c. 570-632),** the founder of the religion of Islam, commonly called Mohammedanism, was born at Mecca, Arabia. He first gained his livelihood by tending the flocks of his uncle Abu Talib, who had adopted him at an early age and with whom he later made trading journeys to southern Arabia and Syria. In his 25th year, he took service, probably as a camel driver, with the rich widow Khadija, who married him in 595. For some time he carried on a trade as merchant in Mecca.

Religious Conditions of Arabia. At this time, no central government had been established in Arabia, and various tribes, partly nomad, partly sedentary, held sway over ill-defined districts. A certain unity was maintained by language and custom and by mercantile and religious pilgrimages. From time immemorial, the city of Mecca had been sacred to these peoples. Jews, Christians, and Magi, mingling with innumerable Oriental worshipers, all congregated in Mecca at stated times. Mohammed was thus familiarized with the religious ideas prevailing then in southwestern Asia.

Mohammed's Mission. Mohammed was in the habit of withdrawing from his usual occupation to a cave, where he remained alone for hours, wrapped in thought. When 40 years of age, at the mountain of Hira near Mecca, he had the first of a long series of visions that convinced him of being the special messenger of God.

When his mission in life was thus revealed to him, Mohammed began to announce the eternal rewards awaiting those who pleased God by prayer and righteousness and the eternal punishments in store for those guilty of murder, theft, adultery, dishonesty, luxury, and other sins. By obedience to his message, each one might attain to *islam*, that is, the perfect surrender of the will to God. God's mercy was principally to be obtained by prayer, fasting, and almsgiving. The pilgrimage to Mecca was recognized by the new creed. He did not preach openly at first. His earliest revelation was communicated only to his family and one friend, Abu Bekr, and by the fourth year of his mission, he had made but 40 proselytes.

Persecution and Conflict. Mohammed's contravention of tribal and religious customs and beliefs gradually awakened opposition against the new prophet and against his adherents. He emigrated to Taif, from which he soon barely escaped with his life. With his loyal followers he went to Medina about 622. From this memorable migration, called the hegira, dates the origin of Islam and of the Mohammedan era. At Medina, Mohammed became the head of a civil community, which he ruled as a theocracy. He went to war with the enemies of Islam, especially the Meccans. With the aid of his allies, the Chuzaites, Mohammed took Mecca in 630 and was publicly recognized as chief and prophet. With this recognition, the victory of the new religion in Arabia was assured.

MOHAMMEDANISM. Toward the end of the 10th year of the hegira, he undertook, at the head of at least 40,000 Moslems, his last solemn pilgrimage to Mecca, and there on Mount Arafat, he instructed them in all the important laws and ordinances of the faith. The ceremonies observed by him on that occasion were fixed for succeeding ages.

Mohammed was prophet, teacher, legislator, and conqueror. When he died, unbelievers were brought to the faith by force of arms. A vast empire bowed before the shibboleth, "Koran, tribute, or sword." Islamism was later checked in the West by Charles Martel and in the East by Leo the Isaurian.

Mohammed's whole religious system is embodied in the *Koran*, which is the standard of faith as well as the basis of Mohammedan law. This book is made up of the successive revelations received by Mohammed through a series of years. The confession of faith of a Moslem serves as the summary of his religion,—"There is no God but the true God, and Mohammed is His messenger."

Moissan (*mwá'sĂN'*), **Henri (1852-1907),** French chemist, was born in Paris. Educated at the Museum of Natural History, he became professor of chemistry at the Sorbonne. He is best known for his success in obtaining the element fluorin in the free state, which he accomplished by electrolysis, and for his development of the electrical furnace for producing high temperatures. He melted and volatilized many substances previously considered infusible and prepared numerous new compounds, particularly carbides, silicides, and borides. From these results he was led to undertake the artificial preparation of the diamond and succeeded in making minute specimens. In 1906, he was awarded the Nobel prize for chemistry.

Molière (*mô'lyâr'*), **(1622-1673),** is the stage name of Jean Baptiste Poquelin, greatest of French dramatists. He was born in Paris. His father, Jean Poquelin, who was purveyor of furniture to the royal court, trained the boy to follow his trade of upholsterer. He was, however, further educated, 1636-41, at the Jesuit College at Clermont, where he studied philosophy under the famous Gassendi. Upon the illness of his father, he pursued the family trade in the household of Louis XIII. He followed the king in his journey to Narbonne in 1642 and saw there the French Theater as it was emerging from neglect and flourishing under the talents of Corneille and the patronage of Richelieu. A passion for the stage awoke in him and became so insistent that he quitted his employment, assumed the name of Molière, and joined a society of young men devoted to theatrical pursuits.

EARLIER SUCCESSES. For the next few years, Molière wandered in the provinces, an active actor-manager and playwright. In 1653, his first regular comedy, *The Giddy-Head*, played by his troupe at Lyons, won a great success by the wit and skill of its dialogue. The next year, in Languedoc, he produced *The Loving Spite*.

In 1658, Molière and his company received the patronage of the court in Paris. Molière already possessed a reputation for great power of invention and for skill in dramatic construction. His troupe became known as the "King's comedians," and, for his remaining 15 years, Molière labored incessantly as a player and dramatist under the marked favor of Louis XIV. His first great Paris success, *The Affected Misses*, was a keen satire on the ridiculous pedantry of the women in the literary salons. In this play we see Molière at his best, in the satiric comedy of manners.

For types of character, Molière now needed but to study the world before him. Although he occasionally fell back on farces in the manner of Plautus and the Italian comedy and wrote extravaganzas for court pleasures, these were only interludes in his career. His particular forte was in submitting contemporary customs and manners to a penetrating analysis and imparting to his characters vitality, wit, and realism.

GREATEST DRAMAS. Within the next few years, Molière wrote *The School for Husbands*, *The Bores*, and *The School for Wives*. The truth with which he depicted the frailties of women is sometimes ascribed to his unfortunate marriage, in 1662, at the age of 40, to 18-year-old Armande Béjart, an actress. In 1666, Molière produced *The Misanthrope*, one of his best plays. As a comedy it has less interest than *The Hypocrite*, produced in 1667, which is generally considered his greatest drama.

Then followed in 1668 *The Miser* and, in 1670, *The Simple Gentleman* and *The Cheats of Scapin*. Absurd affectation of learning is satirized ingeniously in *The Learned Ladies*. His last play, *The Imaginary Invalid*, exposed quackery in the medical profession.

CHARACTER AND GENIUS. Molière's conduct in public affairs was honorable and manly. He was devoted to his professional comrades and sincere in his friendship with Corneille, Racine, Boileau, and the nobles who were glad to place his genius on a level with their affluence and rank.

Molière was much greater as a dramatist than as an actor. His work is marked by the profound study that he devoted to every type of folly, affection, and hypocrisy that beset his age. His characters are strong types rather than individuals, and his conceptions lack mystery and beauty. On the other hand, his gift for immortalizing various types of character, his creative art, and his knowledge of men and their motives make him unique in comedy. He died following a convulsion which siezed him on the stage when playing *The Imaginary Invalid*. A monument to him is to be seen in the cemetery of Pére Lachaise, Paris. See *Literary Plots, Characters, and Allusions* under titles of chief works.

Molotov (*mô'lŭ-tŭf*), **Vyacheslav Mikhailovich (1890-),** Russian statesman. He organized Bolshevik student groups before the Russian Revolution in 1917, after which he held party posts in Leningrad and Gorki. In 1921, he was secretary of the Communist party. In 1930, he was president of the Soviet of People's Commissars, the body which performs the function of economic planning and control. He was transferred to the office of foreign commissar in 1939 in place of Litvinov, the transfer marking a reorientation in Russian policy and being followed by a treaty with Germany. After the German attack on Russia, Molotov negotiated a 20-year treaty alliance with Britain in 1942, and co-operated with the Allies. After the surrender of Japan, his policies became antagonistic to the Western powers. As foreign minister he opposed world agreement. He was replaced in 1949 by Andrei Vishinsky, but on the death of Stalin in 1953 again became foreign minister. In 1956 he was succeeded by Dmitri Shepilov, but remained as First Deputy Premier.

Moltke (*môlt'kĕ*) **Helmuth Karl Bernhard, Count von (1800-1891),** German general, was born in Parchim. He was graduated from the Military Academy at Copenhagen, 1818, and entered the Prussian service in 1822. In 1835, he went to Turkey; remained there several years; and took part in the campaign of the Turks in Syria against the viceroy of Egypt. He became lieutenant general of the Prussian army, 1859, and drew up the plans of the campaigns against Denmark, 1864, and Austria, 1866. He was commander in chief of the Franco-Prussian War, 1870-71, and to his brilliant strategy are ascribed the splendid victories of the German arms. In recognition of his service to the nation, he was created count in 1870 and field marshal of the German Empire in 1871.

Mommsen (*môm'zĕn*) **Theodor (1817-1903),** German historian and classical scholar, was born at Garding. He studied at Kiel, 1838-43; examined Roman inscriptions in France and Italy for the Berlin Academy, 1844-47; and, in 1848, was appointed to the chair of law at Leipzig, of which he was deprived two years later on account of the part he took in politics. In 1852, he became professor of Roman law at Zurich; in 1854, obtained a similar appointment at Breslau; and, in 1858, was made professor of ancient history at Berlin.

He edited the monumental *Corpus Inscriptionum Latinarum*; helped to edit the *Monumenta Germaniæ Historica*; and, from 1873 to 1895, was secretary of the Academy of Sciences. His greatest works are his *History of Rome* and *The Roman Provinces*. Freeman characterized Mommsen as "the greatest scholar of our times, well-nigh the greatest scholar of all times. . . . Language, law, mythology, customs, antiquities, coins, inscriptions, every source of knowledge of every kind—he is master of them all." He made important contributions to almost every field of classical learning. In 1902, he was awarded the Nobel prize for literature.

Monet (*mô'nĕ'*), **Claude (1840-1926),** French landscape painter, was born in Paris. While influenced by Courbet, Corot, and Manet, he formed his own style directly from the study of nature, endeavoring to depict the fleeting aspects of things and to reproduce effects of light and air without regard for elements of detail or composition. In 1874, he exhibited the painting entitled "Impression, Rising Sun," which suggested the name for the impressionist school, of which he was the leader.

After 20 years of struggle against ridicule and criticism, his artistic ideas were recognized and have since been influential in modern art. Among his characteristic pictures are "The Orchard," "The Sun in a Fog, Waterloo Bridge," and "Rouen Cathedral," all in the Luxembourg Museum, Paris. Representative works are found in the Walters Gallery, Baltimore; the Art Institute, Chicago; and other American collections.

Moneta (*mô-nā'tă*), **Ernesto Teodoro (1833-1918),** Italian journalist and peace advocate, was born in Milan. He took part in the Milan uprising of 1848; was a general staff officer in Garibaldi's army; and, from 1861 to 1867, served in the Italian army. From 1867 to 1896, he was director of the influential Milan newspaper *Il Secolo*.

About 1886, he began to advocate the cause of international peace and to form peace societies in northern Italy. He represented Italy in several peace congresses and was president of the International Congress at Milan in 1906. In 1903, he published *Le guerre, le insurrezione, e la pace nel secolo XIX*, in recognition of which he was awarded one-half of the Nobel peace prize in 1907.

Monroe, James (1758-1831), fifth president of the United States, was born in Westmoreland County, Va. He was educated at William and Mary College, served in the Revolutionary army; was present at several battles; and, in 1783, entered the General Congress as a delegate from his native state. In the Virginia convention, 1788, he opposed the adoption of the Federal Constitution and allied himself with the Republican (now Democratic) party, which party elected him to the United States Senate in 1790.

Four years later, he went to France as minister, but was recalled in 1796. He was governor of Virginia, 1799-1802. In 1803, as the associate of Livingston, he was dispatched on a special mission to negotiate for the purchase of Louisiana. In 1803, in England, and, in 1805 in Spain, he performed special diplomatic services for his country. In 1811, he was again governor of Virginia and, in the same year, became Secretary of State under President Madison.

In 1816, Monroe was elected president of the United States by the Republican party. The acquisition of Florida from Spain and the settlement of the vexed question of the extension of slavery by the Missouri Compromise helped his practically unanimous re-election in 1820.

President Monroe's most noteworthy acts include the recognition of the independence of Mexico and of the South American republics and the promulgation of what has since been called the "Monroe Doctrine." The period of his administration was known as the "era of good feeling." In 1825, he retired to his seat at Oak Hill, Loudoun County, Va., and later to New York, where he died. He was elected to the American Hall of Fame in 1930. See *Monroe Doctrine.*

Montagu (*mŏn'tà-gū*), **Lady Mary Wortley (1689-1762),** English poet and letter writer, eldest daughter of Evelyn Pierrepont, afterward Duke of Kingston. In 1712, she married Edward Wortley Montagu and, in 1716, accompanied him on his embassy to Istanbul. An account of this journey appeared in *Letters,* which established her reputation as a witty and brilliant writer. After her return to England in 1718, she shone conspicuously in the circles of talent and fashion, despite prejudice aroused by her attempt to educate the public to the advantages of inoculation against smallpox. Pope was among her friends, but he at length quarreled with her and satirized her and was satirized in turn. In 1739, she settled on the continent, remaining there until 1762, when she returned to England. Her letters are frequently scandalous and always amusing.

Montaigne (*mŏn-tān'*; F., *môN'tān'y'*), **Michel-Eyquem de (1533-1592),** French essayist, was born on the feudal estate of his father, Pierre Eyquem, in Perigord. As soon as he could speak, he was placed under the care of a German tutor, with whom he conversed entirely in Latin, learning Greek as a pastime and speaking no French. He became so familiar with Latin, the language of learning, that he was able, at 13 years of age, to complete his formal education in the College of Guienne at Bordeaux.

Having no taste for military life, Montaigne studied law and, from 1554, served as councilor in the parliament of Bordeaux. He went several times to court and enjoyed the favor of Henry II. Montaigne married Françoise de la Chassaigne when he was 33 years of age.

The cruelty and bloodshed of the religious wars filled Montaigne with distaste for public life, and he retired to his estate, resolved to spend the rest of his life in study. During this dismal period, he began his *Essays,* which were first published in March 1580 and won such immediate popularity that within a few years they had been read by nearly every man of education in France.

Shortly after the publication of the *Essays,* Montaigne undertook a journey for his health to Germany, Switzerland, and Italy, which he described in his *Journal of Travel.* While abroad, he was elected mayor of Bordeaux by the votes of the citizens, and he was subsequently honored with re-election. In 1586, he retired from office and returned to his estate. When, soon afterwards, the plague added to the miseries and difficulties with which he was surrounded, he became a wanderer with his family. In 1588, he went to Paris and engaged in vain attempts to reconcile Henry of Navarre and the Duke of Guise. Here he made the acquaintance of Mademoiselle de Gournay, whom he regarded tenderly as his adopted daughter and to whom his widow intrusted the task of publishing the first complete edition of his works.

His *Essays* have exercised an influence, particularly on French and English literature, greater perhaps than any other single modern book. An English translation of it by John Florio is the only book that Shakespeare is definitely known to have possessed. These essays range over every subject connected with human life and manners, and exhibit acuteness of thought combined with great depth of sympathy. Montaigne's merit is that, in an age of religious intolerance, he tried to build up a human morality and to lead man into the paths of justice, integrity, and forbearance, without appeal to supernatural fears.

Montcalm (*mŏnt-kăm'*) **Louis Joseph, Marquis de (1712-1759),** French general, was born near Nimes, France. He was commander in chief of the French troops in Canada, 1756-59. He captured Fort Ontario, Oswego, 1756, and Fort William Henry, 1757. He repulsed the British under Abercrombie at Ticonderoga in 1758; repelled Wolfe's attack on Quebec in 1759, but was defeated and mortally wounded in the battle of the Plains of Abraham, near Quebec, September 13th of the same year. By this defeat, France lost Canada, which then passed under the control of England.

Montesquieu (*mŏn'tĕs-kū'*; F., *môN'tĕs'kë'û'*), **Baron la Brede et de (1689-1755),** French publicist, was born of a noble family at the Chateau de la Brede near Bordeaux, France. While still a student, he collected a large mass of extracts from the civil law, which later formed the first part of his great work, *The Spirit of the Laws.*

In 1714, he became a councilor in the parliament of Bordeaux, and, in the following year, he married Mademoiselle de Lartigues. In 1716, he was made president of the parliament. In 1721, he published his *Persian Letters,* which, purporting to be from the pen of two Persians traveling in Europe, satirized the follies and vices of France. Although this small book appeared anonymously, its authorship was soon revealed. Its success was great, but, in 1728, Montesquieu altered some of the more offensive pages to facilitate his admission to the French Academy.

The years 1729-31 Montesquieu spent traveling in Hungary, Italy, Switzerland, Germany, the Netherlands, and England and made the acquaintance of many eminent men. Following these travels by a retirement of two years, he was able to give to the world in 1734 his *Considerations on the Causes of the Grandeur and Decadence of the Romans.*

He devoted the next 14 years to the preparation of *The Spirit of the Laws,* which appeared at Geneva in 1748. It found an audience immediately and ran through 22 editions in 18 months. The purpose of this book was to find in nature and history the explanation of the existing maxims and institutions of various nations, and to show how diversities in physical and moral circumstances have contributed to produce diversities in social institutions. He made answer to the charge of atheism in his *Defence of the Spirit of Laws.*

Montesquieu enjoyed his triumph quietly in La Brede. His extensive influence in France and Great Britain has been due to his genius for generalization, his sure instinct in political science, and his sincere desire for human improvement and happiness.

Montessori (*mŏn'tĕ-sō'rē*), **Maria (1870-1952),** Italian educator, received the degree of doctor of medicine from the University of Rome in 1894. As principal of a school for feeble-minded children, her success led her to apply similar principles and methods to the education of normal children. Her system stressed the freedom of the child. She became director of the Montessori Research Institute established at Barcelona in 1917 and in 1922 was government inspector of schools for Italy. Her most important works are *Pedagogical Anthropology* and *The Montessori Method.*

Monteverdi (*mŏn'tà-vâr'dē*) or **Monteverde, Claudio (1567-1643),** Italian composer, was born at Cremona. He introduced many innovations in musical composition; originated the monodic style; and, having produced the first operas of importance in *Arianna* and *Orfio,* is frequently called the founder of modern opera. From 1601 to 1612, he was chapelmaster at Mantua and, from 1613 until 1643, at San Marco in Venice.

Montgolfier (*mŏnt-gōl'fĭ-ĕr*; F., *môN'gôl'fyā'*), **Jacques Etienne (1745-1799)** and **Joseph Michel (1740-1810),** distinguished as the inventors of the balloon, were the sons of a paper manufacturer at Annonay, France. Etienne, after a few successful experiments with the balloon, went to Paris, where his discovery created a great sensation and was substantially recognized by Louis XVI. Joseph was elected to the institute in 1807. The parachute also is one of his inventions. See *Airship.*

Montgomery of El Alamein, Field Marshal Bernard Law Montgomery, Viscount (1887-), British general, was born in Ulster, Ireland. He served with distinction in World War I. As a major general in World War II he took part in the evacuation of Dunkirk. In 1942 he took command of the defeated British eighth army in Egypt. In the battle of El Alamein he defeated the Germans under Rommel, and pursued them 1500 miles to Tunisia. As general he led the Anglo-American invasions of Sicily and Italy. He commanded the British ground forces in the invasion of France, and the northern wing of the Allied army, with the rank of field marshal, in the invasion of Germany. After commanding the British army of occupation, he was made chief of the imperial general staff, and in 1946 was raised to the peerage.

Moody, Dwight Lyman (1837-1899), American evangelist, was born at Northfield, Mass. He became a Congregationalist and, from 1856, devoted himself to religious work in Chicago and elsewhere. During the Civil War, he

served on the Christian commission. His church and school at Chicago having burned in 1871, he went to England and succeeded in raising funds for rebuilding them. For many years Ira D. Sankey, the singer, was associated with him in a remarkably successful evangelical campaign. Moody established a school for Christian workers at Northfield, Mass., and a Bible Institute at Chicago.

Moody, Helen Wills (1906-), (Mrs. Aidan Roark), American tennis player, was born in Centreville, Calif. Her fabulous record of championships has never been matched or even approached. She studied art at the University of California, and her career as an artist has been eclipsed only by her fame as an athlete. Helen Wills Moody won her first Women's National Tennis Championship in 1923, and then went on to take it six more times. She won the National Singles seven times, the English Championship eight times, and the French Championship four times. Her most dramatic triumph was in 1935. After having to default to Helen Jacobs because of injury two years earlier, Helen Wills Moody came back to defeat Miss Jacobs at Wimbledon. She is the author of several books on tennis.

Moody, John (1868-), American financial analyst, was born at Jersey City, N. J. Educated in public schools, he engaged in newspaper work until 1890 and then was employed for 10 years by an investment banking house. Here he conceived the idea of supplying authoritative data to investors regarding securities. In 1900 he founded *Moody's Manual of Railroads and Corporation Securities*, which was followed in 1909 by *Moody's Manual*, analyzing securities. These services, supplying information to banks, insurance companies, brokers, and other interested parties, became standard equipment in the investment business. Similar services were published in England. Books from his pen include *The Truth about the Trusts*, *The Investor's Primer*, and *The Long Road Home*.

Moody, William Vaughn (1869-1910), American poet and playwright, was born at Spencer, Ind. After being graduated from Harvard, 1893, he taught English at Harvard and Radcliffe, leaving in 1895 to become instructor at the University of Chicago, where he was appointed assistant professor of English and rhetoric, 1901. His lyrical drama *The Masque of Judgment*, *Poems*, and *The Fire-Bringer* brought recognition which was greatly extended by his drama *The Great Divide*. Appearing in 1907, it took rank as one of the best American plays. He was elected to the American Academy of Arts and Letters in 1908.

Mooney, Edward (1882-), American prelate, was born at Mt. Savage, Md. He was ordained priest in 1909. After teaching in Cleveland, and holding a pastorate in Youngstown, Ohio, he was appointed apostolic delegate to India in 1926 and to Japan in 1931. He was made archbishop of Rochester in 1933, and archbishop of Detroit in 1937. He was created cardinal in 1946.

Mooney, James (1861-1921), American ethnologist, was born at Richmond, Indiana. He engaged in journalism, and in 1885 began a connection with the Bureau of American Ethnology lasting throughout his life. He studied chiefly the Indians of the South and the West, and prepared a large number of Indian exhibits. His publications include *Sacred Formulas of the Cherokees*, *Calendar History of the Kiowa Indians*, and *Cheyenne Indians*.

Moore, Henry (1898-), English sculptor, was born in Yorkshire. His bold and original creations adorn many a church, museum, park, and other public place in England and throughout the world. With no family artistic inheritance, Moore applied himself to sculpture at an early age and with his first exhibition showed his ability both to shock and to please art critics. Adventurous and searching, always trying to capture life's most vital and basic forms, Moore has been a profound student of geology and zoology and a brilliant experimenter in the use of wood, stone, marble, and metal as sculpturing media. His most famous and spectacular works are massive figures of women. Moore's sketches of Londoners sleeping in the Underground during World War II air raids are a moving evocation of embattled Britain, and were put in book form in 1944.

Moore, Sir John (1761-1809), British general, was born in Glasgow, Scotland. He served in the British army during the American Revolutionary War; in Corsica, 1793-94; and subsequently in Ireland, the Netherlands, Egypt, and Sicily. In 1798, he was made major general. On his return from an expedition in aid of Sweden, he was sent to Portugal in 1808 to command an army in co-operation with the Spaniards against the French. He was obliged to retreat from Salamanca to the sea; won the battle of Corunna in 1809; but fell during the action, dying at the moment of victory.

Moore, John Bassett (1860-1947), American publicist and authority on international law, was born in Smyrna, Del. He was graduated from the University of Virginia, 1880; studied law at Wilmington, Del.; and was appointed law clerk in the State Department. In 1886, he became third assistant secretary of state. In 1891, he was made professor of international law and diplomacy at Columbia University. He represented the government in various foreign missions and in 1913, became counselor to the Department of State, resigning in 1914 to resume his chair at Columbia. He was a judge of the Permanent Court of International Justice from 1921 to 1928 and a member of the Permanent Court of Arbitration at The Hague from 1912 to 1938. Besides many other books in his field, he wrote *Digest of International Law*, which became the standard authority.

Moore, Marianne Craig (1887-), American poet, was born in St. Louis, Mo. She is universally admired for the depth, wit, and precision of her works. Educated at Bryn Mawr, she taught at a U. S. Indian School at Carlisle, Pa. for four years. From 1921 to 1925, she was an assistant at the New York Public Library, and from 1925 to 1929, she was editor of the influential magazine, *The Dial*. Her first published work, *Poems*, was a collection made, unknown to her, by her friends, in 1921, which established her as an important poet. Other volumes have been *Observations* (1924), *Selected Poems* (1935), *Nevertheless* (1944), and *Collected Poems*, which won the Pulitzer prize for poetry in 1952. T. S. Eliot has said of Marianne Moore that she has created "part of the small body of durable poetry written in our time."

Moore, Thomas (1779-1852), Irish poet, was born at Dublin. He was graduated from Trinity College, Dublin, 1798, and, in 1799, went to London to study law, taking with him a translation of the *Odes of Anacreon*, which he published in 1800. In 1801 he published his juvenile poems as *The Poetical Works of the Late Thomas Little, Esq.*, a pseudonym suggested by his diminutive stature. In 1803, he was appointed registrar to the admiralty in Bermuda, but soon returned to England by way of the United States and Canada, leaving a deputy in charge. His deputy having embezzled funds for which he was responsible, he lived in Europe to escape imprisonment until he was able to satisfy the debt through proceeds of his writings. He then returned to England.

Meanwhile Moore had written the highly popular oriental poems *Lalla Rookh* and *Loves of the Angels*. His greatest and most enduring work, however, consisted of songs, which include "Oft in the Stilly Night," "Canadian Boat Song," and "Come, Ye Disconsolate." Moore was intrusted with the memoirs of Lord Byron and, by use of them, composed his *Notices of the Life of Lord Byron*. He afterward reluctantly destroyed the memoirs.

Moran (mô-răn'), Thomas (1837-1926), American artist, was born at Bolton, Lancashire, England. His early life was spent at Philadelphia, where he learned engraving. He then studied painting in England, France, and Italy. His large paintings the "Grand Cañon of the Yellowstone" and the "Chasm of the Colorado" were bought by Congress. His other works include "The First Ship" and "Ruins on the Nile," in the Wilstach Collection, Philadelphia; "Bringing Home the Cattle," in the Albright Gallery, Buffalo; also "Balboa Discovering the Pacific," "Hiawatha and the Serpents," and "The Wilds of Lake Superior."

More, Paul Elmer (1864-1937), American essayist and critic, was born in Saint Louis, 1864. He was graduated from Washington University in 1887 and continued his studies at Harvard. He taught Sanskrit at Harvard, 1894-95, and at Bryn Mawr, 1895-97. He was literary editor of the *Independent*, 1901-03, and of the New York *Evening Post*, 1903-09. From 1909 to 1914, he was editor of the *Nation*, to which he contributed many reviews and critical essays.

In the field of literary criticism he achieved foremost rank by his profound scholarship, keen philosophical analysis, and effectiveness of method. His critical work is contained in the *Shelburne Essays*. His writings include also *Helena and Occasional Poems*, *The Great Refusal*, *Benjamin Franklin*, *Nietzsche*, *Hellenistic Philosophies*, and *The Christ of the New Testament*. In 1915, he was made a member of the American Academy of Arts and Letters.

More, Sir Thomas (1478-1535), English author and statesman, was born in London. He was educated at Oxford and Lincoln's Inn; rose to eminence as a lawyer; was appointed undersheriff for London; and was elected a burgess of the Parliament under Henry VII, where he was often successful in resisting claims of the crown. In 1514 and in 1515, he was sent on commercial embassies to the Netherlands and, after his return, became a privy councilor. In 1523, he was chosen speaker of the House of Commons. He became lord chancellor in 1529.

His political duties did not prevent his production of a number of literary works, the chief of which was the *Utopia*. He constantly refused to lend his authority to Henry VIII's project of divorce and second marriage. In 1534, he refused to swear allegiance to the Act of Succes-

sion for securing the throne to the offspring of Anne Boleyn and was committed to the Tower. In July 1535, he was charged with traitorously attempting to deprive the king of his title as supreme head of the Church and was condemned and executed. See *Utopia*.

Morehouse, Daniel Walter (1876-1941), American astronomer, was born at Mankato, Minn. He was graduated at Northwestern Christian College, Excelsior, Minn., at Drake University, and at the universities of Chicago and California. In 1900, he was appointed professor of physics and astronomy at Drake University. In 1908, he discovered a comet, which was named Morehouse in his honor. He lectured on astronomy at the University of California in 1910-11. In 1922, he became president of Drake University.

Morgan, Sir Henry (1635-1688), epic British adventurer, was born in Wales, and either was kidnaped or ran away to the West Indies. He became the leader of a band of buccaneers who, with the tacit approval of the British Crown, operated out of Jamaica and the Barbados against Spanish shipping and the Spanish domains in the Caribbean. Morgan's most famous coup came in 1670-71, when he led 37 ships and 2200 men against a superior Spanish force and captured Panama City. Morgan let his victory become an unabridged holocaust. When accounts of his savage cruelty reached England, he was ordered to be returned under arrest. However, his bravery and public popularity won for him a knighthood from Charles II. He was sent back to Jamaica with the respectable titles of Lieutenant Governor and Commander in Chief.

Morgan, John Pierpont (1837-1913), American financier and art collector, was born in Hartford, Conn. He was graduated from English High School, Boston; studied at the University of Göttingen; and entered the bank of Duncan, Sherman, and Company, 1857. In 1871, he became a member of the firm of Drexel, Morgan, and Company, later J. P. Morgan and Company, leading private bankers of the United States, with branch houses in London and Paris.

He financed the largest reorganization of railways and consolidation of industrial properties in the United States; organized and floated securities of the United States Steel Corporation, 1901, with a capital of $1,100,000,000; and gained financial control over many important railway systems and American and British ocean transportation lines.

Morgan gave large donations to the New York Trade Schools, the Cathedral of Saint John the Divine, and many other institutions. He made valuable gifts to the American Museum of Natural History, the Metropolitan Museum of Art, and the New York Public Library.

The greatest art collector of his day, Morgan owned famous collections of pictures, books, manuscripts, tapestries, and porcelains. His collection of rare books was housed in a white marble structure built for the purpose in connection with his New York home. In 1912, he gave to the Library of Congress a complete set of autographs of the signers of the Declaration of Independence.

Morgan, John Pierpont (1867-1943), son of the preceding, was born at Irvington, N. Y. He was graduated from Harvard and joined the firm of Morgan and Company, to the control of which he succeeded at the death of his father in 1913.

Under his management, the firm greatly extended its business. It took a leading part in financing Allied loans during World War I and in the unprecedented expansion of American investments abroad in the postwar period. The firm was dominant also in floating domestic securities in the 1920's, but its prestige declined when the banking and security laws of 1933 and 1934 required the segregation of the banking and investment portions of the business. In 1924, Morgan presented his father's library valued at 7 million dollars, as a memorial to New York City, with a substantial endowment.

Morgan, Thomas Hunt (1866-1945), American zoologist, was born at Lexington, Ky. He was educated at the State College of Kentucky and Johns Hopkins University. He was made professor of biology at Bryn Mawr College in 1891 and of experimental zoology at Columbia University in 1904. In 1928, he became director of the Kerckhoff laboratories at the California Institute of Technology. His investigations, mainly in the field of animal evolution, genetics, and heredity, place him among the foremost zoologists of the time. In 1933 he won the Nobel prize for medicine, which was awarded for the discovery that inherited physical characteristics are dependent on genes, in the chromosomes of sperm and germ cells, the behavior of which he described. His publications include *Heredity and Sex*, *The Physical Basis of Heredity*, and *Embryology and Genetics*.

Morgenthau (*môr'gĕn-tou*) **Henry (1856-1946),** American diplomat, was born in Mannheim, Germany. He was brought to the United States in 1865 and was educated in the College of the City of New York and Columbia University. He practiced law in New York from 1879 to 1899 and then was made president or director of a number of financial or industrial corporations and became prominent in the Democratic National Committee. In 1913-16, he was ambassador to Turkey, where, after the outbreak of World War I, he was charged also with the diplomatic interests of Great Britain, France, Italy, Russia, Belgium, and other countries. He later served on a commission sent to Poland and as chairman of the Near East Relief. He narrated his experiences in *Ambassador Morgenthau's Story*.

Morgenthau, Henry, Jr. (1891-) American administrator, the son of Henry Morgenthau, the diplomat, was born in New York City. Educated at Cornell University, he later published *The American Agriculturist* from 1922 to 1933, serving also on state commissions relating to conservation and agriculture. When Franklin D. Roosevelt became president in 1933, he appointed Morgenthau to head the Farm Credit Administration, from which he was transferred in 1934 to be Secretary of the Treasury. It fell to his lot to finance expenditures beyond any previous governmental outlays in American history. The influence of treasury policies on the nation's economic life was enlarged by banking laws of which Morgenthau was a leading supporter. He left the Treasury in 1945.

Morley, Christopher (Darlington) (1890-1957), American editor and author, was born at Haverford, Pa. He was graduated from Haverford College and, as a Rhodes scholar, studied at Oxford University, 1910-13. He joined the editorial staff of Doubleday, Page and Company in 1914 and was later an editor successively of the *Ladies' Home Journal*, the Philadelphia *Public Ledger*, and the New York *Evening Post*. His works include *The Eighth Sin*, *Parnassus on Wheels*, *Thunder on the Left*, *The Romany Stain*, and *Kitty Foyle*.

Morley of Blackburn, John, Viscount (1838-1923), English statesman and writer, was born in Blackburn and was educated at Cheltenham and Oxford. He was called to the bar, but devoted his time chiefly to writing and public duties. Among other publications, he edited the *Fortnightly Review*, 1867-83, and *Macmillan's Magazine*, 1883-85.

In 1883, Morley entered Parliament. From the first, he advocated home rule for Ireland, and his articles in favor of it, followed by speeches in 1885, made him Gladstone's most conspicuous supporter. He became chief secretary for Ireland in 1886 and again in 1892. From 1905 to 1910, he was secretary for India and was lord president of the council until 1914, when he resigned from the cabinet because his convictions were opposed to war.

Morley's place in English letters is assured by his authoritative *Life of Gladstone*, his *Life of Burke*, *Life of Cobden*, and other important works, among which are *Diderot and the Encyclopædists*, *Notes on Politics*, and *Recollections*. He was created viscount in 1908.

Morrill, Justin Smith (1810-1898), American legislator, was born in Strafford, Vt., and devoted himself to mercantile pursuits until his election to Congress. He sat in the House of Representatives from 1855 to 1867 and in the Senate from 1867 until 1898. In 1861, he secured enactment of a bill for the establishment, through public land grants, of state colleges for teaching agriculture and the mechanic arts. Under a measure of 1890, he obtained an annual grant of $25,000 to such colleges, which came eventually to number about 70. He was also the author of the highly protectionist Morrill Tariff bill of 1861.

Morris, Gouverneur (1752-1816), American statesman, was born at Morrisania, N. Y. He was graduated from King's College, now Columbia, 1768; studied law; and was admitted to the bar, 1771. He was one of those who drew up the state constitution of New York in 1776. He was also a member of the Continental Congress, 1777-80, and aided Robert Morris in the organization of the bank of North America in 1781. In 1787, he was one of the committee to draft the Federal Constitution; was minister to France, 1792-94; and served as a United States senator, 1800-03.

Morris, Robert (1734-1806), American financier and statesman, was born in Liverpool, England, and was sent to America at the age of 14. He amassed a large fortune as a merchant in Philadelphia. Sent as a delegate to the Continental Congress in 1775, he signed the Declaration of Independence. In 1781, he was created superintendent of finance. Failing public support, he borrowed on his personal credit, when necessary, to provide funds for the army. He founded the Bank of North America, which aided in financing the Revolution. In 1787, he nominated Washington for the presidency.

Morris, William (1834-1896), English poet and artist, was born near London. He was educated at Marlborough School and Oxford; studied architecture and painting; and became the associate of Burne-Jones and Rossetti. In 1861, he established a business in artistic furniture, tapestry, printing, book-illumination, and stained glass. Artistically he did much to elevate the public taste in domestic decoration.

Morris took a keen interest in typography, establishing the *Kelmscott Press*, which reprinted various choice works. In his later years, he became known as one of the leaders of the socialist movement in England. His life was a protest against commercialism and a crusade for artistic handicraft such as was typical of medieval times. His works include *The Earthly Paradise*, *The Life and Death of Jason*, *Love Is Enough*, and *News from Nowhere*. See *Earthly Paradise*.

Morrison, Herbert Stanley (1888-), English labor leader and statesman. Beginning work as an errand boy, he held various manual labor jobs, but early proved his administrative ability in the trade union movement. As secretary of the London Labor party, he evinced a rare knowledge of London government, which he later used in modernizing the city's traffic facilities as minister of transport in 1929-31. He was first elected to Parliament in 1923. In 1940, Churchill made him home secretary, minister for home security, and minister in charge of air raid precautions. In the Labor ministry of 1945 he was Lord President of the Council.

Morrow, Dwight Whitney (1873-1931), American banker, diplomat, and politician, was born at Huntington, W. Va., in 1873. Educated at Amherst College and Columbia University, he entered the employ of a New York law firm in 1899, becoming a member in 1905. From then until 1914, he was a partner in the firm of J. P. Morgan and Company. He resigned in 1927 to accept appointment as ambassador to Mexico. By a high order of diplomacy he succeeded in smoothing over a controversy arising from Mexico's taking over of oil properties owned by American corporations. In 1930, he represented the United States at the London Naval Conference. On his return, he stood for Republican nomination as United States senator, declaring for the repeal of the prohibition amendment. He was elected, but died the following year.

Morse, Jedidiah (1761-1826), American preacher and author of textbooks. He was educated at Woodstock Academy and at Yale College, where he was graduated in 1783. After teaching for a few years, he entered the Congregational ministry. While active in religious and moral movements, he achieved fame as author of the first American textbooks on geography. In 1874, he published *Geography Made Easy*; in 1797, *Elements of Geography*; and, in 1814, *Universal Geography*.

Morse, Samuel Finley Breese (1791-1872), American artist and inventor, was born at Charlestown, Mass. From Phillips Academy he was admitted to Yale University, at which he was graduated in 1810. After five years passed in the study of painting and sculpture in England, Morse opened a studio at Boston in 1815. Indifferent success led him to travel as a portrait painter. At this time he met Lucretia P. Walker of Concord, N. H., whom he married October 1, 1818.

Invention of the Telegraph. After the death of his wife in February 1825, Morse settled in New York. There he made general progress with his brush and became first president of the National Academy of Design. He sailed for Italy in 1829 in order to execute a commission for some pictures. At this time, he spent two years in Rome and one in Paris. On the return voyage from Havre to New York in 1832, in the course of a conversation on recent discoveries in electromagnetism, Morse conceived the idea of a magnetic telegraph. His plan was complete as to its main features—a current passing through a wire between two places, signals to be made at one terminus by alternately making and breaking the circuit at the other. It remained to devise an apparatus to embody his ideas.

Development of the Invention. In 1835, Morse was appointed professor of the literature of the arts of design in New York University. In a studio allotted to him in Washington Square, he prosecuted his experiments with Professor Gale and Alfred Vail, both of whom he subsequently admitted into partnership. In 1837, Morse filed a caveat at the patent office in Washington and applied to Congress for $30,000 to defray the expense of an experimental line of 50 miles. With the Honorable F. O. J. Smith, now admitted as the fourth member into partnership, Morse sailed for Europe to procure patents there in 1838. Discouragement and disappointments awaited him except in France, where he readily obtained a patent.

In 1840, Morse obtained his American patent, but not until 1843 did Congress appropriate the money for the establishment of the trial line between Washington and Baltimore. On May 24, 1844, success crowned the public test. Early in August 1845, he sailed from New York to present his telegraph again to European governments.

Honors. In his last years, Morse received not only an adequate pecuniary reward for his services, but countless other honors. In 1848, he married Sarah E. Griswold and moved to a splendid mansion which he had built near Poughkeepsie, N. Y. Orders and decorations were bestowed upon him by the sovereigns of Turkey, Prussia, Württemberg, Austria, France, Denmark, Spain, Portugal, and Italy.

In 1856, Morse went to Europe to superintend some of the preparations for laying the Atlantic cable. Presentations at royal courts and honors by men of science and affairs attended his progress. In 1858, he received $80,000 from the nations of Europe and saw his telegraph then in use, to the almost complete exclusion of its rivals everywhere. America honored him by the erection of a bronze statue in Central Park, New York. At his death memorial services were held in many American cities. Reports of these meetings, with addresses and poems, were published by order of Congress. See *Telegraph*.

Morton, William Thomas Green (1819-1868), American dental surgeon, was born at Charlton, Mass. After establishing himself in dental practice in Boston, he began early in 1844, to study medicine in the office of Dr. Charles T. Jackson, where he became acquainted with the value of sulphuric ether as a local anesthetic and used it first in dental operations. Actual surgical anesthesia by ether was made known to the public, October 16, 1846, through an operation for facial tumor performed at the Massachusetts General Hospital by Dr. J. C. Warren, to whom Morton had imparted his knowledge of the method. In November 1846, Morton obtained a patent for the process of anesthesia by means of ether.

Although he was probably the first to recognize the general anesthetic properties of ether and deserves credit for its public introduction into surgery, its use was doubtless first suggested to him by Dr. Jackson, while the discoveries of both seem to have been antedated by the successful though unpublished employment of ether in surgical operations by Dr. C. W. Long of Georgia in 1842. Morton was awarded the Montyon prize for medicine and surgery by the French Academy in 1852. He refused $100,000 offered by Congress for his patent. He was elected to the American Hall of Fame in 1920.

Moses, Hebrew lawgiver and prophet, is believed to have lived and flourished about the 15th century B. C. Moses, according to the traditional account, was the son of Amram, of the tribe of Levi, and was born when this Hebrew tribe was settled in northeastern Egypt in bondage to the Egyptians.

To save him from the consequences of an Egyptian royal edict that all male infants of the Hebrews should be drowned, Moses was placed in a basket and hidden among the rushes which grew along the banks of the Nile. The king's daughter came to the river, where she found the child. She took it and brought it up as her own. When grown, Moses was sent to the king's palace at Heliopolis, where he enjoyed the advantages of education and refinement. He became adept in all the sciences of Egypt, Assyria, and Chaldea. He also led armies against the Ethiopians, pursuing them to Saba, or Meroe.

Fearing because he had murdered an Egyptian overseer who was illtreating a Hebrew slave, Moses fled and escaped into Midian, where he remained for many years tending the flocks of his father-in-law, Jethro. While there, he heard the voice of Jehovah bidding him deliver his race from slavery. He returned to Egypt and prevailed on the Egyptian king to permit the Hebrews to depart. Their departure is known in history as the Exodus.

Shortly after the Exodus, Moses heard a voice calling him into Mount Sinai. He ascended and, after 40 days, returned, bearing a stone tablet on which was written the decalogue, or ten commandments. These laws were more or less successfully enforced on the Hebrews, who for the space of a generation, fought under the leadership of Moses against various peoples of the desert northeast of Egypt. Their conquests brought them eventually to the more fertile land of Canaan. Throughout this period, Moses appeared as a representative of Jehovah, the worship of whom became, mainly through his efforts, the national religion of the Hebrews. Moses has therefore continued to be reverenced as the prophet of Jehovah and the lawgiver of Israel.

Moses did not enter the land of Canaan with the Hebrews but is said to have obtained a view of it from the top of Mount Pisgah just before his death at 120 years of age. According to the biblical account, he was buried at the foot of Mount Nebo by Jehovah himself.

Moses, Anna Mary Robertson, "Grandma Moses" (1860-), American artist, was born at Greenwich, New York. Following the discovery in 1938 of some of her landscape paintings in a drugstore at Hoosick Falls, N. Y., she became famous as an American primitive artist. She has had many exhibitions of her work in leading art galleries, and millions of Christmas-card reproductions of her paintings have been sold.

Moses, Robert (1888-), city planner and New York park commissioner, was born in New Haven, Conn. He studied at Yale, Oxford, and Columbia, and was the first American president of the Oxford Union debating society. In the administration of Governor Alfred E. Smith he was secretary of a non-partisan committee to modernize

the administrative machinery for the state of New York. As chairman of the state Council of Parks and member of the State Fine Arts Commission he began to concentrate on the type of public service for which his vision, organizing ability, and political resourcefulness made him peculiarly fitted. His big opportunity came when he was commissioned by Mayor La Guardia to reorganize the city parks department of New York. Moses brought about a historic expansion of recreational grounds and facilities in New York and on Long Island. Jones Beach is his best known achievement.

Motley, John Lathrop (1814-1877), American historian and diplomat, was born in Dorchester, Mass. He was graduated from Harvard in 1831 and afterward studied at Göttingen and Berlin. After traveling for some years in Europe, he returned to the United States; studied law; and was admitted to the bar. In 1841, he became secretary of legation at Leningrad; was minister to Austria, 1861-67; and served as minister to England, 1869-70. On three works Motley built up a great literary reputation. They are *The Rise of the Dutch Republic*; its sequel, *The History of the United Netherlands*; and *John of Barneveld*. He was elected to the American Hall of Fame in 1910.

Moulton (*mōl'tŭn*), **Forest Ray (1872-),** American astronomer, was born at Le Roy, Mich. He was educated at Albion College and the University of Chicago, to the faculty of which institution he was appointed in 1898. He rose by 1912 to a professorship in the Department of Astronomy there and, by his various researches, won a position of prominence among the scientific scholars of America. In 1928 he resigned to devote himself to business, but, in 1936, accepted the secretaryship of the American Association for the Advancement of Science. His publications include *Celestial Mechanics, Descriptive Astronomy, Periodic Orbits,* and *Consider the Heavens.*

Moulton, Richard Green (1849-1924), educator and author, was born in Preston, England. He was graduated from London and Cambridge universities and from the University of Pennsylvania. He was a university extension lecturer with English and American universities, 1874-92. In 1892, he became professor of English literature at the University of Chicago, and, in 1901, was made head of the department of general literature. One of his chief interests was popularizing the Bible as literature. Among his works are *The Ancient Classical Drama, The Literary Study of the Bible, Shakespeare as a Dramatic Thinker, The Modern Study of Literature,* and *The Modern Reader's Bible.*

Mountbatten of Burma, Louis Mountbatten, Earl (1900-), British admiral, was born at Windsor, England. A great grandson of Queen Victoria, he was known as Prince Louis Francis Albert Victor Nicholas of Battenberg until 1917, when the surname of Mountbatten was adopted for patriotic reasons. He began his naval career as a cadet at the age of thirteen, and served as a midshipman in World War I. During World War II, he led the British Commandos in raids on Norway and France, and then served as supreme Allied commander in Southeast Asia, 1943-46. He was the last British viceroy of India, 1947, and the first governor general of the newly-created Indian dominion, 1947-48. In 1953-54, he was commander in chief of the Allied naval forces in the Mediterranean. Lord Mountbatten is the uncle of Philip Mountbatten, Duke of Edinburgh, husband of Queen Elizabeth II of England.

Mozart (*mō'zärt*; G., *mō'tsärt*), **Johann Wolfgang Amadeus (1756-1791),** Austrian composer and chief founder of the opera, was born at Salzburg, Austria. When three years old, Mozart attracted attention by his delight in striking chords on the piano. With his sister he made his first appearance in public at Munich in his sixth year, later visiting Vienna, Paris, and London. After his return to Salzburg, his father gave him a thorough education in musical theory and practice.

At the age of 15, he produced the opera *Mithradates* at Milan amid great applause. After a long series of concert journeys over Europe, 1763-1773, he sought other employment in Paris without success. He had, however, the opportunity of hearing the various kinds of music then in vogue.

He was now appointed concert master and organist at Salzburg with a small salary and permission to travel occasionally to perform his new works. His opera *Idomeneo*, composed in 1780, was as original in its phraseology and development as in its modulation, harmony, and instrumentation. He is said to have written it to win the good graces of the Webers, a musical family of Mannheim, with whom he subsequently lived in Vienna and whose daughter Constanza he married in 1781.

Mozart was obliged to break with his hard master, the Archbishop of Salzburg, and he supported himself with difficulty by giving concerts and music lessons. Amid incessant rebuffs and violent intrigues, he set *The Marriage of Figaro* to music as an Italian opera in 1786. Its happy reception at Prague induced him to settle there, where he finished his master opera, *Don Giovanni*, in 1787.

In 1788, he returned to Vienna. Then followed the busiest period of his life. Frequent concert journeys and incessant labor exhausted him; the fear of early death oppressed him. In this condition he composed his exquisite opera *The Magic Flute* and commenced a *Requiem*, which was never finished.

Mozart united profound learning and universal genius in all his works, whether song, sonata, concerto, symphony, mass, or opera. He was the greatest pianist of his time in Germany. He revolutionized the lyrical drama by *Idomeneo*, and the romantic opera may be said to have been created in *Don Giovanni* and *The Magic Flute*. Mozart is the first composer in whose works all traces of the old tonality disappear; he was the father of the modern school. See *Music: German Classic Masters.*

Muhlenberg (*mū'lĕn-bûrg*), **Frederick Augustus Conrad (1750-1801),** American clergyman and political leader, son of Heinrich Melchior Muhlenberg, was born at New Providence (now Trappe), Pa. He was educated at the University of Halle, Germany; entered the Lutheran ministry; and was pastor in New York City, 1773-76. He then returned to his native state; resigned from ministerial work; entered politics; and was elected to the Continental Congress in 1779. After distinguished service in the Pennsylvania legislature, of which he was twice speaker, he was elected to the first United States Congress. He was the first speaker of the House of Representatives, 1789-91, and was again speaker, 1793-95.

Muhlenberg, Heinrich Melchior (1711-1787), American clergyman, founder of the German Lutheran Church in America, was born at Einbeck, Germany. He studied at Göttingen and Halle; was pastor of a Lutheran church in Lusatia, 1739-41; and settled in Pennsylvania, 1742, as a missionary. In 1748, he was instrumental in forming the first American Lutheran synod. In 1762, while he resided in Philadelphia, he formulated the constitution for the Lutheran congregation there. This became the basis of the constitutions under which most congregations were subsequently established.

Muir (*mūr*), **John (1838-1914)** American naturalist and explorer, was born at Dunbar, Scotland; was educated in Scotland and at the University of Wisconsin. He discovered Muir Glacier, Alaska, and visited the arctic regions in search of the DeLong Expedition. On foot he visited many of the grander scenes in the mountains of California. Between 1899 and 1912, he traveled in Asia, Australasia, South America, and Africa. He was a pioneer advocate of forest conservation and of the establishment of national parks.

His writings include *The Mountains of California, Our National Parks, My First Summer in the Sierra, The Yosemite, The Story of My Boyhood and Youth,* and many scientific articles. In 1915 appeared *Letters to a Friend* and *Unpublished Prose and Letters,* both of which contain much material on Alaska. He was a member of the American Academy of Arts and Letters.

Müller (*mül'ĕr*; E., *mŭl'ĕr*), **Friedrich Max (1823-1900),** British philologist and Orientalist, son of a German poet, Wilhelm Müller, was born in Dessau, Germany. He was educated at Leipzig; studied at Paris; and settled in England in 1846. In 1854, he was appointed professor of modern languages at Oxford, where, from 1868 to 1875, he was professor of comparative philology, a science to which he made large contributions.

Besides editing the *Rig-Veda*, he published *Lectures on the Science of Language* and *Chips from a German Workshop*, dealing, not merely with the origin of languages, but with the early religious and social systems of the East; also *The Origin and Growth of Religion, Comparative Mythology,* and *Biographical Essays.* He was chief editor of the series of works entitled *The Sacred Books of the East.*

Mumford, Lawrence Quincy (1903-), librarian, born in Ayden, North Carolina. He was graduated from Duke University in 1925, where he received his master of arts degree in 1928, and the following year was graduated from the Columbia University School of Library Science. After serving on the library staffs of Duke and Columbia, he joined the staff of the New York Public Library in 1929, where he served until 1945, when he became assistant director of the Cleveland Public Library and director in 1950. In 1954 he was elected president of the American Library Association, and was named Librarian of Congress by President Eisenhower.

Mumford, Lewis (1895-), American author and social philosopher, was born at Flushing, Long Island. His education at Columbia University, City College of New York, and New York University was supplemented by independent reading and research suggested by the Scottish biologist, Patrick Geddes. In the same way that Geddes had studied Edinburgh as a whole, Mumford studied New York, its history, its architecture, its character, and its significance as a phase of civilization. His essays in the *Dial*, the *New Republic*, and other magazines contained, not only criticism of art and architecture, but also an appraisal

of the social values that are reflected by a city's activities and development. Among the books which express his philosophy are *Sticks and Stones, Technics and Civilization,* and *Culture of Cities.*

Munch, Charles (1891-), American conductor, was born at Strasbourg, Alsace-Lorraine, France, where he began training as a violinist, continuing his studies later in Paris and Berlin. He became a teacher at the Strasbourg Conservatory, and later at Leipzig, Germany, where he conducted at Gewanhaus, the famous concert hall. He then went to Paris where he conducted a number of important orchestras. In 1946, he came to the United States, making his American debut with the Boston Symphony Orchestra. He was guest conductor of the New York Philharmonic Symphony Society for three seasons, and in 1949 succeeded Serge Koussevitzky as leader of the Boston Symphony Orchestra, with which he toured Europe in 1952 and Russia in 1956. Munch has been director of the Berkshire Music Center, Lenox, Mass., since 1951, and also conductor of the summer festival concerts at Tanglewood.

Münchhausen (*münкh'ou-zĕn*), **Hieronymus Karl Friedrich, Baron (1720-1797),** member of an ancient and noble German family, was born in Hanover, Germany. He served as cavalry officer in the Russian campaign against the Turks, 1737-39. By false and ridiculously exaggerated tales of his exlpoits and adventures, he attained celebrity so remarkable that his name has become proverbial. The title of the tales ascribed to him is *Baron Münchausen's Narrative of His Marvelous Travels and Campaigns in Russia.*

Munkácsy (*mōōn'kä-chē*), **Michael (1844-1900),** Hungarian painter whose real name was Michael Lieb, was born at Munkacs. Left an orphan, he was apprenticed to a joiner at the age of 11 and, after several years of hard work and privation, he made the acquaintance of artists who befriended him. In 1865, he was enabled to study art at Vienna and, in 1868, began work under Knaus at Düsseldorf.

In 1870, his first important picture, "The Last Day of a Condemned Man," now in the Wilstach Collection, Philadelphia, was exhibited with great success at Paris. Soon afterward, he established his residence there and became one of the most popular artists of his time. Among his best-known pictures are "Milton Dictating *Paradise Lost* to His Daughters," and the world-famous "Christ before Pilate," purchased by John Wanamaker.

Munsel, Patrice Beverly (1925-), American soprano, was born at Spokane, Wash. She joined the Metropolitan Opera Company in 1943, the youngest singer to become a member of that organization. She made her debut as Philine in *Mignon,* and has sung 11 leading roles with the Metropolitan. In the part of Adele in *Die Fledermaus* in 1950, she stopped the performance twice on the first night. In 1953, she starred in the film biography of Melba. She has been guest star of several European opera companies, including the Royal Opera at Copenhagen, Denmark. In private life, she is Mrs. Robert C. Schuler.

Munsey, Frank Andrew (1854-1925), American publisher, was born in Mercer, Me. He was educated in the public schools of Maine and began his business career in a country store. He went to New York, 1882, and started *The Golden Argosy,* a juvenile weekly, later the adult monthly *The Argosy.* In 1889, he launched *Munsey's Weekly,* which was converted, in 1891, into *Munsey's Magazine.* He also acquired *The All-Story Magazine,* the New York *Sun,* and the Baltimore *News.* His publications include *Afloat in a Great City, The Boy Broker, A Tragedy of Errors,* and *Derringforth.* On his death, he bequeathed his residuary estate, about 40 million dollars, to the Metropolitan Museum of Art, New York City.

Münsterberg (*mün'stĕr-bĕrĸ*), **Hugo (1863-1916),** psychologist, was born at Danzig, Germany. He was graduated from the universities of Leipzig and Heidelberg and taught psychology at the University of Freiburg five years. In 1892, he was made professor of psychology and director of the Psychological Laboratory at Harvard University.

At first his researches were in the field of physiological psychology, but, in later years, he devoted himself to the application of psychological laws to the problems of everyday life and wrote various popular books dealing with the psychology of testimony, of medicine, and of education. Besides important works in German, his writings include *Psychology and Life, The Americans, Science and Idealism, Psychology and Industrial Efficiency,* and *The War and America.*

Murat (*mü'rä'*), **Joachim (1767-1815),** French marshal, was born near Cahors, France. Rising by reason of his intrepidity as a cavalry leader, he was elevated by Napoleon to the highest commands and married Napoleon's sister Caroline. He was made king of Naples as Joachim I Napoleon. He led the cavalry in Napoleon's Russian campaign, 1812, and at the battle of Leipzig. Following the emperor's return from Elba, Murat was defeated in Italy and was deposed by the allies, but, returning to the attack, was captured and shot.

Murillo (*mū-rĭl'ō*; Sp., *mōō-rēl'yō*), **Bartolomé Estéban (1617-1682),** Spanish painter, was born in Seville, Spain. Left an orphan at 10, he was apprenticed to an artist who taught him the rudiments of painting. From 1642 to 1645, he studied the works of the great masters under Velasquez at Madrid. Returning to Seville, he married, in 1648, a wealthy and noble lady; established a distinguished home; and became the most celebrated religious painter of Spain, ranking high among the great painters of the world.

A favorite subject with Murillo was "The Immaculate Conception," which he painted 15 times. One of the most famous of his pictures by this name was purchased by the French government in 1852 for 586,000 francs. It was presented to the Spanish government in 1940 and transferred to the Prado Museum, Madrid. Other noted works are "Saint Anthony of Padua and Infant Jesus" and "Saint Francis of Assisi" at Seville; "The Divine Shepherd," and "Annunciation," at the Prado Museum, Madrid; "Holy Family," "Angels' Kitchen," and "Beggar Boy," in the Louvre, Paris. See *Painting.*

Murphy, Frank (1890-1949), American administrator and politician, was born at Harbor Beach, Mich. Educated at the University of Michigan and colleges in England and Ireland, he practiced law in Detroit, taught law in the University of Detroit, served as judge of the recorder's court and, in 1930, became mayor of Detroit. Attracting attention for his vigorous attack on a pressing relief problem in the city, he was named high commissioner to the Philippine Islands in 1933. Three years later he was elected governor of Michigan. His first duties included mediation in two large automobile sit-down strikes, in which his even-handed policy led to settlements with a minimum of violence. Failing of re-election as governor he was appointed Attorney General of the United States in 1939 and was elevated to the Supreme Court in 1940.

Murphy, John Benjamin (1857-1916), American surgeon, was born at Appleton, Wis. He was graduated from Rush Medical College, Chicago, in 1879. After engaging in practice, 1879-82, he studied surgery in Vienna, 1882-84. Returning to Chicago, he attained eminence as a surgeon. He invented the anastomosis button, known as Murphy's button, which greatly facilitated intestinal operations. He was widely known also for his success in autogenous bone grafting and in uniting the femoral artery when severed by a gunshot wound. Murphy became professor of surgery in Northwestern Medical School and chief surgeon at Mercy Hospital. His writings include *Gunshot Wounds of the Abdomen, Surgery of the Stomach,* and *Original Experimental and Clinical Research.*

Murphy, William Parry (1892-), American physiologist, was born at Stoughton, Wis. After being graduated from the University of Oregon and the Harvard Medical School, he was closely associated in hospital work with George R. Minot, with whom he shared in the discovery that the eating of liver has a curative effect in the treatment of pernicious anemia. In recognition of this work and his research on diabetes, he was, in 1935, made senior associate at the Harvard Medical School, shortly after having been awarded one-third the Nobel prize in medicine for 1934.

Murray, George Gilbert Aimé (1866-), British scholar and publicist, was born at Sydney, Australia. He went to England in 1877 and was educated at Oxford University. During 1889-99, he was professor of Greek at the University of Glasgow and, from 1908 to 1936, regius professor of Greek at Oxford University. Following World War I, he took a prominent part in advocating the organization of the League of Nations and later directed its activities on intellectual co-operation. His publications include *Five Stages of Greek Religion; Faith, War, and Policy; Problems of Foreign Policy; Hamlet and Orestes; Liberality and Civilization,* and many verse translations of Greek dramas.

Murray, Sir James Augustus Henry (1837-1915), British lexicographer and philologist, was born at Denholm, Scotland. He was graduated from London University and engaged in teaching during 1855-85. His *Dialect of the Southern Counties of Scotland* established his reputation as a philologist. The great work of his life, the editing of the Philological Society's *New English Dictionary,* was begun at Mill Hill, 1870, and was continued at Oxford for the remainder of his life. This dictionary, designed to be the most complete and exhaustive ever attempted in any language, was nearly finished at his death.

Murrow, Edward R. (1908-), radio news correspondent, was born at Greensboro, N. Car. After he was graduated from Washington State University, he became assistant director of the Institute of International Education, in which capacity he made many contacts abroad. In May, 1937, he was sent to Europe as representative of the Columbia Broadcasting System and arrived just in time to

be present at the Nazi invasion of Austria. From then on he was in the midst of stirring events which led to World War II and reached their climax in the bombing raids on London. Murrow's on-the-spot reporting of these events enabled American listeners to share in many historic happenings overseas. His opening words, "*This is London,*" became the title of a book in which he recounted numerous observations and experiences. In addition, he has created a living form of documentary review entitled "I Can Hear It Now," which is a series of recordings edited to recall dramatic moments in history. His television program "Person to Person" is extremely popular.

Mussolini, Benito (1883-1945), Italian statesman, was born at Dovia, Italy, of a family long identified with revolutionary politics. His earlier activities were in the field of journalism. He traveled extensively throughout Europe and was known for his extreme socialistic views, which led to his expulsion from Switzerland.

About 1908, his opinions began to take a nationalistic direction. In 1915, he was one of the strongest advocates of war against Austria. He served at the front until he was incapacitated by a wound. Then he set about organizing the so-called Fascisti, originally a group of intellectuals opposed to Bolshevism. The group became a party in 1921 and, in 1922, succeeded in making Mussolini prime minister and virtually dictator of Italy. In this capacity, he devoted himself vigorously to the strengthening of Italy's economic and political situation. He also abolished representative government. In 1929, he granted the pope sovereignty over a newly created Vatican City within Rome. A policy of expansion resulted in the Italian conquest of Ethiopia in 1936 and Albania in 1939. His alliance with Hitler in 1936-39 was known as the Berlin-Rome axis.

In 1940 Mussolini declared war on France and Great Britain and in 1941 on the United States. A few initial successes were soon followed by continuous defeats. When his Italian empire had been lost and Sicily invaded, Mussolini was forced to resign. Rescued by the Germans, he set up a Fascist government in northern Italy. When the German resistance in Italy collapsed, he was captured by a band of "partisans" and hanged, April 28, 1945.

Mussorgsky (*mŭs-sôrg'skĕ*), **Modest Petrovitch (1839-1881),** Russian composer, was born at Karev. He became an able performer at the age of 10. After entering the Military Academy at Leningrad, he continued musical studies. Upon graduation, he entered the Russian army, but later resigned his commission to devote himself entirely to musical composition. In 1870, he completed his celebrated opera *Boris Godounov*, which treats a patriotic subject with remarkable dramatic power. His other works include the operas *Khovanstchina*, *The Match-Maker*, *Œdipus*, and *The Fair at Soroschini*.

Mustapha (*mo͝os'tä-fä*) **Kemal Pasha (1879-1938),** Turkish ruler, was born of humble parentage at Saloniki. He came into prominence as a leader of the Young Turks and won recognition by his reckless courage while fighting against the Italians in Tripoli. In World War I, he further distinguished himself in the defense of the Gallipoli Peninsula against the Allied forces and was a trusted confidant of the German commander in chief, von Sanders.

After the conquest of Palestine by the Allies in 1918, Kemal organized the so-called Nationalist army. He established a new government at Ankara, supplanting the regular government in Istanbul; refused to recognize the terms of peace proposed by the Allies; inflicted a disastrous defeat on the Greeks in 1922, when they attempted to take possession of territory assigned to them; and obtained recognition and favorable terms of peace from the dominant European powers. Having been elected as first president of the Turkish republic in 1924, he pursued a vigorous policy of modernization, abolishing the caliphate and polygamy, and adopting the Latin alphabet for Turkish use.

Mutsuhito (*mo͝ot-so͝o-hē-tō*) **(1852-1912),** emperor of Japan, ascended the throne in 1876. His reign was marked by profound social and governmental changes. The feudal system was abolished. Under his rule Japan entered upon an unprecedented era of prosperity. Civilization made rapid progress, and the introduction of Western arts and ideas secured for Japan the foremost place among Asiatic nations. He gave the Japanese a Parliamentary constitution based somewhat on European principles.

Nansen (*nän'sĕn*), **Fridtjof (1861-1930),** Norwegian arctic explorer, was born near Oslo, and was graduated from the University of Oslo, 1888. He started on his first arctic expedition in 1882 and, in 1888-89, undertook a celebrated journey across Greenland. The highest altitude registered was over 10,000 feet, with a temperature of from 80° to 90° below zero. In 1893, Nansen sailed in the *Fram* to make an examination of the entire polar regions and penetrated farther north than any of his predecessors.

Nansen then became professor of zoology at Oslo University; took an active part in the separation of Norway and Sweden in 1905; was minister for Norway at London, 1906-08; and was made professor of oceanography in Oslo University, 1908. During World War I, he was active in providing for the welfare of prisoners and was later appointed high commissioner of the League of Nations for the repatriation of war prisoners. His efforts were directed also toward the relief of the famine sufferers in Russia in 1921-22. He received the Nobel peace prize for 1922. His publications include *Across Greenland*, *Eskimo Life*, *Farthest North*, *Norway and the Union with Sweden*, and *Hunting and Adventure in the Arctic*.

Napier (*nāp'yĕr*; *nă-pēr'*), **Sir Charles James (1782-1853),** British general, was born at London. He served first during the Irish rebellion, 1798. At the battle of Corunna, during the Napoleonic wars, he was severely wounded and was taken prisoner. He then returned to England and devoted himself to literary work. In 1810, he went to the Iberian Peninsula; fought at Coa and Busaco, where his jaw was broken and his eye was injured by a shot; and took part in actions at Fuentes de Onoro and Badajoz, both in 1811.

From 1822 to 1830, Napier was governor of Cephalonia; in 1841, he was sent to India to command the army of Bombay against the Amir of Sind. Here he destroyed the fortification of Emaun Ghur, 1843, and at the battle of Meanee (Miani), with 2800 English and Sepoys, he defeated 30,000 Baluchs. After the annexation he was governor of Sind until 1847.

Napier (*nā'pĕr*), **John (1550-1617),** Scottish mathematician, was born at Edinburgh. He matriculated at Saint Andrews in 1563, traveled on the continent, and settled down to a life of literary and scientific study. In 1594, he published *Plaine Discovery of the Whole Revelation of Saint John*, which was translated into Dutch, French, and German. What he is remembered for, however, is the discovery of logarithms, probably the most valuable instrument for calculations since the invention of numbers. He explained the system in *Mirifici Logarithmorum Canonis Descriptio*, 1614. He invented a calculating apparatus, known as "Napier's bones." See *Logarithms*.

Napoleon Bonaparte (1769-1821), military leader and emperor of France, was born of Italian parents at Ajaccio on the Island of Corsica. After a few months spent in learning French at Autun, he was sent, at the age of 10, to the Military School at Brienne, France, and subsequently to Paris, where, in 1785, he obtained a commission in the artillery. He saw action first at the siege of Toulon in 1793. After the fall of Toulon, Napoleon was suspected, not without reason, of being implicated with the government of Robespierre, and he shared in the disgrace of its fall.

Early Campaigns. Napoleon's defense of the Tuileries in October 1795 led the Directory to put him in charge of the army operating against Italy. Two days before entering upon the campaign, he married Josephine Beauharnais, March 1796. In Italy began the course that marked him as a man of determination, force, and quick action. After his victories there, he decided to move on to Vienna; but Austria made overtures of peace with large cessions of territory.

The Directory placed Napoleon in command of a great expedition then being prepared against Egypt. He reached Alexandria, July 1, 1798, and took possession of Cairo. His fleet, however, was destroyed in the Nile by Nelson. Unable to return to Europe, he immediately prepared an expedition into Turkey. Success attended his first efforts, but he was checked at Acre by British marines under Smith.

Period of Greatest Power. Hearing that the armies at home were meeting with misfortune, Napoleon secretly embarked for France. The revolution of November 10, 1799, gave rise to the formation of a new constitution, and Napoleon, as "first consul," became the virtual ruler of France. In 1800, failing to conclude peace with Austria and England, he determined to stake all on the chance of a campaign, and entered Italy. He won brilliant victories at Marengo and at Hohenlinden, after which he made peace with Austria and England, gaining all Italy.

In August 1802, Napoleon was made consul for life. In this capacity, he reorganized and centralized governmental administration in France. In May 1804, he was proclaimed hereditary emperor of the French and, a year later, king of Italy. England, Russia, and Austria formed against him a coalition, which was dissolved as a result of three great victories won by Napoleon: over the Austrians and Russians at Austerlitz in 1805; over the Prussians at Jena in 1806; and over the Russians at Friedland in 1807.

Napoleon's chief aim was now the humiliation of England. In this, however, he failed, being compelled to witness the defeat of his army in Spain and Portugal and the destruction of his navy assembled for the invasion of Britain. In 1809, Austria attacked Napoleon, but was decisively defeated at Ratisbon and Wagram. With a view to stopping the hostile machinations of the old legitimate dynasties, Napoleon obtained a divorce from Jose-

phine in 1809 and married Maria Louisa, archduchess and daughter of the emperor of Austria.

Downfall. In order to break the power of England, Napoleon had, in 1806, promulgated the Berlin decree, forbidding all trade with England. This decree caused great hardship and discontent on the continent. Russia allied herself with England and was accordingly attacked by Napoleon in 1812. He defeated the Russians at Borodino, September 7, 1812, and entered Moscow. The burning of the city and a subsequent military reverse compelled the French to retreat in the dead of winter. In this disastrous campaign, Napoleon lost nearly 400,000 men as well as much of his prestige. Hastening to Paris, he raised new armies with which to face a combination of all the powers of Europe. After a series of terrible battles, including Lutzen, Boutzen, and Dresden, he made a last stand at Leipzig. Here, in the "battle of the nations," he was overwhelmingly defeated, October 1813. Paris was taken by the allied armies on March 30, 1814. Napoleon was forced to abdicate unconditionally on April 11, 1814. He received the sovereignty of Elba, a small Italian island.

Last Campaign. Napoleon, ascertaining that general discontent in France followed the accession of the Bourbons, left Elba, accompanied by 600 soldiers of the old guard, and landed at Cannes. He entered Paris on March 20, 1815, dethroned Louis XVIII, and re-established himself on the throne of France. He was immediately denounced by the allied soverigns. Despairing of averting a war by negotiation, Napoleon resolved, with his usual vigor and decision, to strike the first blow. He defeated the Prussians at Flanders, but ultimately suffered an overwhelming defeat at the hands of the English and Prussians on June 18, 1815, at Waterloo.

Banishment. The defeated emperor fled to Paris and finally abdicated in favor of his son, Napoleon II, June 22. Finding escape impossible, he surrendered on July 15 and was carried a prisoner to the island of Saint Helena. The remainder of his life was politically insignificant, but he wrote several able and interesting works, chiefly relating to his eventful career.

Genius and Achievements. Napoleon ranks as one of the world's greatest military leaders. His career has been variously estimated, some regarding him as the chief bearer of the Revolutionary gospel to Europe, while by others he has been described as an archadventurer, who used democratic ideas to cloak the most despotic tyranny. His career caused the last remnants of feudalism to crumble and was an important factor in making possible the modern middle-class society. He is responsible also for the codification of French law, which was adopted in many parts of Europe. He was buried at Paris in a mausoleum under the dome of the Hôtel des Invalides.

Napoleon III, or **Charles Louis Napoleon Bonaparte (1808-1873),** emperor of the French, was born in Paris. He was the son of Louis Bonaparte, king of the Netherlands, and of Hortense Beauharnais, daughter of Empress Josephine.

In 1830, he took part in a revolutionary movement in Italy and, in 1836, entered France; but, seeking to arouse the soldiery at Strasbourg in his favor, he was taken prisoner and was transported to the United States, whence he went to Switzerland and later to England. In 1840, he landed at Boulogne, again hoping to arouse the French soldiery in his favor. For this second attempt, he was tried for high treason and received a sentence of perpetual imprisonment in the castle of Ham. In 1846, he escaped in the disguise of a workman and once more took up his residence in London.

In 1848, on the abdication of Louis Philippe, the provisional government permitted his return to France. In December of the same year, he was elected by an immense majority president of the newly-constituted republic. In 1851, by his bloody *coup d'état*, Louis Napoleon secured his election as president for ten years. A year later, he again appealed to the people and obtained an almost unanimous vote for the restoration of the empire.

In 1854, Napoleon joined England and Turkey in the war against Russia. In 1859, in behalf of Italy, he entered upon the war with Austria which ended in the Treaty of Villafranca. This was followed by the annexation of Savoy and Nice by France, 1860. He occupied Mexico in 1863, but the issue of that occupation was the execution of the emperor Maximilian in 1867. In 1870, the Franco-Prussian War broke out. This led to the surrender of the emperor and his army at Sedan and to the ultimate re-establishment of the republic. He died at Chistlehurst, England.

Nash, Ogden (1902-), American writer, was born at Rye, New York, and was educated at Harvard. He is a versifier whose comic poems depend for their delightful effect on unexpected rhymes and sophisticated themes. Nash has been a frequent contributor to *The New Yorker*. With Kurt Weill and S. J. Perelman, he wrote *One Touch of Venus*, starring Mary Martin, in 1943. Many collections of his poems have been published, including *Hard Lines* (1931), *The Bad Parents Garden of Verse* (1936), *I'm A Stranger Here Myself* (1938), and *The Private Dining Room* (1953).

Nasser, Gamal Abdel (1918-), Egyptian army officer and political leader, was born in the Assiout Province of Egypt. He is a graduate of the Royal Military Academy, was in active service during World War II, and advanced to the rank of Colonel. He headed the twelve-man Revolutionary Command Council which took over control of the army, forced the abdication of King Farouk, and proclaimed Egypt a republic. After serving as Minister of the Interior and Deputy Prime Minister, he became Prime Minister, but without relinquishing his leadership of the country's military forces. His domestic and foreign policies have been somewhat conflicting, suggesting a struggle within himself between different interests and objectives. The interior minister part of him seeks an era of peace and prosperity, with the completion of great public improvements such as the Assuan Dam. The military dictator in him engages in Hitler-like saber rattling toward Israeli and the Western powers.

In June 1956 Nasser was elected first president of the Republic of Egypt. Following the withdrawal of proposed loans by the United States, Britain, and the International Bank to finance the Assuan Dam, President Nasser in July decreed the seizure of the Suez Canal Company and nationalization of the canal. Joint military action by Great Britain and France to regain control of the canal and by Israel to stop Egyptian border attacks halted canal operations. The United Nations international police force took over disputed Suez points after the U.N. had obtained a cease-fire and withdrawal of the invading forces.

Nathan, George Jean (1882-), American editor and dramatic critic, was born at Fort Wayne, Ind. Educated at Cornell and Bologna universities, he joined the editorial staff of the New York *Herald* in 1905. His incisive views on acting and the other theater arts made him a valued contributor to numerous magazines of a sophistic type, including *Smart Set*, of which he was editor, with H. L. Mencken, from 1914 to 1923, the two then founding, and editing until 1930, the *American Mercury*. His publications include *Bottoms Up*, *The World in Falseface*, *The House of Satan*, *Art of the Night*, and *Encyclopedia of the Theatre*.

Nearing, Scott (1883-), American economist and sociologist, was born at Morris Run, Pa. Educated at the University of Pennsylvania, he taught there from 1906 after having served as secretary to the Pennsylvania Child Labor Commission. His socialistic views led to his dismissal from the university in 1915, after which he lectured at Toledo (Ohio) University and the Rand School of Social Science, New York. His lectures and books were directed toward modifications of social institutions with a view to more equitable distribution of economic benefits. He opposed participation in all wars on the ground that they benefited only the propertied classes. His publications include *Social Adjustment*, *The American Empire*, *Black America*, *War*, and *Fascism*.

Nebuchadnezzar (*nĕb'ŭ-kăd-nĕz'ar*), **(? - c. 562 B.C.),** king of Babylon, was the son of Nabopolassar. Proceeding by command of his father, Nebuchadnezzar defeated Necho, king of Egypt, and conquered Palestine. In 605 or 604 B. C., he became king; took Jerusalem about 597; and made Zedekiah king as his vassal. Zedekiah soon rebelled and Nebuchadnezzar again took Jerusalem after a terrible siege, destroyed the temple, threw down the walls of the city, and carried the people captive to Babylon. He took Tyre after a siege of 13 years, overran Egypt, and became one of the most powerful sovereigns of his time. His restoration of Babylon by the erection of walls, magnificent temples, and other notable structures has been revealed in modern times by archeological excavations. He became insane in his later years.

Necho (*nĕ'kō*) **(? - 594 B.C.),** Egyptian king, the Pharaohnechoh of the Bible and the Nechos of Greek writers, succeeded Psammetichus in 610 B. C. When the Assyrian empire fell, Necho endeavored to conquer Syria and, at the beginning of his campaign, defeated and slew Josiah, king of Judah, at Megiddo, and, shortly afterward, deposed Josiah's son Jehoahaz, elevating Eliakim in his stead. Necho extended his conquests to the Euphrates, but was driven back by Nebuchadnezzar. He ruled Egypt with vigor, sending an expedition by sea around Africa, and attempting a canal from the Nile to the Red Sea.

Necker (*nĕk'ĕr*, F., *nĕ'kâr'*), **Jacques (1732-1804),** French financier and statesman, was born at Geneva. He became a banker at Paris, where his financial ability and his economic writings led to his appointment as director of the finances in 1776. His reforms excited the hostility of the court, and he was dismissed in 1781. In 1788 he was recalled and supervised the assembling of the States-General. Again abruptly dismissed by the king, the States-General forced his recall. In 1790 the revolutionary factions turned against him, and he was forced to leave France. He died in Switzerland. His daughter was the famous Madame de Staël.

Nehru (*nā'rōō*) **Jawaharlal, Pandit (1889-)**, Indian politician, was born at Allahabad of a wealthy Hindu family. He was educated in England. Returning to India in 1912, he joined the nationalist movement, and was a member, and three times president, of the Indian National Congress. His opposition to the government led to his imprisonment on several occasions. In 1947 he became the first premier of the Dominion of India.

Neihardt (*nī'härt*), **John Gneisenau (1881-)**, American poet, was born at Sharpsburg, Ill. From 1901 to 1907, he lived among the Omaha Indians. The result was an epic cycle: *The Song of Hugh Glass, The Song of Three Friends,* and *The Song of the Indian Wars,* based on the relations of Indians and whites. The Nebraska legislature elected him poet laureate of the state in 1921. He was professor of poetry at the University of Nebraska, and literary editor of the St. Louis *Post-Dispatch.* In 1944 he was appointed director of information in the Office of Indian Affairs at Chicago. His other poetic works include *The Lonesome Trail, Black Elk Speaks, The Song of the Messiah,* and *The Song of Jed Smith.*

Nelson, Donald Marr (1888-), American business man, was born at Hannibal, Mo., and was graduated from the University of Missouri in 1911. He entered the employ of Sears, Roebuck and Co. as a chemical engineer but changed to managerial work, becoming executive vice-president and chairman of the executive committee in 1939. In 1940 he was called to Washington as director of priorities in the Office of Production Management; from 1942 to 1944 he was head of the War Production Board. In 1944 he went to China as economic adviser to the Chinese government. He wrote *Arsenal of Democracy.*

Nelson, Horatio, Viscount (1758-1805), English admiral, was born at Burnham Thorpe, Norfolk. He entered the navy in 1770 and was promoted to a lieutenancy in 1777. In 1782, he acted under Lord Hood in American waters.

On the eve of the French Revolutionary War, he was again called into service. In command of the *Agamemnon,* he advanced his reputation by gallant conduct, losing his right eye during the storming of Calvi, in Corsica. His conspicuous bravery at the engagement with the Spaniards off Cape Saint Vincent in 1797 brought him the rank of rear admiral. In the same year he lost his right arm at Santa Cruz and, in the following year, with an inferior force, annihilated the French fleet in the Bay of Abukir, for which act he was raised to the peerage as Baron Nelson.

In 1801, for his victory over the Danish fleet at Copenhagen, he was made viscount and commander in chief. During the threatened Napoleonic invasion, he kept a vigilant watch in the channel. In 1805, he crowned his great career by a memorable victory off Trafalgar over the French fleet commanded by Villeneuve. It was before this battle that Nelson gave his famous signal "England expects that every man will do his duty." The admiral was mortally wounded in action and died the same day.

Nelson, Knute (1843-1923), American lawyer and legislator, was born in Norway. He came to the United States in early childhood, lived in Wisconsin and Minnesota, and served in the Civil War. He was admitted to the bar in 1867 and served in the legislatures of Wisconsin and Minnesota. From 1883 to 1889 he was a member of Congress. In 1892 and in 1895 he was chosen governor of Minnesota and, from 1895 to 1923, he represented Minnesota in the United States Senate as a Republican of independent views. He was the author of the act creating the Department of Commerce and Labor.

Nepos (*nē'pŏs*), **Cornelius,** Roman historian, was born probably at Verona and flourished during the time of Julius Cæsar and the first years of the reign of Augustus. He enjoyed the friendship of Cicero. His only extant work, *Vitæ Excellentium Imperatorum,* is held in high esteem as an educational class book. It is a series of brief biographies, based mainly on Greek sources.

Nero Claudius Cæsar Drusus Germanicus (37 A.D.-68 A. D.), Roman emperor, was born at Antium, in Latium. His father was a Roman consul and his mother was Agrippina, daughter of the emperor Germanicus. He was adopted by the emperor Claudius, who had married Agrippina, and, four years later, he succeeded Claudius on the throne, which he occupied for 14 years.

His whole reign was characterized by licentiousness, brutality, and cruelty. In order to please his mistress Poppæa Sabina, he put his mother to death, on the plea that she had plotted against him; and he afterward murdered his wife, Octavia, in order to marry the same mistress.

A fire destroyed a great part of Rome in Nero's reign. It is asserted by some writers that the city was set on fire by the order of Nero, who attributed the fire to the Christians and persecuted them with the most unrelenting cruelty. He afterward killed Poppæa Sabina; murdered Antonia, the daughter of Claudius, because she refused to marry him; and finally married Statilia Messalina, whose husband he had put to death. The philosopher Seneca, who had been his tutor, and the poet Lucan took their own lives at his order. Finally the senate declared him an enemy of his country and he committed suicide.

Nerudo, Pablo (1904-), pseudonym of Ricardo Neftali Reyes, Chilean poet and political leader. At the age of 17 he was awarded a prize for a poem, *La Cancion de la Fiesta,* in the annual spring contest at Santiago. Then followed many poems, usually on conventional themes but written in an original style. Travel and years spent as Consul at Rangoon, Batavia, Ceylon, Madrid, and finally Mexico City, gave him opportunity for wider development but his poetry gradually became more political in theme and outlook. Sympathy with the Republicans during the Spanish Civil War completed his orientation toward the Left, and on his return to Chile he was elected Senator on the Communist ticket. As the outcome of a quarrel with President Videla he fled to Mexico and remained there until an administration more friendly to him was chosen to succeed Videla's. While in Mexico he completed his most ambitious work, *Canto General,* for which the Mexican artist Diego Rivera supplied part of the illustrations. Available to English readers is the collection of poems entitled *Residence on Earth.* Examples and discussions of his poetry may be found in *Poetry* magazine for May 1943, January and June 1945, and January and May 1952.

Nestorius (*nĕs-tō'rĭ-ŭs*), **(? - c.451)**, bishop of Istanbul, was born in Syria. He was made patriarch of Istanbul in 428, was deposed for heresy by the council of Ephesus in 431, and was banished to the Libyan Desert. The heresy he taught, called Nestorianism, was that the two natures, the divine and the human, coexist in Christ, but are not united. He would not allow the Virgin Mary the title that had been given to her as the "Mother of God." The orthodoxy of the Church, as against the doctrine of Nestorius, was championed by Cyril of Alexandria.

Nevin, Ethelbert (1862-1901), American composer, was born at Edgeworth, Pa. As a child he was a remarkable pianist; later he studied in Europe under von Bülow and Klindworth, exhibiting a rare gift for composition. From 1887 to 1893, he taught in Boston, then studied in southern Europe until 1900, when he returned and associated himself with Horatio Parker at Yale. His compositions, all cast in miniature form, are characterized by dainty originality and exquisite melody. *Narcissus,* one of a group entitled *Water Scenes,* and a song, "The Rosary," are among the most popular.

Nevins, Allan (1890-), American historian and educator, was born at Camp Point, Ill., and was graduated from the University of Illinois. From 1913 to 1927, he worked mainly as an editorial writer on the New York *Evening Post,* the *Nation,* and the New York *World.* In 1927, he became an instructor in American history at Cornell University, and in 1931 at Columbia University, where he has achieved eminence as a foremost authority on the development of the United States. Nevins's work is marked by literary ability and a broad range of period and subjects. He has edited the diaries and letters of many noted Americans, written biographies (that of Grover Cleveland won him a Pulitzer prize in 1932), and lucid accounts of critical historical periods. *His Inner History of the Grant Administration* won a Pulitzer prize in 1937. The first two volumes of his most monumental work, dealing with the background of the American Civil War, were published in 1946, and entitled *The Ordeal of the Union,* followed by the two-volume *The Emergence of Lincoln* in 1950. Nevins held the honored chair of Harmsworth Professor of American History at Oxford in 1940-41. During World War II, he served as a public affairs officer.

Newall of Clifton-upon-Dunsmoor, Cyril Louis Norton, Baron (1886-), British soldier, was born in India. Educated at the Royal Military College, Sandhurst, Eng., he served in the British army in India, where he learned flying in 1900 and helped establish the first flying school in India. In World War I, he was advanced to leadership on a brigade of the air force. He held various positions in the royal air force thereafter, being appointed marshal of the Royal Air Force in 1940. The test of his career came in that year, when Germany attacked England by air on a scale never before attempted in warfare. Newall's preparations, both technical and in the training of men, was sufficiently effective to prevent a projected invasion, hold down bombing losses, and later turn the scales. From 1941 to 1946 he was governor general of New Zealand. He was raised to the peerage in 1946.

Newcomb (*nū'kŭm*), **Simon (1835-1909)**, astronomer and mathematician, was born in Wallace, N. S. He came to the United States in 1853; was graduated from Harvard, 1858; and was appointed professor of mathematics, United States navy, in 1861, in which position he oversaw the construction of a telescope completed in 1873. From 1877 to

1897, he was director of the *Nautical Almanac*; was professor of mathematics and astronomy, Johns Hopkins, 1884-94.

Newcomb established formulas from which it was possible to construct accurate lunar tables. His tables of the planetary system were adopted by nearly all the observatories of the world. His numerous writings include *Popular Astronomy, Principles of Political Economy, His Wisdom the Defender, Reminiscences of an Astronomer,* and *Side Lights on Astronomy.* He was elected to the American Hall of Fame in 1935.

Newcomen (*nū-kŭm'ĕn*), **Thomas (1663-1729),** English inventor, was born at Dartmouth. A blacksmith by trade, he is known chiefly as the inventor of the atmospheric steam engine. In this engine, steam was admitted into the cylinder and was then suddenly condensed by a stream of cold water, thus creating a vacuum into which the piston was driven by atmospheric pressure. This engine was commonly used for pumping. Watt's acquaintance with it was a contributing cause of the invention of his engine, in which steam provided the motive power. See *Steam Engine.*

Newman, John Henry (1801-1890), English prelate and author, son of a London banker, was born in London. He was graduated from Trinity College, Oxford, 1820; was ordained to the ministry of the Anglican Church in 1824; and, in 1828, became vicar of Saint Mary's. He was a leader in the tractarian, or Oxford, movement and, in 1841, wrote *Tract XC,* which was severely condemned by officials of the Anglican Church.

After three years of retirement, Newman became a convert to the Roman Catholic Church. As he had exerted great influence among the Anglicans, the effect of this step was great. He went to Rome and was ordained a priest; founded the Brompton Oratory in 1850; and directed the Edgbaston Oratory for many years. He took part in controversies with Kingsley in 1864 and with Gladstone in 1874. He was created cardinal in 1879. Among his chief works are *Apologia pro Vita Sua, An Essay in Aid of a Grammar of Assent,* and *The Dream of Gerontius.* He wrote also the well-known hymn, "Lead Kindly Light." See *Oxford Movement.*

Newton, Sir Isaac (1642-1727), English mathematician and scientist, was born at Woolsthorpe near Grantham, Lincolnshire, England. He obtained his early education at Grantham Grammar School, where he already showed a keen interest in mechanical contrivances. In his 15th year, he was recalled from school to assist in the management of the family's farm. Having demonstrated his unfitness for the business of a farmer, he was sent back to school at Grantham. In 1661, he was admitted to Trinity College, Cambridge, at which he was graduated with the degree of master of arts in 1668. While at Cambridge, he formulated the binomial theorem.

Early Discoveries. In May 1665, Newton committed to writing his first ideas on fluxions, or the calculus, a discovery which afterward gave rise to a controversy with Leibnitz as to priority. In 1665, he discovered the unequal refrangibility of light and the nature of colors. Driven from Cambridge by the plague of this year, he went to Woolsthorpe. It is said that, at Woolsthorpe, in 1666, the fall of an apple, as Newton sat in his garden, suggested to him the most magnificent of his later discoveries, the law of gravitation.

The Law of Gravitation. On his first attempt, however, by means of the law so suggested to his mind, to explain the lunar and planetary motions, he employed a current estimate of the radius of the earth which was so erroneous as to produce a serious discrepancy between the real force of gravity and that required by theory to explain the motions. He accordingly abandoned the hypothesis and returned to his inquiries into the application of fluxions and to the construction of a small telescope, which he completed in 1668. The next year, Newton was appointed to the Lucasian chair of mathematics at Cambridge. In 1672, he was elected a member of the Royal Society, to which he disclosed, in February of that year, his discovery of the composition of light.

Newton had long since deduced from the laws of Kepler the important law that gravity decreases with the square of the distance. In 1682, he heard of Picard's more accurate measure of the earth's diameter, and, repeating with this measure his former calculations, he found to his extreme delight that the force of gravity by which bodies fall at the earth's surface, 4000 miles from the earth's center, when diminished by the reciprocal of the square of 240,000 miles, the moon's distance, was almost exactly equal to that which kept the moon in its orbit. Hence it followed that the same power retained all the other satellites round their primaries and all the primaries round the sun.

Newton had surmounted the difficulties of the planetary motion. The results of his profound studies were afterward set forth in his immortal work, the *Principia,* 1686-87. In this book, written in Latin, Newton established the science of theoretical mechanics as it exists today. In the whole history of science, no single contribution of any man has been as great as this.

Public Services. Shortly before the *Principia* was given to the public, Newton had been called to take an active part in defending the rights of Cambridge University against the illegal encroachments of James II. He sat in the Convention Parliament, 1689-90. He was made warden of the mint in 1696, and, three years later, he was appointed master of the mint, an office which he held until the end of his life. Newton again took a seat in Parliament in 1701, as the representative of his university. In 1705, he was knighted. In Parliament, he recommended the public encouragement of various inventions. He was president of the Royal Society from 1703 until his death, a period of 25 years. Newton died at Kensington and was interred in Westminster Abbey.

Ney (*nā*), **Michel (1769-1815),** marshal of France, the son of a cooper, was born in Saarlouis. He entered the army as a private hussar in 1788; became a general of brigade in 1796; and distinguished himself by his bravery in the wars of the Revolution and of the Empire. He earned for himself from the army under Napoleon and from Napoleon himself the title of "the bravest of the brave." When Napoleon abdicated in 1814, Ney attached himself to Louis XVIII, but, on the former's return from Elba, he joined his old master and commanded the Old Guard at Waterloo. On the second return of the Royalists to power, he was arrested, tried by his peers, and shot.

Nicholas II (1868-1918), last emperor of Russia, son of Alexander III, whom he succeeded, was born in Leningrad. His coronation as czar took place with impressive ceremonial at Moscow, 1896. Proposals for avoiding war, made to the powers in 1898, led to the First Peace Conference at The Hague in 1899 and to the establishment of the Permanent Court of Arbitration. His reign was marked by the construction of the Trans-Siberian Railroad to the Pacific Coast, by the Russo-Japanese War, by the granting of a constitution in 1905, and by participation in World War I. Increasing dissatisfaction with his rule in internal as well as external affairs culminated in the Russian Revolution. He was dethroned in March 1917 and, with his whole family, was officially murdered in July 1918.

Nicholson, Meredith (1866-1947), American novelist, was born at Crawfordsville, Ind. He received his education in the public schools of Indianapolis. In 1891, he published a volume of poems called *Short Flights* and, in 1900, an account of Indiana authors entitled *The Hoosiers.* In 1905, he produced the widely popular novel *The House of a Thousand Candles.* His writings include also *The Main Chance, The Port of Missing Men, The Little Brown Jug at Kildare, The Lords of High Decision, Old Familiar Faces,* and *The Poet,* a fictionized biography of James Whitcomb Riley. He later entered politics and held diplomatic posts in Paraguay, Venezuela, and Nicaragua.

Nicias (*nĭsh'ĭ-ăs*) **(? - 413 B.C.),** Athenian statesman and general, was the son of the wealthy Niceratus. After the death of Pericles, he was the political opponent of Cleon and later of Alcibiades, attracting to his cause the more conservative elements in the state. In the Peloponnesian War, Nicias was opposed to vigorous prosecution of hostilities against Sparta. In 415, he was appointed one of the commanders against Sicily in spite of the fact that he opposed that ruinous expedition. At first, he was successful; and later his fleet was destroyed, his army began a retreat, but he was captured and put to death.

Nicolle (*nē'kŏl'*), **Charles Jules Henri (1866-1936),** French bacteriologist. From an assistant professorship at the Rouen School of Medicine, he was called to the Pasteur Institute at Tunis. There he served also as surgeon in the French army, stationed at Algiers. In 1909, he made the first of a series of discoveries by which he demonstrated that typhus germs are transmitted through lice. This led to his development of a vaccine which imparts immunity to the human organism. His researches, with their promise of wiping out typhus as a plague, were signalized by the award of the 1928 Nobel prize in medicine.

Niehaus (*nē'hous*), **Charles Henry (1855-1935),** American sculptor, was born at Cincinnati, Ohio. He was educated in the public schools of Cincinnati and at the Royal Academy, Munich, and studied classical sculpture at Rome. His ability is best displayed in his monumental sculpture, which exhibits dignity of composition and purity of line. He executed the Garfield Statue, Cincinnati; statues of Ingalls, Allen, Garfield, and Morton in the rotunda of the Capitol, Washington; statues of Gibbon and Moses, Congressional Library; statues of Hooker and Davenport, Connecticut Statehouse; an equestrian statue of General Forrest, Memphis, Tenn.; a statue of McKinley at Canton, Ohio; the pediment of the State Capitol at Frankfort, Ky.; the John Paul Jones Monument in Washington, and Soldiers' and Sailors' memorials in New Jersey.

Nietzsche (*nē'chĕ*), **Friedrich Wilhelm (1844-1900),** German philosopher, was born at Rocken, near Leipzig. He was educated at the universities of Bonn and Leipzig. He was at first the friend and follower of Wagner in art and Schopenhauer in philosophy, although later both fell under his condemnation. At 25, he became professor of philology at Basel, resigning in 1879 from failing health.

In the ensuing ten years, he wrote, often during acute physical distress, the daring philosophical essays on which his fame rests. He maintained that there are two fundamental ethical types: the morality of slaves, or the weak and inferior among mankind, who foster all virtues that protect their weakness; the morality of the strong, the masters of mankind, who stand superior to the common mass of slaves and have no need for their utilitarian virtues. He denounced Christian morality as belonging to the slave type, asserting that only through the morality of the strong can men, that is, the few, the masters, rise to higher stages and attain the state of the "superman."

Among his works are *Thus Spake Zarathustra, Beyond Good and Evil, The Genealogy of Morals, The Twilight of the Gods,* and *The Will to Power.* His latest works are characterized by an insane egoism, the symptom of a mental disease from which he suffered before his death.

Nightingale, Florence (1820-1910), a philanthropic nurse, was born of wealthy English parents at Florence, Italy. At the age of 22, she entered a training school for nurses and she afterward studied the methods of nursing and hospital management with the sisters of Saint Vincent de Paul, Paris. In 1854, she volunteered to organize a staff of nurses for service in the Crimean War, and, during the terrible winter of 1854-55, she ministered with unwearied devotion to the suffering soldiers. On her return to England in 1856, she established a training college for nurses at Saint Thomas's and King's College hospitals. It was largely due to her influence that women were first employed as nurses for military hospitals.

Nijinsky (*nĭ-zhĭn'skĭ*), **Vaslav (1890-1950),** world-famous dancer and choreographer, was born in Russia, of Polish parents. A protege of Diaghilev, to whose company he once belonged, Nijinsky rose rapidly to the highest rank as a dancer. Two ballets created especially for him by Michael Fokine were *Spectre de la Rose* and *Petruchka.* Nijinsky's reputation as a choreographer rests upon four ballets which he originated: *Till Eulenspiegel, L'Apresmidi d'un Faun, Jeux,* and *Sacre du Printemps.* In 1919, at the height of his fame, he became mentally ill. The best of treatment encouraged the hope that he would be able to return to the ballet stage, but he died without regaining his sanity.

Nimitz, Chester William (1885-), American naval officer, was born at Fredericksburg, Tex. After being graduated from Annapolis in 1905, he rose through the grades to rear-admiral in 1938. He was chief of the Bureau of Navigation when, after the disaster at Pearl Harbor, he was placed in command of the Pacific fleet with the rank of admiral. The fleets under his command checked the Japanese advance at the Coral Sea and Midway; occupied or cut off their posts in Micronesia; and crushed Japanese naval power. He was made admiral of the fleet in 1944 and chief of naval operations, 1945. Retired, 1947. He was named head of the Truman Commission on Internal Security and Individual Rights, 1951.

Nixon, Richard Milhous (1913-), lawyer and politician, was born at Yorba Linda, California. After attending Whittier College, he was graduated from Duke University Law School, and was admitted to the California bar. He practiced law in Whittier, California. After serving as an officer in the United States Navy during World War II, he was elected to Congress from California in 1946 and was re-elected in 1948. He gained prominence while a member of the Committee of Un-American Activities for his work in exposing disloyal persons. In 1950 he was elected to the United States Senate, and in 1952 was the successful Republican candidate for vice president. He was renominated for the vice presidency in 1956 and was re-elected.

Nobel (*nō-bĕl'*), **Alfred Bernhard (1833-1896),** Swedish chemist and inventor, was born at Stockholm. In 1862, his father, a mechanician, began to manufacture nitroglycerin. In 1867, through the accidental escape of some nitroglycerin from a cask into the siliceous sand of the packing, Alfred discovered how to make a safe and manageable explosive—dynamite. He also invented blasting gelatin and several kinds of smokeless powder. Ultimately he patented more than 100 inventions and established manufactories in various parts of the world.

At his death he left a fund of $9,200,000 to provide five annual prizes to be awarded to the persons making the most important contribution in physics, chemistry, physiology or medicine, literature, and the cause of world peace. These prizes amount to about $40,000 each, and the first awards were made in 1901. See *Nobel Prizes.*

Nogi (*nō'gē*), **Maresuke, Count (1849-1912),** Japanese general, was born in Choshu. He served in the Satsuma rebellion of 1877 and was twice severely wounded. In the Chinese-Japanese War of 1894-95, he commanded a brigade at the battles of Kinchow and Port Arthur and, at the conclusion of the war, was promoted lieutenant general. While in command of the third army in the Russo-Japanese War, he captured Port Arthur, 1905. He was created baron in 1895, and count in 1906.

Nordau (*nôr'dou*), **Max Simon (1849-1923),** German physician and writer, of Jewish descent, was born at Budapest. He received his university education at Budapest, Berlin, and Paris; traveled through Europe; and took up his residence in Paris, 1880. His books on moral and social questions, more especially two in English translation, *Lies of Our Civilization* and *Degeneration,* led to extensive discussion. The latter argued that genius is allied to degeneration. They were followed by *The Drones Must Die.* He published works also in Italian and French. His body was transferred from France in 1926 to Tel Aviv, Palestine.

Nordenskjöld (*nōōr'dĕn-shûld'*), **Nils Adolf Erik, Baron, (1832-1901),** explorer and geologist, was born at Helsinki, Finland. He was educated at the University of Helsingfors and was appointed curator of the faculty of mathematics and physics. In 1855, he was dismissed for political reasons and left the country. In 1858, he was appointed state mineralogist at Stockholm, having obtained letters of naturalization as a Swedish subject.

Nordenskjöld conducted several voyages of exploration in the Arctic Ocean and made frequent visits to Spitsbergen, where he measured an arc of the meridian. In 1878-79, he discovered the so-called Northeast Passage, traversing, along the northern shores of Europe and Asia, the whole Arctic sea from the Atlantic to the Pacific. Proceeding on his cruise, he was the first to circumnavigate Asia and Europe. For these achievements he was made baron in 1880.

Nordica (*nôr'dĭ-kä*), **Lillian (1859-1914),** née Lillian Norton, American singer, was born at Farmington, Me. Her musical education was obtained at the New England conservatory, Boston, and at Milan, Italy.

She made her debut as an operatic soprano at Brescia, Italy, in *La Traviata.* In 1887, she appeared in London with marked success, continuing her triumphs in Paris, Leningrad, and other European capitals. She was best known in Wagnerian roles.

Possessed of a magnificent voice, a pleasing presence, and marked dramatic ability, she ranked among the foremost American singers of her time and won great distinction abroad. While engaged in a world tour, she contracted pneumonia from exposure in shipwreck and died at Batavia, Java (now Jakarta, Indonesia).

Norris, Benjamin Franklin (1870-1902), American novelist, generally known as Frank Norris, was born in Chicago. He studied art in Paris, 1887-89, and pursued literary courses at the University of California and at Harvard, 1890-95. He was war correspondent in South Africa at the time of the Jameson raid; was editor of the San Francisco *Wave,* 1896-97; and, during the Spanish-American War was correspondent in Cuba for *McClure's Magazine.*

His story of San Francisco slums, *McTeague,* published in 1899, was his first successful novel. This was followed by an ambitious trilogy comprising *The Octopus, The Pit,* and *The Wolf*—the last left unfinished. This series was intended to constitute the epic of wheat and contains an arraignment of the evils of railway monopoly and grain speculation. See *Octopus, The.*

Norris, George William (1861-1944), American legislator, was born in Sandusky County, Ohio. Working his way through school by doing farm work and by teaching, he succeeded in obtaining a law degree at Valparaiso University and began practice of law in Nebraska in 1885. Entering politics, he began in 1903, a distinguished career in Congress as a progressive Republican and later as an independent. For 10 years he sat in the House and then was elected to the Senate for five successive terms but was defeated in 1943. In the face of the most intense popular pressure he voted against war with Germany in 1917. He sponsored, among other measures, the anti-injunction act of 1932; the 20th, or "lame duck," amendment to the Constitution; and the establishment of the Tennessee Valley Authority. In Nebraska he brought about the change to a unicameral legislature.

Norris, Kathleen (1880-), née Kathleen Thompson, American author, was born at San Francisco. In 1909, she married Charles Gilman Norris. In the following year, she began writing short stories and contributed to the leading popular periodicals of America. Her works include *Mother, The Story of Julia Page, The Heart of Rachael, Undertow, The Beloved Woman, Certain People of Importance, Wife for Sale, Lost Sunrise,* and *Corner of Heaven.*

Norstad, Lauris (1907-), American Air Force officer, was born in Minneapolis, Minn., the son of a Lutheran minister whose father had emigrated to the United States from Norway. During World War II he served in Europe and Africa, rising from the rank of lieutenant general in the Air Force to that of major general, his promotion coming as a result of his great skill in staff work. In 1952 he was made a general. Soon after the creation of NATO, General Norstad became commander in chief of the U. S. and Allied Air Forces in Central Europe. In 1956 he succeeded General Gruenther as supreme allied commander in Europe.

North, Frederick North, Baron (1732-1792), English statesman, was educated at Oxford. He entered the House of Commons at the age of 22 and was made junior lord of the treasury in 1759. In 1767, he was appointed Chancellor of the Exchequer and leader of the House of Commons, being there opposed to Fox and Burke. In 1770, he became Prime Minister and his course, to a large extent, caused England to lose the American colonies. He resigned in 1782.

North, Sterling (1906-), American critic and author, was born in Edgerton, Wis., and studied at the University of Chicago. He has been a book reviewer and literary editor of metropolitan newspapers for over 20 years. From 1933 to 1943, he was literary editor of the Chicago *Daily News*. He was then literary editor of the New York *Evening Post*, and has been literary editor of the New York *World-Telegram and Sun* since 1949. His columns, pungent and outspoken, are syndicated to many papers across the country. North, who is the author of twenty published books, drew upon his youth in Wisconsin to write two sensitive novels, *Plowing on Sunday* (1934) and *Night Outlasts the Whippoorwill* (1936). He also has written another novel, *Seven Against the Years* (1939), and several children's books. His *So Dear to My Heart* was made into a motion picture by Walt Disney. He is a frequent contributor to *Harper's, The Nation, Esquire, Atlantic Monthly, Poetry,* and *The Reader's Digest.*

Northcliffe, Alfred Charles William Harmsworth, Viscount (1865-1922), British newspaper proprietor, was born in Chapelizod, Ireland. In 1888, he founded the weekly periodical *Answers*, which had an immediate success. In 1894, he bought the London *News* and, two years later, founded the *Daily Mail*. He subsequently founded the Glasgow *Daily Record*, acquired the Leeds *Mercury*, the Birmingham *Gazette*, and the London *Times*. He was elevated to the peerage in 1905.

After the outbreak of World War I, he conducted a vigorous editorial campaign to secure greater efficiency in providing military equipment and munitions. In June 1917, Northcliffe was sent to the United States as special representative of the British government to co-ordinate the work of the various war commissions. He was also made director of propaganda in enemy countries.

The influence which Northcliffe was able to wield by means of his chain of newspapers was an unprecedented factor in British public life.

Norton, Charles Eliot (1827-1908), American educator, critic, and scholar, was born at Cambridge, Mass. He was graduated from Harvard, 1846, and entered a countinghouse in Boston. He went as supercargo on an East Indian voyage, 1849; later made several trips to Europe; and became known as a Dante scholar and an authority on art. From 1864 to 1868, he was editor, with James Russell Lowell, of the *North American Review*. He was professor of the history of art at Harvard, 1875-98.

By his finely endowed personality, he exercised a great cultural influence upon his generation. Among his writings are *Considerations on Some Recent Social Theories, Historical Study of Church-Building in the Middle Ages,* and translations of Dante's *Vita Nuova* and *Divina Commedia*. He became a member of the American Academy of Arts and Letters in 1905.

Nourse, Elizabeth (1860-1938), American painter, was born at Cincinnati, Ohio. She began study at the Cincinnati Art School at 13 and, by designing and decorative work, earned means to continue study in Paris. At 18, she entered the Académie Julien, studying under Boulanger and Lefèbvre and later under Carolus Duran. Boulanger influenced her to open a studio in Paris, and soon afterward her painting "A Mother and Child" was accepted at the salon.

Continuing to work in Paris, she became one of the ablest American painters in France. The new salon elected her to its membership and her painting "Closed Shutters" was purchased by the French government for the Luxembourg Gallery. Among her other paintings are "Good Friday in Rome," "Consolation," "The First Communion," "Little Sister," and "The Family Repast." Her work is represented in America by "Mother and Children," in the Art Institute, Chicago; "Happy Days," in the Detroit Art Museum; and paintings in other collections.

Noyes (*noiz*), **Alfred (1880-),** English poet, was born in Staffordshire. He received his education at Exeter College, Oxford. From early life he devoted himself to literature. He contributed numerous poems and critical articles to English and American reviews. In 1913, he gave the Lowell lectures on "The Sea in English Poetry" in Boston. He was elected to the professorship of modern English literature at Princeton University in 1914. During World War I, he was temporarily attached to the British foreign office. His many books of prose and verse include *The Loom of Years, The Flower of Old Japan, Forty Singing Seamen, The Enchanted Island, Tales of the Mermaid Tavern, The Winepress, Walking Shadows, The Elfin Artist, Torch-bearers, The Unknown God,* and *Voltaire*. His autobiography, *Two Worlds for Memory,* was published in 1953.

Noyes, John Humphrey (1811-1886), American religious leader, was born at Brattleboro, Vt. His father was a representative of Congress and his mother was an aunt of President Hayes. After being graduated from Dartmouth College, he studied at Andover and Yale and became a Congregational minister in 1833.

Professing a second conversion and a revelation of the dual sexual nature of God, he gathered around him, in 1838, a group which attempted to return to the communism of the early Church. Property was held in common and a system of complex marriages led to a communism in the care of children. The community was forced to migrate to Oneida, N. Y., where the hostility chiefly of the Protestant churches induced an abandonment of the more distinctive institutions of the community. In 1881, most of the members formed a joint stock company, which has become known especially for the manufacture of mousetraps and the so-called Community silverware. Noyes, however, and some of his adherents removed to Canada. Noyes died at Niagara Falls, Ont.

Nye, Edgar Wilson (1850-1896), "Bill Nye," American writer and humorist, was born at Shirley, Me. After spending his childhood in Wisconsin, he went to Wyoming; studied law; was admitted to the bar in 1876; and was elected to the state legislature. He also acted as postmaster and newspaper correspondent. Through his humorous contributions to the press he achieved wide popularity. His health failing, he returned East, finally settling in New York. In company with James Whitcomb Riley, he made frequent tours of the country, giving entertainments consisting of lectures and readings. His writings include *Bill Nye and the Boomerang, The Forty Liars, Baled Hay, Remarks, Chestnuts, Bill Nye's Blossom Rock, The Cadi,* and comic histories of England and the United States.

Oakley, Annie (1860-1926), a crack shot with a rifle or shotgun, was for many years the female star of Buffalo Bill's wild west show. Phoebe Anne Oakley Mozee was born in Darke County, Ohio, and learned to handle a gun when she was nine. She married a vaudeville actor, Frank E. Butler, from whose lips she could shoot a cigarette at 30 feet, or a dime held between his finger and thumb. Joining Buffalo Bill in 1885, she appeared in calf-high scalloped boots, a sombrero, and cowgirl garments, and her specialty was breaking glass balls thrown several at a time into the air to a height of 45 feet. The "infallible little shot" could handle a horse as well as a gun. She died at Greenville, Ohio.

Oberlin (*ō'bĕr-lĭn*), **Jean Frédéric (1740-1826),** Alsatian clergyman and philanthropist, was born in Strasbourg. He was educated at Strasbourg University; studied theology; and became a Lutheran clergyman. He was celebrated for his philanthropy and for his services to the population of Ban de la Roche, among whom he labored for 60 years. He made roads, improved the system of agriculture, and promoted education. At the time of the French Revolution, not only was Ban de la Roche saved, through the reputation of the people and their pastor, from all molestation, but Oberlin was able to offer an asylum to proscribed persons. Oberlin College, Ohio, is named for him.

Obregon (*ō'brâ-gōn'*), **Alvaro (1880-1928),** Mexican statesman, was born in Nogales, Sonora, Mex., of Basque and Yaqui parentage. Joining Carranza in 1913, he distinguished himself by defeating Huerta and winning several other victories at the head of a Constitutional army. In 1915, he opposed Villa, over whom he won four victories, losing his right arm in one of these engagements.

After serving as Carranza's minister of war, he resigned in May 1917 and retired to his estate, where he accumulated a fortune by controlling the chick-pea crop on the Western Coast. Becoming a candidate for the presidency, he was charged by Carranza with rebellion and was arrested. He escaped; raised an army; succeeded in driving Carranza from power; and was elected president in 1920.

Obregon's administration resulted in substantial progress in carrying out the revolutionary program of 1915. After an intervening term by Calles, Obregon was again elected president in 1928, but before taking office he was assassinated.

O'Casey, Sean (1884-), Irish playwright, was born in Dublin. His greatest works are associated with the Abbey Theater at Dublin, where his first play, *The Shadow of a Gunman*, was produced in 1925. O'Casey had no formal education, but worked as a laborer and fought with the Irish Revolutionary Army in the bitter "trouble" with England until his dramatic genius emerged. His most famous plays are *Juno and the Paycock* (1924) and *The Plough and the Stars* (1926). Both were put on at the Abbey Theater, and both are lit by a lyrical beauty and emotional intensity. He has written three autobiographical works. *Pictures in the Hallway* (1942), *Inishfallen, Fare Thee Well* (1949), and *Rose and Crown* (1952). O'Casey, a self-exile from Ireland, lives in Devon, England.

Occam (*ŏk'ăm*), or **Ockham, William of (c. 1280-c.1349)**, English scholastic, was born at Ockham in Surrey. He entered the Franciscan order; studied at Oxford and Paris; and was a leader in the Franciscans' protest against Pope John XXII's denunciation of evangelical poverty. After imprisonment at Avignon, Occam fled to Munich and there found a defender in Emperor Louis of Bavaria, whom he in turn stoutly defended against the temporal claims of the pope. Besides insisting on the divine right of rulers, Occam won fame as the reviver of nominalism. He held that God's existence could not be proved. Among his writings on government, philosophy, and theology are his *Dialogus* and *Tractatus de Sacramento Altaris*.

Ochs (*ŏks*), **Adolph Simon (1858-1935)**, American newspaper proprietor, was born in Cincinnati, O. of Jewish parentage. He attended public school in Knoxville, Tenn. Beginning work as a printer's devil at 15, he succeeded, five years later, in acquiring the debilitated Chattanooga *Times*, which he made a leading paper in the South. In 1896, he obtained ownership and control of the New York *Times*, then in financial difficulties, and increased its net circulation from about 10,000 to over 400,000 in the next 35 years, the annual receipts rising to more than 25 million dollars. This result was secured largely through improvements in news service. Ochs owned the Philadelphia *Public Ledger* from 1902 to 1912, when he sold it to Cyrus H. K. Curtis.

O'Connell, Daniel (1775-1847), Irish Nationalist leader and orator, was born in County Kerry. He studied at the College of Douai, France, and was admitted to the Irish bar in 1798. He organized the Catholic party and contended successfully for the admission of Catholics to Parliament, himself entering Parliament in 1829. His remarkable speeches in Parliament were equaled only by his popular addresses throughout Ireland. In 1840, he revived the Catholic party for repeal of the Anglo-Irish union. In this cause, however, he met determined opposition from the British government. In 1844, he was found guilty of sedition, but the House of Lords set aside the verdict.

O'Connell, William Henry (1859-1944), American cardinal, was born at Lowell, Mass. He was graduated from Boston College, 1881, and immediately entered the American College at Rome, where he was ordained priest, 1884. In 1895, he was appointed rector of the American College at Rome. He was made bishop of Portland, Me., 1901, and was named assistant at the pontifical throne, 1905. He became archbishop of Constance, 1906; succeeded to the see of Boston, 1907; and, in 1911, was made cardinal.

O'Connor, Thomas Power (1848-1929), Irish journalist and politician, popularly known as "Tay Pay," was born at Athlone. He was graduated from Queen's College, Galway, 1866; took up journalism in Dublin, 1867; went to London, 1870; and there became an editor on the *Daily Telegraph*. Afterward he was employed in the London office of the New York *Herald*. In 1880, he entered Parliament as a member for Galway and, after 1885, was member for Liverpool for more than 30 years. He was a powerful supporter of the Irish Nationalist party and toured the United States several times, speaking in the interests of Irish Home Rule. He founded and was editor of the *Star*, the *Sun*, and *T. P.'s Weekly*.

Odlum, Floyd Bostwick (1892-), American financier, was born at Union City, Mich. Educated at the University of Colorado, he came East and, after gaining experience in the electric power business, interested a number of friends in Massachusetts in the idea of investment trusts. With an initial investment of about $40,000 in 1923, he formed a company to hold utility stocks. The company grew during the 1920's but its greatest expansion came after the disasters which overtook most investment trusts after 1929. Odlum's ability in negotiation enabled him to secure control of 22 other trusts, which he merged to form Atlas Corporation. Part of the success of the enterprise depended on its purchase of businesses in difficulties and, by refinancing and provision of able management, restoring them to profitable operation.

Oehlenschläger (*ûl'lĕn-shlâ'gĕr*), **Adam Gottlob (1779-1850)**, Danish poet and dramatist, was born near Copenhagen. In 1803, he published *The Play of St. John's Eve*, which attracted favorable notice. This was followed by a series of national tragedies in verse, which raised him to the first rank among Danish poets. His plays show epic and lyric rather than dramatic qualities and they display unrivaled command of language. He ranks among the Danes as Goethe among the Germans.

Oersted (*ûr'stĕTH*), **Hans Christian (1777-1851)**, Danish physicist, was born at Rudkjobing, in the Island of Langeland. He was graduated from the University of Copenhagen. He then traveled in the Netherlands, Germany, and France and, in 1806, was appointed professor of natural philosophy in the University of Copenhagen.

In 1820, he published an essay entitled *Experiments on the Effect of Opposing Electricity Upon the Magnetic Needle*, in which he showed the identity of the forces of magnetism, electricity, and galvanism. Oersted desired to make science popular and he wrote numerous works with that object in view. He also gave many popular lectures.

Offenbach (*ôf'ĕn-bäK*; *ôf'ăn'bäk'*), **Jacques (1819-1880)**, French composer of comic operas, was born of German Jewish parents in Cologne. In 1833, he began study at the Paris Conservatory; in 1849, became leader of the orchestra at the Théâtre Français; and, in 1855, opened the Bouffes Parisiens, where he produced operas of his own composition until 1866. Among his many works are *Les Deux Aveugles*, *Le Violoneux*, *Le Mariage aux Lanternes*, *Orphée aux enfers*, *Barbe-Bleue*, *La Grande Duchesse*, *Geneviève de Brabant*, and *Les Brigands*. His *Tales of Hoffmann*, published after his death, became popular.

Oglethorpe (*ō'g'l-thôrp*), **James Edward (1696-1785)**, English general and founder of Georgia, was born at London. He served in the British army and in Parliament. He planned a colony in America as a refuge for debtors then imprisoned in English jails and also for persecuted German Protestants. George II gave the necessary land, named Georgia in his honor, and Parliament contributed $50,000. He brought over 120 persons and founded the city of Savannah in 1733. In anticipation of a war with Spain, Oglethorpe returned to Georgia in 1738 with a regiment of 600 men. He invaded Florida and was unsuccessful in an attack on Saint Augustine, but later repulsed a Spanish invasion of Georgia. He left the colony in 1743 and surrendered the charter to the British government in 1752. He died in England.

O'Hara, John Francis (1888-), American educator and churchman, was born at Ann Arbor, Mich. Educated at the Montevideo (Uruguay) Jesuit College and Notre Dame University, he was ordained a Roman Catholic priest in 1916. The next year, he began teaching at Notre Dame University, of which he became president in 1934. In 1939, he was made auxiliary bishop of the army and navy diocese. As part of a policy to promote cultural solidarity throughout the Americas, he instituted a movement for interchange of students with South American universities and conducted a news service. He was made bishop of Buffalo in 1945 and archbishop of Philadelphia, 1952.

O'Hara, John (Henry) (1905-), American author, was born in Pottsville, Pa., the son of a doctor. He is a writer of incisive novels and short stories dealing with many levels of American life, and he is also an accomplished journalist and film writer. Both his locale and his father's profession recur in O'Hara's themes. He was a reporter on small papers in Pennsylvania, and then on large New York City dailies, specializing in sports and drama criticism. O'Hara's first novel, published in 1934, was *Appointment in Samarra*. Its tragic hero, Julian English, is one of two memorable characters that O'Hara has created, the other being the vivid Pal Joey. In 1935, O'Hara's brilliant repertorial talents were shown in *Butterfield 8*, an episodic but gripping novel set at the end of the prohibition era in New York. He wrote the libretto for the stage adaptation of his Pal Joey stories, with music by Richard Rodgers, which appeared on Broadway in 1940 and was revived to even greater acclaim in 1954. O'Hara's great popular success has come since the publication of *A Rage to Live* in 1949, followed by *The Farmers Hotel* (1951), *Ten North Frederick* (1955), and many volumes of collected short stories. His writing is marked by laconic humor and a striking aptness for reproducing dialogue.

Ohm (*ōm*) **Georg Simon (1787-1854)**, German physicist, was born at Erlangen. He was educated at the University of Erlangen. He held the chair of physics at Cologne, 1817-26; was director of the Nuremberg Polytechnic School, 1833-49; and became professor at Munich in 1849. "Ohm's law" was a result of his researches in electricity. The unit of resistance in an electrical conductor was named the ohm by the Paris congress of physicists in 1881 in honor of his achievements. See *Ohm's Law*.

O'Keeffe, Georgia (1887-), American painter, was born at Sun Prairie, Wis. Having studied at the Chicago Art Institute, the Art Students' League in New York City, and Columbia University, she worked as illustrator for advertising agencies and then taught art at the University of Virginia and the West Texas State Normal College. From 1918, she confined her activities to painting under the encouragement of Alfred Stieglitz, photographic artist, to whom she was married in 1924. Exhibiting simplicity and directness of approach in pure tones of luminous color, she depicted chiefly flowers, buildings, and desert scenes, usually with an element of obscure symbolism.

Olaf (*ō'läf*), **Saint (995-1030)**, king of Norway. When a youth he went as a viking to England, where he fought many battles and became zealously interested in Christianity. In 1015, he succeeded in securing the throne of Norway. The severity with which he sought to exterminate paganism alienated his subjects, who adhered to Canute of Denmark. Olaf fled to Russia and, in 1030, gave Canute battle at Stiklestad, where Olaf was defeated and slain. His body, laid in the Cathedral of Trondhjem, is said to have wrought many miracles. Olaf became the patron Saint of Norway.

Olivier (*ō-lēv'i-ā*), **Sir Laurence Kerr (1907-)**, British stage and motion picture actor and director, was born in Dorking, England, gaining early theatrical experience with the Birmingham Reportory Theatre in the 1920's. He began his motion picture career in 1930. Best known for his acting in such Shakespearean roles as Hamlet, Romeo, and Richard III, he has also appeared in many other plays, both classical and modern. He has directed and acted in numerous productions of the Old Vic company of London. Sir Laurence is married to Vivien Leigh, the actress, with whom he has appeared in a number of plays.

Olmsted (*ōm'stĕd*), **Frederick Law (1822-1903)**, American landscape architect, was born at Hartford, Conn. He studied engineering at Yale and became interested in landscape gardening. About 1850, he traveled on foot through England and on the continent, studying parks and ornamental grounds. He is best known for planning Central Park, New York, and the Capitol grounds, Washington. He designed parks and public works at Chicago, Buffalo, Brooklyn, Boston, Milwaukee, and Montreal and acted as commissioner of the National Park of the Yosemite. He published *Walks and Talks of an American Farmer in England* and *A Journey in the Seaboard Slave States*.

Olney (*ōl'nĭ*), **Richard (1835-1917)**, American lawyer and statesman, was born at Oxford, Mass. He was graduated from Brown, 1856, and at Harvard Law School, 1858. He was admitted to the bar in 1859; practiced law at Boston; was elected to the Massachusetts legislature, 1874; and became a member of President Cleveland's cabinet. While serving as attorney general, 1893-95, he set the precedent for securing labor injunctions from federal courts, taking this action in the Pullman strike of 1894. He was Secretary of State in 1895-97. He then resumed the practice of law in Boston. His state papers are noteworthy for their vigor.

Omar (*ō'mär*), **Abu-Hafsa-ibn-al-Khattab (c. 581-644)**, second caliph of the Moslems. Before 617, he persecuted Mohammed and his followers, but, having been converted to the faith of Islam, he devoted himself to its interests and advised the Mohammedan leader Abu-Bekr to undertake conquests in order to propagate the new religion. On the death of Abu-Bekr, Omar became caliph and pushed on the wars of conquest with increased vigor, subduing Iran, Syria, Palestine, Egypt, and Armenia. Omar is thus to be considered the organizing genius of Mohammedanism, which he found an obscure sect and left a powerful empire.

In 637 A. D., he was summoned to Jerusalem to receive the keys of that city and, while there, he gave orders to build a mosque, now called by his name, on the site of the temple of Solomon. He instituted the practice of dating from the hegira. He was assassinated.

Omar Khayyam (*ō'mär kī-äm'*) **(? - c. 1123)**, Persian astronomer and poet, was born at Nishapur in the latter part of the 11th century. Having been appointed astronomer to the sultan, he reformed the Moslem calendar. Of his Arabic mathematical treatises, one on algebra was edited and translated by Woepcke in 1851. Omar was known to the Western world only as a mathematician until the translation of his *Rubaiyat* by Edward Fitzgerald was published in 1859. Omar was the poet of agnosticism. Though some see nothing in his poetry save the wine cup and roses, others read into it the multiple meanings of Sufi mysticism.

O'Neill, Eugene Gladstone (1888-1953), American playwright, was born in New York City. He studied at Princeton and Harvard universities. *Thirst, and Other One act Plays*, published in 1914, is the first of a series which brought him to the forefront of contemporary dramatists. Those of later authorship include *The Moon of the Caribbees, Emperor Jones, All God's Chillun Got Wings, Desire under the Elms, Mourning Becomes Electra*, and *Days without End*. His *Beyond the Horizon, Anna Christie*, and *Strange Interlude* won awards of the Pulitzer prize for the year's best play of 1920, 1922, and 1928 respectively. In 1936, he was awarded the Nobel prize for literature. His play *Long Day's Journey into Night* was first published and produced posthumously in 1956.

Onnes (*ŏn'nĕs*), **Heike Kamerlingh (1853-1926)**, Dutch physicist, was born at Groningen. He was educated at the University of Groningen; became assistant in the Delft Polytechnic School; and later was appointed professor of physics at Leiden. In 1883, he instituted a long series of investigations into the effects of low temperatures on matter. He succeeded in liquefying helium in 1908 and also determining its boiling point, density, and critical temperature. Continuing his experiments with helium, he produced, in 1911, a temperature very near to absolute zero. He also showed that, at certain temperatures, there might be a perpetual electric current through metals. In 1913, Onnes was awarded the Nobel prize for physics.

Oppenheimer, J. Robert (1904), American physicist, was born in New York City and was educated at Harvard, Cambridge, and Göttingen. He also studied at the California Institute of Technology and Leyden and Zurich. In his research work he was especially interested in following out the implications of "quantum mechanics," and he did much experimental work on problems in nuclear physics. From teaching and research at the University of California he was called, in 1942, to join the atomic bomb project. He became director of the War Department's laboratory at Los Alamos, New Mexico. Since 1947 he has been director of the institute for advanced study at Princeton University.

Optic, Oliver (1822-1897), is the pseudonym of William Taylor Adams, American juvenile writer, born in Medway, Mass. For many years he was a public school teacher in Boston. He wrote more than one hundred books for boys.

Orange, Prince of. See *William I*, the Silent; *William III*, king of England.

Orcagna (*ōr-kän'yä*), **Andrea di Cione (c. 1300-c. 1368)**, Italian painter, sculptor, architect, and poet, was born at Florence. His father was a sculptor and goldsmith, and his elder brother was a painter. He was appointed architect of the Church of Or San Michele at Florence, 1355, and his greatest work, the marble tabernacle of this church, is considered one of the most beautiful art creations of Italy. He was also chief architect of the Cathedral at Orvieto. The frescoes of the "Last Judgment" and "Christ and the Virgin," in the Church of Santa Maria Novella at Florence, still survive as examples of his painting. His work was studied by succeeding painters, especially by Michelangelo and Raphael.

Origen (*ŏr-ĭ-jĕn*) **(c. 185-c. 254)**, Greek Church father, was born at Alexandria. Much of his life was spent in Alexandria, where he won a great reputation as a teacher. He succeeded Clement as the head of the Catechetical school, but was finally compelled by persecution to leave in 231. From Alexandria he retired to Cæsarea and afterward to Tyre. In the persecution under Decius in 250, Origen was cast into prison and was subjected to protracted torture.

His writings were exceedingly numerous. A treatise on *Prayer*, an *Exhortation to Martyrdom*, and a polemical pamphlet *Against Celsus* are the most important of his works left to us. His theology represents a blend of the Greek science and philosophy of his day with the Hebraic elements of Christianity.

Orlando, Vittorio Emanuele (1860-1952), Italian statesman. Becoming a barrister and a law professor at the University of Rome, he was elected to the Chamber of Deputies in 1898. At different times he served as minister of education, minister of justice, and minister of the interior. He favored Italian intervention in World War I. After the disastrous defeat of Italian arms at Caporetto, he became premier and represented Italy at the Versailles Peace Conference. Popular dissatisfaction with the results of his negotiations led to the downfall of his ministry in 1919. He resigned his seat in Parliament in 1925 and his professorial chair in 1932 rather than espouse the cause of the Fascists. After the fall of Fascism, he took part, as an "elder statesman," in the reorganization of Italy.

Ormandy, Eugene (1899-), American musical director, was born in Budapest, Hungary, where he was a child musical prodigy before the age of five. He came to the United States in 1921. From 1931 to 1936 he was conductor of the Minneapolis Symphony Orchestra, and since then has been leader of the Philadelphia Symphony Orchestra.

Osborn, Alexander Faickney (1888-), advertising executive, was born in New York City. After he was graduated from Hamilton College in 1909, he became a newspaper reporter in Buffalo, N. Y. He entered the advertising business in 1915, and from 1919 to 1928 he was a partner of Bruce Barton and Roy Durstine. Since 1928 he had been a member of the firm of Batten, Barton, Durstine, and

Osborn. Among the books he has written are *Your Creative Power* and *Wake Up Your Mind*.

Osborn, Henry Fairfield (1857-1935), American paleontologist, was born at Fairfield, Conn. In 1877, he was graduated from Princeton, where he was assistant professor of natural science, 1881-83, and professor of comparative anatomy, 1883-90. He was then professor of zoology at Columbia University and curator of the American Museum of Natural History until 1910, after which time, while retaining connections with these institutions, he devoted himself to research. The exhibitions devised by him became models for other museums throughout the world.

His explorations in various western states resulted in important contributions to American paleontology. He also conducted exploring expeditions in Africa in search of mammalian fossils.

Oscar II (1829-1907), king of Sweden and Norway, was born in Stockholm. He was trained for the navy; studied at the University of Upsala; and was crowned king in Stockholm and at Drontheim in 1872. He reigned over Sweden and Norway until 1905 and thereafter over Sweden. He was an intelligent and judicious ruler, and, though he opposed the separation of Norway from the joint kingdom, his patience and tact made a peaceful solution possible. He was a keen student of naval and military history and a talented writer.

O'Shaughnessy, M. M. (1864-1934), American hydraulic engineer, was born in Limerick, Ireland. He was educated at the Royal University of Dublin and, in 1885, emigrated to California. Seven years later, he was appointed chief engineer of the California Midwinter Exposition, held in 1893-94. He was construction engineer of numerous water power and drainage projects in California and Hawaii, including the Morena Dam at San Diego, Cal. He died only a few days before the completion of the Hetch Hetchy Dam, to which he had devoted about 20 years of his life.

Osler(*ŏs 'lẽr*), **Sir William (1849-1919),** physician, educator, and author, was born at Bondhead, Ont. He was graduated from McGill University, Montreal, 1872. He was professor of medicine at McGill University, 1874-84; at the University of Pennsylvania, 1884-89; at Johns Hopkins University, 1889-1905; and at Oxford University from 1905 until his death.

Osler worked in nearly every field of medicine and, by his ability as an organizer and as a teacher, greatly influenced medical progress in all English-speaking countries. A remark of his on the comparative uselessness of men over 60 years of age gained wide notoriety in the distorted form that men over 60 should be chloroformed. He took an active part in the medical preparations for the British forces in World War I. He is most famous for his *Principles and Practice of Medicine*, first published in 1892. Other works include *Science and Immortality, Counsels and Ideals*, and *A Way of Life*.

Osmeña (*ōs-mā'nyä*), **Sergio (1878-.),** Filipino statesman, was born in 1878. Educated in law, he became governor of Cebu and, from 1916 to 1935, represented Cebu in the Philippine legislature, being leader of the Nationalist party. In 1935, he was elected vice president of the Philippines, with Manuel Quezon as president. On the latter's death in July 1944, while both were refugees in the United States from the Japanese conquerors of their homeland, Osmeña succeeded to the presidency. He returned to liberated Manila in 1945 but was defeated for re-election in 1946.

Ossoli (*ŏs'ō-lē*), **Marchioness.** See *Fuller, Sarah Margaret*.

Otho I (*ō'thō*) **(912-973),** the Great, emperor of the West, son of the emperor Henry I of Germany. In 936, he was formally crowned king of the Germans and, in 962, became Holy Roman Emperor. His reign was a succession of generally triumphant wars, during which he brought many turbulent tribes into subjection and acquired and maintained almost supreme power in Italy, imposing laws with equal success on the kings of Lombardy and the popes at Rome. He also consolidated the power of the German emperors and established Christianity at many different points in the Scandinavian and Slavonic lands.

Otis, Elisha Graves (1811-1861), American inventor, was born at Halifax, Vt. He became a carriage worker and established manufacturing concerns at Albany and Yonkers, N. Y. In his Yonkers factory, he perfected a safety device for passenger elevators by means of which the suspended car is prevented from falling even though the cables on which it is hung should break. This safety elevator made the modern high building possible and probably increased the value of city real estate more than any other 19th-century invention.

Otis, James (1725-1783), American statesman and orator, was born at West Barnstable, Mass., and became a leader of the Boston bar. He was advocate general in 1760, when the revenue officers demanded his assistance in obtaining from the superior court general search warrants allowing them to enter any man's house in quest of smuggled goods. Otis refused, resigned his office, and appeared in defense of popular rights. Elected to the Massachusetts Assembly in 1761, he became prominent in resistance to the Revenue Acts. His fame rests chiefly on *The Rights of the British Colonies Asserted and Proved*, published by him in 1764. He was killed by lightning.

Ouida (*wē'dä*). See *Ramée, Louise de la*.

Ovid (*ŏv'ĭd*), or **Publius Ovidius Naso (43 B.C.-17 A.D.),** Roman poet, was born of a noble family at Sulmo. He was educated for the law, but his love of poetry turned him from the legal profession. In 8 A. D., he was banished to Tomi by Augustus for an undisclosed cause.

Besides his celebrated *Metamorphoses*, treating in the spirit of burlesque all the transformations recorded in legend from the creation of the world to the time of Julius Cæsar, he was the author of a poem called *Ars Amatoria*; *Fasti*, a sort of poetical Roman calendar; and *Tristia* and *Epistolæ ex Ponto*, elegies written in complaint of his banishment. A masterly facility of composition, a vigorous fancy, a fine eye for color, and highly musical versification are the merits which made him a favorite both in his own day and in after ages. He died in exile at Tomi.

Owen, Sir Richard (1804-1892), English comparative anatomist, was born at Lancaster, Eng. He studied medicine at Edinburgh and London, then began work in zoology by preparing catalogues of the collections in the Museum of the Royal College of Surgeons and lecturing on comparative anatomy. In 1856, he became superintendent of the Natural History Department of the British Museum, a position favorable for studying living and fossil animals.

By his monumental work on anatomy and fossils, Owen became the logical successor of Cuvier in the fields of zoology and paleontology. His numerous researches in zoology were largely devoted to structure and embraced every group from the sponges to man.

Owen, Robert (1771-1858) English social reformer, was born in North Wales. In 1799, he married the daughter of David Dale, from whom he, with others, bought the village and cotton mills of New Lanark, Scotland. Here he introduced improved housing and education, making it a model and highly successful community, based partly on cooperative enterprise. Extending and enlarging his ideas of social improvement, he came to the United States in 1824 and founded a communist society at New Harmony, Ind.; but the enterprise failed and, in 1827, he returned to Great Britain, where similar experiments were made at Ralahine and at Tytherley. Owen began the agitation for one of the earliest factory laws, in 1819; he founded the first infant schools in England; and was the forerunner of socialist and consumer co-operative movements. His ideas are developed in his *Book of the New Moral World*.

Owen, Ruth Bryan. See *Bryan, Ruth*.

Owens, Jesse (1915-) American Negro track and field star, was born in Alabama. Considered the greatest track athlete of the century, he first showed his exceptional skill while in high school at Cleveland, Ohio. Later, as a member of the Ohio State University track team, Jesse Owens, one day in 1935, broke three world records and tied a fourth. At the Olympic games in 1936, he won four gold medals by equalling the world record in the 100-meter race (10.3 sec.), by breaking it in the 200-meter race (20.7 sec.) and also in the broad jump (26 ft. 5-5.16 in.), and winning the 400-meter relay race. Because he failed to make a scheduled track and field tour through Sweden following his Olympic triumphs, he was suspended by the Amateur Athletic Union.

In 1951, Jesse Owens returned to Berlin's Olympic Stadium as part of a show arranged by the U. S. High Commission and the Army and addressed 75,000 German citizens whom he urged to "stand fast with us in the fight for freedom and democracy." Made secretary of the Illinois Athletic Commission in 1952, he resigned in 1955 to undertake for the State Department a good will tour of India which met with great success. Since then, as a member of the Illinois Youth Commission, which is dedicated to keeping youngsters active in sports and out of trouble, he has organized what he calls Junior Sports Jamborees that have proved successful.

Oxford, Robert Harley, Earl of (1661-1724), English statesman, was born in London. He entered Parliament in 1689, and, in 1701, was elected speaker by a large majority. He retained this post until 1704, when he became secretary of state. He was forced out by other ministers, whose power he had sought to undermine through paying court to his cousin, Lady Masham, an intimate of Queen Anne. This connection served to bring him back to power as virtual prime minister, his popularity having been greatly increased by an attempt on his life on the part of a French refugee, France at that time being England's foe in the War of the Spanish Succession. The Peace of Utrecht was

signed through Oxford's efforts in 1713. When, in 1714, he lost the favor of his cousin, Lady Masham, Bolingbroke succeeded in getting him dismissed and became premier himself.

On the subsequent death of Queen Anne, both of the rivals, formerly colleagues, were suspected of having conspired to restore the Stuarts. When George I was proclaimed king, Bolingbroke fled to France, but Oxford remained to meet his fate. He was sent to the Tower, and, after two years' imprisonment, was brought to trial, acquitted, and released. He spent the remainder of his life in retirement.

Oxford and Asquith (*ŏks'fẽrd ăs'kwĭth*), **Herbert Henry Asquith, Earl of (1852-1928),** English statesman, was born at Morley, Yorkshire. He was educated at Balliol College, Oxford, and, in 1876, was admitted to the bar. He entered Parliament in 1886 and rose rapidly to first rank as a debater, becoming one of the most effective speakers on the Liberal side. He was chancellor of the exchequer, 1905-08, and, on the death of Sir Henry Campbell-Bannerman, 1908, became prime minister.

For a long period, Asquith tactfully controlled the contentious elements of his own party and placated the Labor members and the Irish Nationalists. To meet war conditions, he formed a coalition cabinet in May 1915, which continued in power until December 1916, when it was superseded by the virtual though authorized dictatorship of Lloyd George at the head of a special war council. Asquith was member of Parliament for East Fife, 1886-1918, and, in 1920, was elected member of Parliament for Paisley. He was elevated to the peerage in 1925. His *Genesis of the War* is an important historical document.

Oyama (*ō-yä-mä*), **Iwao, Prince (1842-1916),** Japanese soldier, was born in Kagoshima. He entered the Japanese army; was appointed colonel in 1871; and was promoted to the rank of major general in the same year, lieutenant general in 1878, general in 1891, and field marshal in 1898.

During the war between Japan and China, he was minister of war, but took the field as commander of the second army and captured Kinchow, Talienwan, Port Arthur, and Weihaiwei. In 1904, he was chief of the general staff and, when war broke out with Russia, he was appointed commander in chief in Manchuria, defeating the Russians at the three great battles of Liaoyang, the Shaho, and Mukden. He was created prince in 1907.

Paderewski (*pä'dĕ-rĕf'skē;-rĕs'kē*), **Ignace Jan (1860-1941),** Polish pianist and composer, was born in Podolia, Poland. He began to play the piano at three and, at seven, was placed under a local teacher. In 1872, he studied at Warsaw and later at Berlin. In 1884, he resolved to adopt the career of a virtuoso; removed to Vienna; placed himself under his fellow countryman Theodor Leschetizky; and, at the end of three years' hard study, made his debut in Vienna, immediately taking rank among the foremost pianists of the world.

In 1890, he astonished London with his marvelous playing and, in 1891, made the first of many remarkably successful tours in the United States. His compositions include the operas *Manru* and *Sakuntala*, a symphony, and numerous works for the piano, of which his *Minuet* has become widely known.

During and after World War I, he took a prominent part in securing the independence of Poland and he signed the treaty of peace in behalf of the newly formed republic. In 1919, he was chosen the first premier of Poland. He resigned the same year and later resumed his career as a pianist, taking up his residence in the United States near Paso Robles, Cal.

Paganini (*pä'gä-nē'nē*), **Niccolo (1782-1840),** Italian violinist, was born at Genoa. He received instruction in his ninth year at Genoa and afterward at Parma. In 1798, he began foreign tours alone; from 1801 to 1804, he lived in retirement; resumed concert tours in 1805; and played in Italy with great success for more than 20 years.

Paganini was one of the world's greatest masters of the violin. His intensity and passion enabled him to sway great audiences at his will. A feat that attracted special attention was his playing of a military sonata on a single string. He wrote many compositions.

Page, Thomas Nelson (1853-1922), American novelist and diplomat, was born in Hanover County, Virginia. After being graduated in law at the University of Virginia, 1874, he practiced at Richmond, Va., 1875-93, but subsequently turned to literature and lecturing.

His novels deal chiefly with the courtly and high-spirited aristocracy of Virginia at or about the time of the Civil War. Besides novels, he produced dialect stories and verse. In 1913, he was appointed American ambassador to Italy and served until 1922. Among his numerous writings are *In Ole Virginia, The Burial of the Guns, Meh Lady, Marse Chan, The Negro—The Southerner's Problem, The Land of the Spirit,* and a book of poems entitled *The Coast of Bohemia.* He was elected a member of the American Academy of Arts and Letters in 1908.

Page, Walter Hines (1855-1918), American journalist and diplomat, was born at Cary, N. C. After being graduated from Johns Hopkins University, he edited the *Forum* from 1890 to 1895 and, for the next few years, acted as literary adviser to Houghton, Mifflin and Company and as editor of the *Atlantic Monthly.* In 1899, he helped to found the firm of Doubleday, Page and Company and became editor of its magazine, the *World's Work.*

In 1913, Page was appointed ambassador to England. At the opening of World War I, his situation was a delicate one since he was charged with the diplomatic interests of Germany and Austria and with many other difficult ambassadorial tasks imposed by American neutrality. Then and later he labored strenuously for his ideal of cooperation among the English-speaking peoples. After his death, he was honored by a tablet unveiled in 1923 in Westminster Abbey.

Paine, John Knowles (1839-1906), American composer, was born in Portland, Me. After studying in his native city, he continued his musical education in Germany, 1858-61. In 1862, he became instructor and, from 1876 until 1906, he was professor of music at Harvard, occuping the first chair of music established in an American university.

While his early works are strictly classical in form and spirit, his later compositions show transitions to the romantic school. His choral music to the *Œdipus Tyrannus* of Sophocles, 1881, was perhaps the best American composition of its time. His works include *Centennial Hymn; St. Peter,* an oratorio; *Azara,* an opera; *Spring,* a symphony; *The Tempest* and *An Island Fantasy,* symphonic poems; and the vocal-orchestral works *The Nativity, Song of Promise,* and *Phœbus, Arise.*

Paine, Thomas (1737-1809), political and philosophical writer, was born at Thetford, England. He was at first a staymaker and afterward an exciseman. In 1774, he came to America and found employment with a publisher in Philadelphia. In 1776, Paine wrote a pamphlet entitled *Common Sense,* which maintained the cause of the colonies against the mother country. The influence of this publication was extraordinary, and it won him the friendship of Washington, Franklin, and other American leaders. He became secretary to the Committee of Foreign Affairs; visited France, 1787; and later went to England, where he published *The Rights of Man,* in reply to Burke's *Reflections upon the Revolution in France.* Going to France, he was elected in 1792 by the department of Pas de Calais as a deputy to the National Convention. At the trial of Louis XVI, he proposed that the king should be spared and offered him an asylum in America. In 1793, Robespierre caused Paine to be imprisoned for nearly a year. While in France, he wrote his famous *Age of Reason* in favor of deism. In 1802, he returned to the United States. He was elected to the American Hall of Fame in 1945.

Palestrina (*pä'lâs-trē'nä*), **Giovanni Pierluigi da (c. 1526-1594),** Italian composer, was born near Rome. In 1551, he was made master of the Julian Chapel, Rome, and in 1554, published a collection of masses that were so highly approved by Pope Julius III that he appointed their author one of the singers of the papal choir. His numerous masses, motets, hymns, offertories, magnificats, litanies, and madrigals mark an epoch in the annals of music and have led to his being called the "Homer of music." His place in the older styles of composition corresponds to that of Bach in the modern forms. See *Counterpoint, Schools of.*

Paley (*pā'lĭ*), **William (1743-1805),** English theologian, was born at Peterborough. He was educated at Christ's College, Cambridge. In 1776, he obtained the vicarage of Dalston and, within the next nine years, became prebendary, archdeacon, and chancellor of Carlisle. In 1785, he attained high reputation by his *Principles of Moral and Political Philosophy.* In this work he propounds the ethical theory called utilitarianism. In 1790 appeared his most original and valuable work. *Horæ Paulinæ,* which was followed by *A View of the Evidences of Christianity* and by *Natural Theology.*

Palissy (*pä'lē'sē'*), **Bernardde (c. 1510-1589),** French potter and naturalist, was born at La Chapelle Biron in the province of Perigord, France. In early youth, Palissy worked at his father's kiln; later he was apprenticed to a glass stainer at Agen. He spent his nights in study to obtain scientific knowledge and manual skill in his craft. Contact with geometry and designing and his love of outdoor life led him to study surveying.

In 1528, Palissy set out to make a tour of France, living by the practice of his two trades. His scientific knowledge was extended by experience thus gained, and his latent artistic qualities were stimulated. About 1539, Palissy married and settled at Saintes. An enameled cup of *faïence,* probably of Oriental ware, inspired him in an attempt to discover how white enamel was produced. He experimented for 16 years, exhausting all his resources and even burning his furniture. Disappointed in this quest, he nevertheless discovered a new kind of ware superior in

workmanship, design, and color to any previously made in France.

He became famous and was patronized by the nobility, who employed him to embellish their mansions with ornaments of the newly discovered ware. These ornaments received the name of *rustic figulines*. The marshal De Montmorency became his patron, and Catherine de' Medici protected him, although he was a stout Huguenot, and gave him a site in Paris for his furnaces.

Palissy remained in Paris for many years and devoted himself to his artistic employments and to the study of chemistry, geology, and natural history. Beginning in 1575, he delivered a number of public lectures on natural history, which were published later under the title *Discourses on Waters and Fountains*. In 1588, he was thrown into the Bastile as a heretic and was condemned to death. There he wrote many of his philosophical, artistic, and horticultural meditations, which were included in the *Garden*.

In chemistry, Palissy's classification of salts is still regarded as exact, and he was the first to establish a rational theory of crystallization. In literature, his poetic power and graphic style place him among the great writers of France; yet it is to the practical craftsman and artist that the world is most indebted. He died while in the Bastile under sentence of death.

Palladio (*păl-lä'dyō*), **Andrea (1518-1580),** Italian architect, was born at Vicenza. Having studied with the greatest care the writings of Vitruvius and the monuments of antiquity at Rome, he settled in his native city, where he acquired a wide reputation by his restoration of the basilica of Vicenza. His style, a composite characterized by great splendor of execution and justness of proportion, exercised an immense influence on the architecture of northern Italy. From his writings Thomas Jefferson obtained the architectural ideas carried out in the University of Virginia and widely imitated elsewhere.

Palma (*päl'mä*), **Tomás Estrada (1835-1908),** Cuban patriot, was born at Bayamo, and studied law at the University of Seville, Spain. He took part in the Cuban Revolution of 1868-78; rose to the rank of general; and became president of the Cuban republic. He was captured, however, by the Spaniards in 1877 and was imprisoned until the close of the rebellion. Palma then went to Honduras; became a teacher and later postmaster general; married a daughter of President Guardiola; came to the United States; and established a Boys' School in Central Valley, N. Y. During the Cuban Revolution of 1895, he was minister plenipotentiary for the Cuban republic and was subsequently president of Cuba, 1902-06.

Palmer, Alice Freeman (1855-1902), American educator, was born at Colesville, N. Y. She was graduated from the University of Michigan, 1876; was professor of history at Wellesley College, 1879-81, and president in 1882-87; and served as nonresident dean of the Woman's Department at the University of Chicago, 1892-94. In 1887, she married George Herbert Palmer, professor of philosophy at Harvard University. She was one of the most forceful and cultured of American educators. Her sudden death at Paris removed perhaps the most inspiring personality among modern teachers of women. A beautiful memorial to Alice Freeman Palmer, sculptured in relief by Daniel Chester French, has been erected at Wellesley College. She was elected to the American Hall of Fame in 1920.

Palmer, D. D. (1845-1913), founder of chiropractic, was born near Toronto, Ont., and removed later to Iowa. He practiced so-called magnetic healing. In 1895, he treated a partially deaf patient by correcting, through manipulation, the abnormal placement of certain vertebræ, and the subsequent restoration of the patient's hearing led Palmer to regard such vertebral adjustments as a treatment of extremely wide curative value. Later, in cooperation with his son B. J. Palmer, he founded at Davenport, Iowa, the Palmer School of Chiropractic, which was instrumental in spreading widely this type of therapeutics.

Palmerston (*päm'ĕr-stŭn*), **Henry John Temple, Viscount (1784-1865),** English statesman, was born at Broadlands, Hampshire. He entered Parliament in 1807 and, in the same year, became a junior lord of the admiralty. From 1809 to 1828, he was secretary for war. In the administrations of Earl Grey, Viscount Melbourne, and Lord John Russell, he held the post of foreign secretary, resigning in 1851 owing to a disagreement regarding the *coup d'état* of Louis Napoleon. In 1852, he became home secretary under Aberdeen, whom he succeeded as first lord of the treasury in 1855. He was prime minister from 1859 to 1865.

Palmerston's strong foreign policy was marked by sympathy for oppressed nationalities. He aimed at being the minister of the nation rather than a political party, and consequently his party affiliations varied at different stages of his career. He was one of the most generally acceptable ministers since the time of Pitt.

Papin (*pä'păN'*), **Denis (1647-c. 1712),** French physicist, was born at Blois. He studied medicine and practiced for some time. Later he became a pupil and assistant of Huygens; made improvements in the air pump; and attained wide reputation as a scientist.

While associated with Robert Boyle in London, he invented the double air pump and the air gun. To Papin belongs the honor of having first applied steam to produce motion by raising a piston. He invented also the safety valve; showed that liquids in a vacuum boil at a lower temperature than when exposed to the air; discovered the principle of the action of the siphon; and improved the pneumatic machine of Guericke.

Paracelsus (*păr'ä-sĕl'sŭs*), otherwise **Theophrastus Bombastus von Hohenheim (1493-1541),** physician and alchemist, was born in Switzerland. He entered Basel University at 16; studied alchemy and chemistry with Withemina, bishop of Würzburg; and, at the mines in Tyrol, learned the properties of metals and minerals. He acquired fame as a medical practitioner; was made town physician at Basel; and lectured on medicine at the university. He flouted the teachings of the medical authorities of the time, Galen and Avicenna, and publicly burned their works, declaring himself to be the monarch of medicine. A dispute with the authorities in 1528 drove him from Basel, and, after wandering for a dozen years, he settled in 1541 at Salzburg.

Paracelsus insisted vigorously on the necessity of observation in science and he learned many facts which he used to confound those who depend on older authorities. He appears also to have believed in magic and alchemy, and he claimed to have discovered the secret of prolonging human life indefinitely.

The hostility excited by his contempt for the authorities of the day and by a measure of quackery in his pretensions long blinded the world to the man's real achievements. He improved pharmacy and therapeutics, introduced many new remedies, made new chemical compounds, and taught that diseases were not mere excesses or deficiencies of certain liquids but were actual entities.

Park, Mungo (1771-1806), African explorer, was born near Selkirk, Scotland, and was educated at Edinburgh University. In 1795, he set out for Africa to find the source and the course of the Niger River, in which undertaking he succeeded the following year. He returned to Great Britain and published his *Travels in the Interior of Africa*. In 1805, he headed an expedition in search of the mouth of the Niger. After suffering great hardships, Park and his three remaining companions were drowned in the rapids near Bussa. The details of the expedition were made known through his journal and the discoveries of later explorers.

Parker, Sir Horatio Gilbert (1862-1932), novelist, was born in Camden East, Ont. He was educated at Trinity College, Toronto; was trained in journalism in Australia; and there began his literary and dramatic work. He traveled extensively in the East, in Europe, Egypt, and northern Canada, and settled in England, where he became a member of Parliament in 1900 and was knighted in 1902. He initiated and organized the first imperial universities conference in London, 1903. Parker was in charge of publicity work for the British government for more than two years in the first part of World War I. His services were rewarded by a baronetcy in 1915. His writings include a book of poems entitled *A Lover's Diary, The Vendetta, The Trail of the Sword, The Seats of the Mighty, The Battle of the Strong, The Right of Way, History of Old Quebec, A Ladder of Swords, Northern Lights, The World in the Crucible,* and *The Promised Land.*

Parker, Horatio William (1863-1919), American composer, was born at Auburndale, Mass. He was graduated from the Royal Conservatory, Munich, 1885; was professor of music in the Cathedral School of Saint Paul, Garden City, L. I., 1885-87, and was organist in Holy Trinity Church, New York, 1888-93, and Trinity Church, Boston, 1893-1901. He became professor of the Theory of Music at Yale in 1894.

In 1893, he produced his oratorio *Hora Novissima*, regarded as one of the finest American compositions. In 1911, with Brian Hooker, who wrote the libretto, he won the Metropolitan Opera prize of $10,000 for the opera *Mona*. In 1914, with Hooker, he was awarded for *Fairyland* the $10,000 prize offered by the national federation of women's clubs for an American opera.

Parker's other compositions include the overtures *Regulus* and *Count Robert of Paris*; the oratorios *St. Christopher* and *Morven and the Grail*; and the choral works *The Holy Child, The Kobolds, The Dream King, A Wanderer's Psalm,* and *A Star Song*. He was elected to the American Academy of Arts and Letters in 1905.

Parker, Louis Napoleon (1852-1944), English dramatist and composer, was born of American parents at Calvados, France. He was educated at Freiburg, Germany, and at the Royal Academy of Music, London, of which he became a fellow in 1898. He was director of music in Sherborne

School, Dorsetshire, from 1877 to 1896. Cantatas composed by him include *Silvia* and the *Twenty-third Psalm*. He is the author of many plays, including *The Love-Knot, Rosemary, Disraeli, Pomander Walk, The Bridge*, and *The Pageant of Kenilworth*.

Parker, Matthew (1504-1575), English prelate, was born at Norwich, England. He studied at Corpus Christi College, Cambridge, and was ordained a priest in 1527. In 1535, he was appointed chaplain to Queen Anne Boleyn. In 1552, he was presented by King Edward VI with the deanery of Lincoln. On the accession of Queen Mary, he was deprived of his preferments and was even obliged to conceal himself.

On the death of Mary and the accession of Elizabeth, 1558, Parker was appointed by the queen archbishop of Canterbury. It is to Parker we owe the "Bishops' Bible," undertaken at his request and published at his expense in 1572. He had also the principal share in drawing up the *Book of Common Prayer*. It was under his presidency, too, that the *Thirty-nine Articles* were finally reviewed and subscribed to by the clergy, 1562.

Parker, Theodore (1810-1860), American clergyman and scholar, was born at Lexington, Mass. He entered Harvard in 1830 and, during his collegiate course, supported himself by teaching private classes and schools. He was graduated from Harvard Divinity School in 1836 and, the next year, became a Unitarian minister at West Roxbury.

Parker was somewhat separated from the conservative Unitarians, as shown by his sermon *The Transient and Permanent in Christianity* and by his *Discourse on Matters Pertaining to Religion*, which attracted widespread notice and comment. For many years he preached to immense congregations at Melodeon and Music halls, Boston. He also lectured throughout the country and became an ardent antislavery agitator.

Parkhurst, Charles Henry (1842-1933), American Presbyterian clergyman, was born in Framingham, Mass. He was graduated from Amherst, 1866, and studied theology at Halle and Leipzig. He was pastor of the Congregational Church, Lenox, Mass., from 1874 to 1880, when he was made pastor of Madison Square Presbyterian Church, New York.

Parkhurst became widely known for his vogorous, fearless sermons and by his work in behalf of civic and social reform. In 1891, he was made president of the Society for Prevention of Crime. His investigations indicating partnership of police with criminals led to an investigation of the New York police by the state legislature in 1894. His writings include *The Blind Man's Creed, The Swiss Guide, Our Fight with Tammany, A Little Lower than the Angels*, and *My Forty Years in New York*.

Parkman, Francis (1823-1893), American historian, was born in Boston and was graduated from Harvard in 1844. He began the study of law, but soon chose as his life work the writing of the history of French power in America. In preparation for his task he made several trips to Europe and lived for some time among the Indians of the Northwest.

In addition to rare powers as an investigator, he possessed consummate literary ability and produced a series of valuable works, which place him in the highest rank among American historians. His books include *The Conspiracy of Pontiac, The Jesuits in North America, La Salle and the Discovery of the Great West, The Old Régime in Canada, Montcalm and Wolfe, A Half Century of Conflict*, and *California and the Oregon Trail*. He was elected to the American Hall of Fame in 1915.

"Parley, Peter." See *Goodrich, Samuel Griswold*.

Parmenides (*pär-mĕn'ĭ-dēz*), Greek philosopher, the greatest member of the Eleatic school, was born at Elea and flourished in the 5th century B. C. In his didactic poem *On Nature*, he sought to demonstrate the reality of absolute being, or matter. He held that nonexistence, or empty space, was inconceivable. This belief involved logically the denial of all motion. Parmenides took this step and maintained that motion was only apparent and existed for the senses alone, whereas the intelligence must refuse to recognize the validity of such appearances.

Parnell (*pär'nĕl*), **Charles Stewart (1846-1891),** Irish statesman, was born in Avondale and was educated at the University of Cambridge. He entered public life in 1875 as member of Parliament for Meath. In 1880, he became leader of the Irish party and entered upon an agitation for a reform in the method of land ownership in Ireland. In October 1881, he was imprisoned at Kilmainham under the Coercion Act, but was released in April 1882.

At the general election of 1885, all Home Rule candidates nominated by Parnell were elected, and he subsequently entered into an alliance with the followers of Gladstone. In the next Parliament, he proposed a bill to suspend evictions in Ireland and to reduce rent; the bill was rejected, but the agitation continued.

In 1888, a special commission was appointed to examine charges made against Parnell and others by the London *Times* of palliating the murder of a government official in Ireland. The inquiry cleared Parnell, and he then brought suit for libel against the *Times* and recovered £5000 damages. As the result of his connection with a divorce case in 1890, Parnell was deposed by the majority of his party, but continued to lead the minority. Parnell was a remarkably effective debater and possessed great political ability.

Parrhasius (*pă-ra'shĭ-ŭs*), Greek painter, son of Evenor, also an artist, was born at Ephesus in the 5th century B. C. He practiced his profession at Athens, where he received the rights of citizenship. According to Pliny, he was the first to establish a true proportion between the different parts of a picture and to indicate the round by light and shade. One of his most notable pictures represented a personification of the Athenian democracy, showing graphically the varying moods which actuated it.

Concerning his skill, a tale is recorded describing his contest with Zeuxis. The latter painted some grapes with such perfection that birds came to peck at them. Zeuxis then demanded that Parrhasius should draw aside the curtain and display his picture. Upon discovering that his competitor's painting was the curtain itself, Zeuxis acknowledged himself outdone, for, while Zeuxis had deceived birds, Parrhasius had deceived a skilled artist.

Parry, Sir Charles Hubert Hastings (1848-1918), English composer and musical scholar, was born in Bournemouth. After being graduated from Oxford, he took an extended course in music. In 1883, he was appointed choragus of Oxford University and, in 1891, was made professor of the Royal College of Music, succeeding Sir George Grove as director in 1894. From 1900 to 1908, he was professor of music at Oxford.

Parry is best known by his oratorios *Judith, Job*, and *King Saul* and by his choral works with orchestra *The Glories of Our Blood and State, Ode to St. Cecelia's Day, War and Peace, The Pied Piper of Hamelin*, and *The Soul's Ransom*. He also composed symphonies, overtures, and chamber music. His numerous writings include *The Evolution of the Art of Music*.

Parsons, Sir Charles Algernon (1854-1931), English inventor and shipbuilder, was educated at the University of Cambridge. He devoted his attention to electricity and engineering and became proprietor of electrical supply and marine engine works. He invented the compound steam turbine about 1884; notably improved it by a condenser in 1891; and adapted it for practical maritime use in 1897. In 1910, he invented a geared turbine engine. He wrote *The Steam Turbine* and numerous papers on related subjects. See *Steam Engine*.

Parsons, William Barclay (1859-1932), American engineer, was born in New York City. He was graduated from Columbia University in 1879. He made surveys for the Canton-Hankow Railway, China, 1000 miles, in 1898-99; designed and constructed the underground railway system in New York; was a consulting engineer for the Panama Canal; and was chief engineer of the Cape Cod Canal, 1912-14. For his services in World War I, he was decorated by the governments of Great Britain and Belgium besides being cited by the American government for conspicuous distinguished service. His writings include *Turnouts, Track, An American Engineer in China*, and *Robert Fulton and the Submarine*.

Partridge, William Ordway (1861-1930), American sculptor and author, was born at Paris, France. He studied at Columbia University and received his art education in Rome, Florence, and Paris.

Partridge's sculpture is characterized by refinement, imagination, and versatile technique. He excels in portrait busts. His works include a statue of Shakespeare, Lincoln Park, Chicago; a bronze statue of Alexander Hamilton, Brooklyn; the Kauffmann Memorial, Washington; a statue of Whittier, Boston Public Library; an equestrian statue of General Grant for Grant Square, Brooklyn; the Schermerhorn Memorial at Columbia University; the group "Christ and Saint John," Brooklyn Museum of Fine Arts; and a statue of Pocahontas made for the Jamestown Exposition, 1907. His writings include *Art for America, The Song Life of a Sculptor, The Technique of Sculpture, The Angel of Clay*, and *The Czar's Gift*.

Pascal (*pȧs'kăl*; F., *pȧs'kȧl'*), **Blaise (1623-1662),** French philosopher and mathematician, was born at Clermont Ferrand. He founded the modern theory of probabilities and anticipated the mathematics of conic sections. He also formulated the law of pressure in liquids, since known by his name. In 1654, he gave up the study of mathematics and natural philosophy and embraced the austere religious life of the Jansenists at Port Royal near Paris, where he spent his remaining years.

The controversy between the Jesuits and the Jansenists led to Pascal's publication of the *Provincial Letters* in favor of the latter. His celebrated *Thoughts on Religion*, exalting

faith above reason, has been translated into most European languages. Pascal's style is unsurpassed in graceful energy and remains a model of French prose.

Passy (*pä'sē'*), **Frédéric (1822-1912),** French statesman and economist, was born in Paris. He was educated for the law and, in 1846, became auditor to the council of state. He entered politics but withdrew upon the proclamation of the Second Empire. He then turned his attention to topics of social science on which he lectured extensively. In 1868, he founded the International League of Peace. After the fall of Napoleon III, he re-entered politics, serving in the Chamber of Deputies, 1874-89. Thenceforward he devoted himself to the cause of pacifism, assisting Sir W. R. Cremer in founding the Interparliamentary Union. In 1901, he was awarded, with Henri Dunant, the first Nobel peace prize.

Pasteur (*pàs'tûr'*), **Louis (1822-1895),** French chemist and bacteriologist, was born at Dole. He received the degree of doctor of science at the Ecole Normale, Paris, 1847. He became professor of physics at Dijon, 1848, and of chemistry at Strasbourg, 1849. After holding various scientific positions at Lille and Paris, he was professor of chemistry at the Sorbonne, 1867-89. Later his researches were made in connection with the Pasteur Institute.

From 1854 to 1857, Pasteur conducted researches on ferments and fermentation, which led to the conclusion that this process is due to living organisms. Treatment of milk so as to destroy such organisms is known, after him, as pasteurization. He studied and successively combated the contagious silkworm disease as well as fowl cholera and anthrax, which he treated by vaccines of diluted virus. His last work was connected with a vaccine treatment for hydrophobia. Pasteur is regarded as the founder of the modern science of bacteriology.

Pater (*pā'tĕr*), **Walter Horatio (1839-1894),** English essayist and critic, was born in London. He was educated at Oxford; became a fellow at Brasenose College; and spent practically all of his life in quiet study at Oxford. He came early under the influence of Ruskin and found his mission in interpreting the spirit and the ideals of the Renaissance. His *Studies in the History of the Renaissance*, published in 1873, revealed him as a penetrating critic with a beautiful prose style. Among his other works are *Marius the Epicurean, Imaginary Portraits, Plato and Platonism, The Child in the House*, and *Greek Studies*.

Pathé, Charles (1873-1937), French photographer, was born in Paris. He exploited an early Edison patent for a motion picture machine, the patent being unprotected in Europe, and, by leasing machines, established a highly profitable business in connection with a motion picture exchange which he began. He then organized a service for photographic events in the news. With headquarters at Joinville, France, he distributed these films to motion picture theaters throughout the world under the name of the Pathé news reel.

Patri, Angelo (1877-), American educator and child psychologist, was born in Italy and was brought at an early age to New York, where he was graduated from Columbia University. He began teaching in the public schools in 1898. He was very successful with young children and began writing with a view to showing parents how to deal with problems of childhood. In addition to syndicated articles in the press, his publications include *Pinocchio in America, The School that Everybody Wants, Problems of Childhood*, and *The Questioning Child*.

Patterson, Joseph Medill (1879-1946), American journalist and publisher, was born in Chicago. He was graduated from Yale University in 1901 and from then until 1905 was on the staff of the Chicago *Tribune*, of which he was, with R. R. McCormick, co-editor and publisher from 1914 to 1925. He then began, with spectacular success, two new publications, *Liberty Magazine*, in Chicago, and the "tabloid" *Daily News*, in New York. During World War I, he enlisted as a private and rose to the rank of captain in the Rainbow Division. *Liberty Magazine* was sold in 1931 to Bernarr Macfadden. He wrote *A Little Brother of the Rich, By-Products*, and *Rebellion*.

Patton, George Smith, Jr. (1885-1945), American general, was born at San Gabriel, Cal. A graduate of West Point in 1909, he entered the cavalry and was promoted through grades to lieutenant-general in 1943. He was made general in 1945. He was the first man detailed in the tank corps, and devoted himself to the development of tank and motorized forces. In North Africa, in his dash across northern France after St. Lo, in the "battle of the Bulge," and in the invasion of southern Germany, his command was distinguished by the celerity of its movements. Injuries received in an automobile accident caused his death at Heidelberg.

Paul III (Alessandro Farnese) **(1468-1549),** pope from 1534 to 1549, was born in Tuscany. His acts include the decree of excommunication against Henry VIII of England, and the edict incorporating the order of the Jesuits.

Paul, Saint (? - c. 67), apostle of Christianity among the Gentiles and chief founder of the Christian Church, was born at Tarsus, a Greek city of Cilicia in Asia Minor. His family were Jews, belonging to the tribe of Benjamin, but they enjoyed the rights of Roman citizenship. His Jewish name was Saul, but, among the Gentiles, he adopted the Latin name Paul. By trade he was a tentmaker.

Conversion. Paul obtained a knowledge of the Greek language and literature at Tarsus and then, about 19 A. D., went to Jerusalem to study the law of Moses under Gamaliel. He became a strict member of the sect of the Pharisees and took a prominent part in the persecution of the Christians. When the rumor spread that some of the worst offenders were actual members of the synagogue in Damascus, he obtained an order to go and arrest them. On the road to that city about 37 A. D., he experienced a vision that convinced him of the Messiahship of Jesus and inspired him with a belief that he was commissioned to preach the new religion among the nations of the earth.

He then retired to Arabia for nearly three years. Returning, he began to preach the new gospel in Damascus and Jerusalem, but Jewish hostility forced him to leave these cities, and minister to the Gentiles.

Missionary Journeys. In 40 A. D., he assisted Barnabas in the evangelization of Antioch. After a short visit to Jerusalem in the famine year of 44, Paul and Barnabas were set apart by the prophets and elders of the church at Antioch for the evangelization of the more distant Jews. From Seleucia they proceeded to southern Asia Minor—Pamphylia, Pisidia, and Lycaonia.

At Antioch, Paul's preaching occasioned a momentous controversy. The extreme Jewish element of the Church insisted on the need of circumcision. Paul maintained that faith was sufficient for salvation. Paul prevailed, partly because of his success in evangelizing the Gentiles. Paul's victory meant the freeing of Christianity from Jewish elements prejudicial to its general acceptance.

Starting again in 51, Paul and Silas traversed Asia Minor from south to north. Crossing the Ægean to Europe, they visited Philippi, Thessalonica, Berea, Athens, and Corinth. On his return to Asia Minor, Paul visited Ephesus, proceeded thence to Cæsarea and Jerusalem, and closed his journey at Antioch.

The third journey of Paul commenced about 57 and extended over much the same district as the previous one. Returning to Jerusalem, he was brought to trial by his Jewish opponents before Felix, the procurator at Cæsarea, and, later, before King Agrippa. Using his right as a Roman citizen, Paul appealed to Cæsar, arriving at Rome in 62, where he was a prisoner for two years. He is believed by some scholars to have made a fourth missionary journey, going into Spain and other countries.

Character and Influence. In the quality of his moral energy Paul surpassed all other apostles of Christianity. His teaching was essentially practical in its nature. The central doctrine of salvation by faith in the Christ, although fundamentally experiential rather than intellectual, became, in his ministry, the means of making Christianity a universal religion rather than a Jewish sect. He was executed in Nero's reign.

Pavlov (*päv'lôf*), **Ivan Petrovitch (1849-1936),** Russian physiologist, was born in Rjasau. He was graduated in medicine at Leningrad, 1883. In 1890, he was made professor at the military academy, Leningrad, and, in 1897, was appointed director and professor of physiology in the Imperial Academy of Sciences.

Pavlov established a new school of Russian physiologists and made important researches in connection with the physiology of the heart, secretive glands, and digestion. In 1904, he was awarded the Nobel prize for medicine. His *Work of the Digestive Glands* has been translated into many languages. It shows that bodily processes normally attending the taking of food by an animal will take place as the result of a stimulus, such as the ringing of a bell, which has no connection with food, if the food and the neutral stimulus have previously been associated in the animal's experience. On this classic study is based the widely held doctrine of conditioned reflexes, which may be said to have revolutionized our understanding of animal and human intelligence.

Pavlowa, Anna (1887-1931), Russian dancer, was born in Leningrad. At the age of 10, she entered the Imperial Ballet School at Leningrad and, in the years succeeding 1904, appeared in the principal Russian cities. In 1911, she undertook the first of many tours in Europe and America, winning great admiration for her dance creations in both the classical and ballet styles. Among her most successful dance creations were "The Swan," "The Butterflies," "Dionysus," "Amarilla," and "The Fairy Doll."

Payne, John Howard (1791-1852), American dramatist, was born at New York. He made his debut as an actor in New York City in 1809; was successful for 30 years; and also wrote several plays, of which *Brutus, Charles II*, and *Clari* are the best-known. The song "Home, Sweet Home" occurs in *Clari*, which was produced as an opera in Lon-

don, 1823. Yet the author of "Home, Sweet Home" had no home for the last 40 years of his life and died while American consul at Tunis. His remains were brought to America and were buried at Washington in 1883.

Peabody, Elizabeth Palmer (1804-1894), American educator, was born at Billerica, Mass. She was a sister of Mrs. Nathaniel Hawthorne and Mrs. Horace Mann. She taught in the celebrated school of Bronson Alcott and later was one of the most active in introducing the methods of Froebel into American schools. She established at Boston, 1860, the first kindergarten in America. Her published works include *The Kindergarten in Italy, Letters to Kindergartners,* and *Guide to the Kindergarten.*

Peabody, George (1795-1869), American merchant and philanthropist, was born at South Danvers, now Peabody, Mass. When 22 years old, he was a partner of Elisha Riggs in a wholesale dry goods business in Baltimore. In 1829, he became the head of this firm, which established branches in New York and Philadelphia. Withdrawing from the Baltimore firm in 1843, he established himself in London as a merchant and broker and accumulated a large fortune.

In 1852, Peabody sent a large donation to found an educational institute and library in his native town. He contributed $1,400,000 to the city of Baltimore for an institute of science, literature, and fine arts. The Peabody education fund received more than $3,000,000 for the promotion of education in the Southern states. In appreciation of his gifts for education, which amounted to about $7,000,000, Congress authorized a medal to be struck. To the city of London he donated a fund of $2,500,000 for the construction of lodging houses. His philanthropic munificence, at that time unparalleled, brought him great honors and gratitude from England and from the United States. He was elected to the American Hall of Fame in 1900.

Peabody, Josephine Preston (1874-1922), American poet and dramatist, was born in New York. She attended Radcliffe College, 1894-96, and was instructor in English literature at Wellesley College, 1901-03. In 1906, she married Professor Lionel S. Marks of Harvard University.

In 1897, she published *Old Greek Folk-Stories,* which was followed in 1898 by *The Wayfarers,* her earliest volume of verse, and by *Fortune and Men's Eyes* in 1900. Her first drama, *Marlowe,* appeared in 1900. In 1910, her drama in verse entitled *The Piper* was awarded the Stratford on Avon prize and its favorable reception in England and America won for the author high rank in American poetical drama. Her works include also *The Singing Man, Harvest Moon,* and *The Work of Gubbio.*

Peale, Charles Willson (1741-1827), American portrait painter, was born in Maryland. He received his art education from Copley and Benjamin West. Among his portrait paintings are several of Washington. In 1785, he formed a collection of natural curiosities and founded Peale's Museum at Philadelphia. In 1805, he helped to found the Pennsylvania Academy of Fine Arts, the first of its kind in the United States.

His son, Rembrandt (1778-1860), painted several historical pictures, among them the well-known "Roman Daughter," in the Boston Museum, and "The Court of Death," in the Detroit Art Gallery.

Peale, Norman Vincent (1898-), American clergyman, was born in Bowersville, Ohio. He was graduated from Ohio Wesleyan University in 1920, and in 1922 was ordained a minister in the Methodist Episcopal Church. After holding various pastorates, he became, in 1932, minister of the Marble Collegiate Reformed Church, Fifth Avenue, New York. He is author of a number of inspirational books, and has become widely known as the writer of a syndicated newspaper column on the art of living, and as speaker on a national radio program.

Peary, Robert Edwin (1856-1920), American arctic explorer and discoverer of the north pole, was born at Cresson, Pa. He was graduated from Bowdoin, 1877; entered the United States navy as a civil engineer in 1881; was assistant engineer for the Nicaragua ship canal, 1884-85; and was engineer in charge of the Nicaragua Canal Surveys, 1887-88.

In 1886, he made a reconnaissance of the Greenland inland ice cap. He was chief of the arctic expedition of the Academy of Natural Sciences of Philadelphia which, in 1891-92, sailed to the northeast angle of Greenland, and he discovered and named Melville land and Heilprin land, lying beyond Greenland. He made another arctic voyage in 1893-95, when he discovered the famous Eskimo meteorites near Melville Bay. These were later removed to the American Museum of Natural History, New York. One of them, the largest known meteorite, weighs 90 tons.

Peary made many other voyages to the Arctic Ocean, continuing his explorations and ethnographic studies. In 1902, he made his first attempt to reach the north pole, attaining lat. 84° 17′ north. In the summer of 1905, he reached 87° 6′—a new "farthest north." On July 6, 1908, he left New York in the steamer *Roosevelt* on his final voyage. Establishing winter quarters at Cape Sheridan, he made preparations for the northward journey over the ice pack. On March 1 following, he set out from Cape Columbia over the frozen ocean and, on April 7, 1909, reached the north pole. In honor of this achievement, he received the thanks of Congress and was promoted to the rank of rear admiral. His writings include *Northward Over the Great Ice, Snowland Folk, Nearest the Pole,* and *The North Pole.* See *Polar Exploration.*

Pedro I (*pē′drō*; *pā′drō*) **(1798-1834),** Emperor of Brazil was the second son of John VI of Portugal. At the time of Napoleon's invasion of Portugal, he was taken to Brazil by his parents and became prince regent of Brazil on his father's return to Portugal, 1821. He declared the independence of Brazil and was crowned as Pedro I in 1822. The new empire did not prove successful under his rule, and, in 1831, Pedro abdicated and withdrew to Portugal, the throne of which he secured for his daughter.

Pedro II, or **Dom Pedro de Alcantara (1825-1891),** emperor of Brazil, son of Pedro I. Upon his father's abdication, the son was declared emperor of Brazil at the age of five years. He was crowned in 1841. He was distinguished by his love of learning and his wide culture, and he gave the country an enlightened and progressive administration. In 1871, a law was passed providing for the gradual abolition of slavery and, in 1888, the immediate emancipation of slaves was decided upon. The result was a revolt of the Republican party supported by the rich planters. Pedro was forced to abdicate and a republic was established in 1889. The deposed emperor spent the remainder of his life in France.

Peel, Sir Robert (1788-1850), English statesman, was born near Bury, Lancashire, 1788. He was graduated at Oxford in 1808 and entered Parliament as a Tory in the following year.

In 1810, Peel was appointed undersecretary for the colonies; from 1812 to 1818, was secretary for Ireland; and, in 1821, became home secretary. In 1829, he sponsored a bill relieving Catholics of disabilities due to their religion. This bill was carried and consent was practically extorted from the king.

Peel was premier for a short time in 1834-35. In 1841, he came into power again as a result of a victory of his party's protectionist policy over free trade. He carried legislation revising the tariff and introduced an income tax. The famine in Ireland in 1845 increased the popular pressure in favor of the free admission of grain, a policy which was supported by the Liberal party. Peel yielded, and the so-called Corn Laws were repealed. This action caused the temporary disruption of the Conservative party, and Peel retired from office in 1846. He continued to lead a group in Parliament which gave a general support to the Liberal party.

Peel was a statesman of great integrity, a master of finance, and a fluent speaker. He was slow in forming his convictions, but was conscientious in acting on them. He died as the result of a fall from his horse. See *Corn Laws.*

Peirce, Benjamin (1809-1880), American mathematician and astronomer, was born at Salem, Mass. In 1829, he was graduated at Harvard, where he became professor of mathematics, 1833, and was professor of mathematics and astronomy from 1842 until his death. He was superintendent of the United States Coast Survey, 1867-74. His reputation as the leading American mathematician of his day rests on his development of analytic morphology, or the calculation of the forms taken by liquids when acted on by forces. To him also is due much information on the rings of Saturn.

Peirce, Charles Sanders (1839-1914), American mathematician and philosopher, was born at Cambridge, Mass. He was educated chiefly by his father, a mathematician, and when 22 years old joined the United States Coast Survey. In the course of 26 years at this post, he conducted researches in astronomy and gravity measurements. He described a previously undetected inaccuracy in pendulum observations. To him is chiefly due the first attempt to use the wave length of light as a standard of measure. He wrote many papers on mathematical reasoning, in which he expanded algebra into an instrument for logical analysis of mathematics.

Peirce's chief title to fame is his development of the original principles of pragmatism, which William James and others carried further and, as Peirce thought, distorted. The principle was first published in 1878 in an article "How to Make Ideas Clear," in which Peirce wrote: "Consider what effects, which might conceivably have practical bearings, we conceive the object of our conception to have. Then our conception of these effects is the whole of our conception of the object."

Having inherited some money, Peirce retired to a small country house near Milford, Pa., and was largely forgotten until the study of his numerous scattered papers after his death convinced specialists in many fields that he was one of the most original thinkers of the 19th century. Lacking social graces and competence in management of money, he was reduced to penury in his last days.

Peirce, Cyrus (1790-1859), American educator, was graduated from Harvard in 1810; studied for the ministry; and was pastor for eight years. He then taught several years at Andover and at Nantucket. In 1839, he was chosen by Horace Mann as principal of the newly organized State Normal School at Lexington, now Framingham, Mass. This institution was the first State Normal School in the United States. Only three students enrolled at the opening of this school, but the earnestness and the skill of the principal soon established confidence and attracted students.

Pelopidas (*pĕ-lŏp'ĭ-dăs*) **(? - 364),** Theban general and patriot, flourished in the first part of the 4th century B. C. He was a fast friend of the Theban statesman Epaminondas, whom he aided in a military capacity throughout the period of the Theban struggle against Sparta.

In 382 B. C., Pelopidas was driven from Thebes by the Spartans and was forced to seek refuge at Athens, whence he returned secretly with a few associates, 379, and recovered possession of the citadel, with his own hand slaying the Spartan leader Leontiades. His "sacred band" of Theban youth largely contributed to the victory of Epaminondas at Leuctra, in 371, but failed in a subsequent attack on Sparta itself. In 364, he won the battle of Cynoscephalæ, but was himself killed.

Penn, William (1644-1718), American colonizer and founder of Pennsylvania, was born in London. He studied at Oxford; early gave evidence of strong religious impulses; and adopted the new doctrines of the Society of Friends. His excessive zeal led to his expulsion from the university and a consequent estrangement from his father. In 1668, he was arrested for attending religious meetings forbidden by law and was tried before the court of common pleas and heavily fined. He remained in prison for some time, refusing to pay the fine, but his father ultimately paid it for him.

In 1681, Penn, who had inherited from his father a claim of £16,000 against the government, obtained from the king in satisfaction therefor a grant of an extensive tract of country lying west of the Delaware River and north of Maryland and which, in the royal patent, was called Pennsylvania. This territory Penn resolved to form into a commonwealth based upon perfect religious toleration. He accordingly set sail thither, arriving in Delaware Bay on October 27, 1682, and founded the city of Philadelphia. In 1683, he entered into a treaty of lasting friendship with the Indians.

In 1684, he returned to England, where, by his influence with James II, he secured the release of 1200 imprisoned Quakers. After the accession of the Prince of Orange as William III, Penn was twice accused of treason and was arrested in 1690 on a charge of conspiracy, but was at length honorably acquitted in 1693. In 1699, he paid a second visit to Pennsylvania and his stay, which lasted two years, was marked by many useful measures. Elected to the American Hall of Fame in 1935.

Pennell (*pĕn'ĕl*), **Joseph (1860-1926),** American etcher, illustrator, and author, was born of Quaker parentage in Philadelphia. He attended art schools in his native city and studied etching under S. J. Ferris. In 1884, he went to Europe and thereafter lived chiefly in London.

Pennell was greatly influenced by Whistler, but developed a strongly original style and became the most widely known of all American graphic artists. His art is simple and direct, and he excels in grasping the artistic possibilities of his subjects, which are chiefly landscape and architectural. He is represented by etchings, drawings, and lithographs in the leading art collections of Europe and America. He also illustrated a large number of books.

His written works include *A Canterbury Pilgrimage, Our Journey to the Hebrides, Lithography and Lithographers, The Glory of Greece,* and, jointly with his wife, *The Life of James McNeill Whistler.* He was elected to the American Academy of Arts and Letters in 1911.

Penney, James Cash (1875-), American merchant, was born on a farm near Hamilton, Mo. He began his mercantile career in a Hamilton store. He then found employment in dry goods stores in Colorado, but was soon working in Wyoming, where, within a few years, he acquired three stores of his own. This was the nucleus of what was to prove one of America's greatest chain of stores, which today number more than 1600 in all states of the Union and do a business in the neighborhood of half a billion dollars a year. Mr. Penny has extensive farming and philanthropic interests.

Pepin (*pĕp'ĭn*) **the Short (714-768),** king of the Franks and father of Charlemagne, was the second son of Charles Martel. In 751, he deposed Childeric III and founded the Carlovingian dynasty. He was the first Frankish monarch whose election received the sanction of the pope. He conquered the Lombards and gave the pope part of their territory. This gift may be said to have laid the foundation of the temporal power of the popes.

Pepper, George Wharton (1867-), American jurist and politician, was born at Philadelphia and was educated at the University of Pennsylvania. He was admitted to the bar in 1889 and began to practice law in Philadelphia. He was professor of law in the University of Pennsylvania from 1893 to 1910. In 1922, he was appointed United States senator to fill the unexpired portion of the term of Senator Penrose, deceased, and was elected for a term ending in 1927. Pepper's published works include *The Borderland of Federal and State Decisions, Pleading at Common Law and Under the Codes, Men and Issues,* and *Family Quarrels.*

Pepperrell, Sir William (1696-1759), American colonial general, was born at Kittery, Me. From 1727 until his death, he was a member of the British council for the province of Massachusetts and, after 1730, was also Chief Justice of the Court of Common Pleas. He commanded a successful expedition against Louisburg in 1745 and was made a baronet in 1746. He was acting governor of Massachusetts, 1756-58, and, in 1759, was made lieutenant general. He published an account of a *Conference with the Penobscot Tribe.*

Pepys (*pēps; pĕp'ĭs; pēps*), **Samuel (1633-1703),** English administrator and diarist. During the reigns of Charles II and James II, 1660-88, he was secretary for the affairs of the navy, a position which he filled with diligence and skill. He wrote *Memoirs of the Royal Navy.* He left to Magdalene College, Cambridge, his large collection of books, manuscripts, and prints, including about 2000 ancient English ballads. His reputation is founded on his famous *Diary,* written from 1660 to 1669, which affords a curious insight into the manners and court life of his day and is one of the most diverting books in the language.

Pérez Galdós (*pā'rāth găl-dōs'*), **Benito (1845-1920),** Spanish novelist and dramatist, was born at Las Palmas, Canary Islands. He began the study of law at Madrid, but soon turned his attention to journalism and the writing of fiction. In extent and in character creation, this work of Galdos rivals that of Balzac. The best known of his romances are *Dona Perfecta, Gloria, La Familia de Leon Roch, Marianela, Fortunata y Jacinta,* amd *Angel Guerra.*

About 1890, Galdos turned his attention to the drama, producing a series of brilliant plays which placed him next in rank to Echegaray among contemporary Spanish writers. The list of his plays includes *Reality, Mad for the Sake of the Family, The Condemned, Will, The Wild Beast, The Grandfather,* and *Love and Science.*

Peri (*pâ'rê*), **Jacopo (1561-1633),** Italian composer, was born in Florence. He made an attempt to reconstruct the music of the Greek tragedies. This resulted in his development of a new recitative style adapted to dramatic declamation. In 1594, he applied his new method to the composition of *Dafne,* now regarded as the first opera. In 1600, he composed *Euridice,* on a text by the poet Rinuccini. Soon afterward, Caccini produced a composition, using the same text, and claimed the credit for originating the declamatory style, but the priority of Peri's work has been established beyond question.

Pericles (*pĕr'ĭ-klēz*) **(c. 490 B.C. -429 B.C.),** Athenian statesman, was born at Athens. He received a careful education and, when about 26, began to take part in public affairs. He soon gained the leadership of the Democratic party in the state and was elected general for many successive years. Cimon, the head of the Aristocratic party, was ostracized and gradually Pericles attained an unrivaled ascendancy in the affairs of the city.

Pericles made it his aim to create a state which should be unique in history both for the qualities of its citizens and for the achievements of its architects and its other artists and thinkers. To this end, he strengthened the position of Athens at the head of the Athenian empire, preparing her for a war with Sparta which he regarded as inevitable. The wealth accruing from the empire was devoted to the erection of the Parthenon, the Propylæa, and other buildings that converted Athens into the most beautiful city of the ancient world.

In private life, Pericles gathered about himself a coterie of brilliant spirits, including Anaxagoras, Phidias, and Aspasia. Indictments brought against his friends marked a certain waning of Pericles' influence. This change was due partly to the hardships attendant on the prosecution of the Peloponnesian War, which broke out in 431 B. C. mainly as a result of Pericles' foreign policy. He conducted the war with vigor and skill during the first two years of hostilities but, having been weakened by an attack of the plague in 430 B. C., he died the next year.

Perkin, Sir William Henry (1838-1907), English chemist, was born in London. He was educated in chemistry at the Royal College in London and there became an assistant in chemical investigation and research.

In 1856, he discovered the aniline dye known as Perkin's purple and thereby became the founder of the coal-tar dye industry. He invented a method for the artificial produc-

tion of madder red, or alizarin; also a process of making coumarin from the Tonka bean and cinnamic acid from benzaldehyde. See *Dyes and Dyeing*.

Perkins, Frances (1882-), American sociologist, the first woman to be made a cabinet officer of the United States, was born at Boston. Educated at Mt. Holyoke College and Columbia University, she became secretary of the Consumers League in New York. From 1911, when she witnessed a fire in a shirt factory that destroyed 146 girl workers, she began to work for the prevention of industrial accidents. Under the governorship of Franklin D. Roosevelt, she showed great ability on the State Industrial Commission, and, when Roosevelt became president of the United States in 1933, he appointed her secretary of labor. She resigned in 1945. The next year she was appointed a member of the United States Civil Service Commission. She married Paul Wilson in 1903.

Perkins, (Richard) Marlin (1905-), American zoo director, was born at Carthage, Mo., and studied at the University of Missouri. He was curator of reptiles at the St. Louis Zoo from 1926 to 1938; curator of the Buffalo (N. Y.) Zoo, 1938-44, and since 1944 has been director of the Lincoln Park Zoo, Chicago. The popular TV program, Zoo Parade, which he originated in 1949, has won many awards. Besides scientific papers, Marlin Perkins has written a number of books, namely, *Animal Faces* (1944), *One Magic Night* (1951), and *Zooparade* (1954).

Peron, Juan Domingo (1895-), soldier and political leader, was president and virtual dictator of the Republic of Argentina. Even before his election in 1945, when presidents came and went in rapid succession, it was Colonel Peron who exercised the power behind the scenes, while holding the triple posts of vice president, minister of war, and secretary of labor and social welfare. With political shrewdness he cultivated the support of the working class, so that his eventual seizure of power had little effective opposition. Criticism from independent newspapers was kept in check by government restrictions. Relations between Peron's government and the United States ranged from hostile to technically friendly. Economic difficulties which arose from time to time caused Peron to become somewhat more favorably inclined toward the "Colossus of the North." A revolt in 1955 resulted in his overthrow and exile.

Perrault (*pĕ'rō'*), **Charles (1628-1703)**, French poet, and critic, was born in Paris. He was educated for the law but turned his attention to letters, winning election to the French Academy by his verses. Most important of all his many writings are the *Mother Goose Stories*, published in 1697, in which *Sleeping Beauty, Little Red Riding Hood, Cinderella, Bluebeard, Puss in Boots,* and *Tom Thumb*, now comprising an indispensable part of the world's nursery books, were first put into literary form. See *Bluebeard, Mother Goose*.

Perry, Bliss (1860-1954), editor, author, and educator, was born in Williamstown, Mass. He was graduated from Williams in 1881 and studied also at Berlin and Strasbourg universities. He was professor of English at Williams College, 1886-93 and at Princeton, 1893-1900; edited the *Atlantic Monthly*, 1899-1909; and, in 1906, was appointed to the chair of belles-lettres at Harvard, a position formerly filled by Longfellow and by Lowell. His publications include *The Broughton House, The Plated City, The Amateur Spirit, Walt Whitman, The Praise of Folly*, and the autobiographical *And Gladly Teach*. He became a member of the American Academy of Arts and Letters in 1910.

Perry, Matthew Calbraith (1794-1858), American naval officer, a brother of Oliver Hazard Perry, was born at Newport, R. I. He entered the naval service in 1809; in 1819, was appointed executive officer of the *Cayne*, which convoyed the pioneer settlers of Liberia to Africa; and later extirpated piracy in the West Indies.

In 1833, Perry was stationed at the Brooklyn navy yard, where, under his superintendence, was built the first regular steamship for the United States navy. Its construction and successful operation won for him the name of father of the steam navy. He was made commodore in 1841 and, in 1852, was sent to Japan to induce that country to enter into relations with the countries of the West. Two years later a treaty was concluded with Japan by which an American consul was to be received in one of the Japanese ports. From this time dates the radical change in Japanese life due to contact with the West.

Perry, Oliver Hazard (1785-1819), American naval commander, was born in South Kingston, R. I. During the War of 1812, he was chosen to fit out a fleet at Presque Isle, now Erie, Pa. After equipping nine vessels, he sailed against the British fleet, comprising six ships, though larger and stronger than those of the Americans. The English so hotly attacked the *Lawrence*, Perry's flagship, that out of 101 men on it only 18 were uninjured. At this juncture, Perry left the *Lawrence* and was rowed to the *Niagara* in a small boat. Resuming the conflict, he gained a splendid victory, taking all the English ships. He sent the following dispatch announcing the result: "We have met the enemy and they are ours. Two ships, two brigs, one schooner, and one sloop."

Pershing, John Joseph (1860-1948), American soldier, was born in Linn County, Mo., 1860. He was graduated at Kirksville State Normal School, 1880, and at West Point, 1886. He served as lieutenant of cavalry in the Apache Indian campaign in New Mexico and Arizona in 1886 and in the Sioux campaign, 1890-91. He was in Cuba, 1898; saw action in the Philippine Islands, 1899-1903; and, as military attaché, accompanied Kuroki's army in Manchuria in the Russo-Japanese War, 1905. The following year, he was made brigadier general. Later, in the Philippines, he commanded operations against the Moros, resulting in their final defeat at the battle of Bagsag, 1913. In 1916, he was placed in command of the United States troops sent into Mexico in pursuit of Villa and was promoted to the rank of major general.

After the declaration of war against Germany, 1917, he was made commander of the southern division and was selected leader of the first military force sent to France. He was elevated to the permanent rank of general, an honor which he was the fourth American to receive, the others being Grant, Sherman, and Sheridan.

Pershing showed his military capacity in World War I most notably by offering effective resistance to the German offensive at the Marne salient in 1918, by planning and successfully carrying out operations contributing largely to crushing this salient, by the victorious annihilation of the salient at Saint Mihiel, and by the winning of the desperate battle of the Argonne Forest. He steadily insisted that the American army be kept as a distinct force, acting with the French and British but not divided among them. In 1925-26 he headed a commission for holding a plebiscite in Tacna-Arica to determine its disposition between Chile and Peru. His memoirs, *My Experiences in the World War*, was published in 1931. The last years of his life were spent at Walter Reed Hospital, in Washington. His body, after lying in state in the Capitol, was buried in Arlington National Cemetery.

Pestalozzi (*pĕs'tä-lôt'sē*), **Johann Heinrich (1746-1827)**, Swiss educational reformer, was born at Zurich. He studied at Zurich; became extremely interested in the problems of education; and, in 1775, established on his estate, Neuhof, a school which was intended to draw its support from popular subscription. This venture proved a financial failure and he gave it up in 1780. With government support, he founded a school for poor children at Stanz in 1798. Later he taught at Burgdorf and Yverdun.

The idea which lay at the basis of his method of intellectual instruction, known as the Pestalozzian system, was that everything should be treated in a concrete way. Objects themselves became, in his hands, the subjects of lessons tending to the development of the powers of observing and reasoning. His special attention, however, was directed to moral and religious training of children as distinct from their mere instruction.

Almost all Pestalozzi's methods are now adopted in the elementary schools of Europe and America, and to no other man has modern primary instruction been so largely indebted. His chief works are *How Gertrude Instructs Her Children* and *Leonard and Gertrude*.

Petain (*pā'tăN'*), **Henri Philippe (1856-1951)**, French general, was born at Cauchy la Tour. While widely known on account of his lectures at the Ecole de Guerre, he was only a colonel in infantry at the outbreak of World War I.

For notable services in the French retreat from Charleroi to the Marne, 1914, he was promoted to the rank of general of a division. In the battle of Artois, May 1915, Pétain's corps broke the German front, taking Carency. In the following June, Pétain completed the capture of the so-called Labyrinth. When the Germans carried the outer works of Verdun, Feb. 21-24, 1916, Pétain was chosen to defend the fortress. He reorganized the battered French defenses and defeated the Germans, successfully resisting the greatest and most costly series of attacks ever made on a single position. During the victorious Allied offensive directed by Foch in 1918, Pétain was commander in chief of the French armies. Upon his triumphal entry into Metz, 1918, he was made a marshal of France.

After the defeat of France in 1940, Pétain formed a government, with its seat at Vichy, to administer unoccupied France. The restored French government, in August, 1945, found him guilty of treason. His sentence of death was commuted to life imprisonment, but he was released shortly before his death.

Peter the Great, or **Peter I (1672-1725)**, emperor and civilizer of Russia was born at Moscow. He became joint czar of Muscovy in 1682 with his half brother Ivan. From Timmermann of Strasbourg, Peter received lessons in military art and mathematics. He afterward had the good fortune to fall under the guidance of Lefort of Geneva, who initiated him into the sciences and arts of civilization

and, by showing him how far Muscovy was in these respects behind the rest of Europe, influenced the whole of Peter's future career. By the death of Count Ivan in 1696, he became sole master of the empire and devoted himself vigorously to the task of introducing Western methods and Western culture into Russia.

Campaigns and Policy. Peter's first step was to secure access to the Baltic Sea and the Black Sea in order to build up a commerce with other European nations. He took Azov from the Turks in 1696, thus obtaining an outlet on the Black Sea. He brought from abroad engineers and naval architects to build a fleet, and he visited the Netherlands and England, traveling as a subordinate member of the Russian embassy in order to study shipbuilding and other Western arts. He returned to Russia to suppress a rebellion of the army. This accomplished, he set about reorganizing the army on Western models. He also introduced into Russia printing, systematic taxation, and Occidental habits of dress.

Access to the Baltic Sea was prevented by Sweden, which Peter attacked in 1700. Although he was defeated at Narva, he later appropriated a portion of Ingria, a province of Sweden on the Baltic coast, when the Swedish king Charles XII was occupied elsewhere. Here he laid the foundation of the new capital, Saint Petersburg, now Leningrad. In 1709, Charles XII invaded southern Russia and was defeated at Pultowa. The following year, Peter seized the whole of the Baltic provinces and a portion of Finland. In 1711, he carried on an unsuccessful war with the Turks, losing the port of Azov and the territory belonging to it.

In 1712, Peter carried his arms into Pomerania and Finland, completely subduing the latter province in the next year. In 1716-17, he visited Germany, the Netherlands, and France, and collected books and art treasures. His policy, particularly in the reorganization of the Church, excited intense opposition in conservative circles in Russia. A widespread conspiracy was formed against him in 1718. His eldest son, Alexei, was implicated and, having been condemned to death by Peter, is believed to have died as the result of torture. In 1722, Peter forced the shah of Persia to give up the three Caspian provinces along with the towns of Derbent and Baku.

Achievements. Peter's accomplishments were many. He established a body of 100,000 troops, under a discipline as regular as that of any army in Europe. He built a navy of 40 ships and 200 galleys. He fortified all the chief cities and beautified them. He built an academy for naval affairs and navigation, and also colleges at Moscow, Leningrad, and Kiev for languages, literature, and mathematics. He established schools in the villages for the peasants, a college of physicians and a dispensary at Moscow, an observatory, a repository for natural curiosities, botanical houses, and printing houses. Lastly, he permitted a general liberty of conscience among his people.

Peter the Hermit (c. 1050-1115), French monk and preacher, was born at Amiens. He is said to have made a pilgrimage to the Holy Land about 1093, and, having there witnessed the cruelties inflicted upon the Christians by the Mohammedans, communicated on his return with Pope Urban II, by whom he was authorized to preach the First Crusade for the recovery of Jerusalem from the hands of the Turks. His enthusiasm aroused western Europe to undertake several expeditions, all of which, except the last, were unfortunate; but at length, in 1099, he had the satisfaction of seeing Jerusalem throw open its gates to the victorious crusaders under Godfrey de Bouillon, though he himself had little share in the glory of the victory. His last years were spent in a monastery, which he had founded at Huy.

Petrarch (*pē'trärk*), **Francesco (1304-1374),** Italian poet, was born at Arezzo in Tuscany. He was educated at Avignon, Montpellier, and Bologna. His attentions were early devoted to literature; but it was not until the death of his father, in 1326, that he was allowed to follow his inclination. Having settled at Avignon, he became deeply attached, in 1327, to the beautiful Laura de Noves. After having traveled in the vain attempt to forget his love, he settled at Vaucluse, a romantic spot, where he wrote some of his finest works.

His literary reputation attracted the regard of princes. He was invited to Naples, to Paris, and to Rome, and received the laureate crown in the capitol of the last-named city. Among the warmest friends and patrons was the Colonna family. While he prided himself on his Latin works, his lasting fame rests upon the *Canzoniere* in Italian, which contain the sonnets to the golden-haired Laura. See *Italian Literature: Early Period.*

Petrie, William Matthew Flinders (1853-1942), English Egyptologist, was born at Charlton, Eng. He was educated privately and, in 1875-80, was occupied in the study of ancient remains at Stonehenge, Eng. In 1881, he began a long series of investigations and excavations at Giza, Egypt. He discovered the long lost Greek city of Naucratis and the towns of Am and Daphnæ. After the publication in 1893 of his *Ten Years Diggings in Egypt,* he was made professor of Egyptology in the University of London. In 1894, he was instrumental in establishing a fund for Egyptian research, which made possible, besides other important excavations, that of the site of Memphis. His numerous publications include *Religion and Conscience in Ancient Egypt, The Formation of the Alphabet, Some Sources of Human History, Seventy Years in Archaeology,* and *Egyptian Science.*

Pfeffer (*pfĕf'ĕr*), **Wilhelm (1845-1920),** German botanist, was born at Kassel. He was educated at the universities of Göttingen, Marburg, Würzburg, and Berlin. He was made professor of botany at Bonn in 1873, at Basel in 1877, at Tübingen in 1878, and at Leipzig in 1887. While his earlier researches were connected with taxonomy and morphology, he soon changed from the study of plant forms to the study of plant functions and, with Sachs, rose to unquestioned pre-eminence in plant physiology. By his work on osmotic pressure, he laid the basis of modern physical chemistry. His *Pflanzenphysiologie,* translated by Ewart in 1905, forms one of the most comprehensive treatises on plant physiology in the English language.

Phidias (c. 500 B.C. -c. 432 B.C.), Grecian sculptor, is generally supposed to have been born in Athens. He was the son of Charmides and was descended from a family of artists. He studied art under Hegias at Athens and then under Ageladas of Argos.

Phidias began his career as a painter, but came into prominence as a sculptor upon the rebuilding and adorning of Athens after its destruction by Xerxes. His great works were all executed during the favorable period when Greece was triumphant over her foreign enemies and her people enjoyed liberty at home.

His first public work was probably the statue of Athena (Minerva) at Platæa. The bronze "Athena Promachos," which stood on the Acropolis at Athens, doubtless came soon afterward. Among his other works are the ivory and gold "Minerva" in Pellene, Achaia; the thirteen statues which the Athenians placed as an offering in the temple of Delphi in memory of the victory at Marathon; and the "Lemnian Minerva," presented by the inhabitants of Lemnos to their new Athenian allies.

When Pericles became the virtual ruler of Athens, Phidias received a commission to execute all the more splendid statues that were to be erected, and he was made general superintendent of all works of art under construction in the city. To Phidias we owe the supervision of the glorious Propylæa and Parthenon. His genius is still attested by the sculptures and friezes taken from the Parthenon in modern times and preserved in London under the name of the Elgin marbles.

About 433 B. C., Phidias went to Olympia, where he produced a colossal statue of Zeus (Jupiter Olympus) made of ivory and gold. This statue was considered one of the seven wonders of the ancient world. It served, also, to fix for all time the material form in which Zeus was represented. A gold and ivory statue of Athena in the Parthenon vies with that of Zeus as the sculptor's most famous work.

On his return to Athens, political passions were running high. The party inimical to Pericles attacked that great statesman through his friends. Phidias was accused of fraud and impiety and was thrown into prison.

Phidias' work is as free as that of Homer himself from any taint of exaggeration, affectation, or false emphasis. With his keen power of ideal majesty, he combined a full technical mastery over every form of plastic art. He was a consummate master in marble, bronze, ivory, gold, or ebony; in sculpture, relief, engraving, chasing, enameling; in colossal statues or the most delicate ornamentation of a fringe or molding. See *Sculpture.*

Philip II (382 B.C.-336 B.C.), king of Macedon, father of Alexander the Great, was born at Pella, and came to the throne in 359. He completed the thorough unification of his kingdom and then speedily entered upon a policy of aggression, his object being to subject all the Grecian states to his rule.

In Thrace, he captured the small town of Crenides, which, under its new name of Philippi, soon acquired great wealth and fame. After capturing all the towns of Chalcidice, the last of which was the city of Olynthus, he made peace with the Thracians and the next year with the Athenians. It was while this siege of Olynthus was in progress that Demosthenes delivered his famous oration *On the Peace,* in which he sought in vain to arouse his countrymen to a sense of their danger.

In 339, the Amphictyonic council, composed of several Grecian states, declared war against the Locrians and, the next year, appointed Philip commander in chief of all their forces. The Athenians, alarmed at his entrance into Greece, formed a league with the Thebans against him; but their united forces were utterly defeated at the battle of Chæronea, 338. Philip was now master of all Greece. In attaining this end, he had shown himself to be possessed of a high degree of astuteness as a soldier and statesman, but the means which he employed were utterly unscrupu-

lous. While he was busily engaged in preparations for war upon the Persian king, he was assassinated and was succeeded by his son, Alexander the Great.

Philip II (1165-1223), king of France, called Philip Augustus on account of his great abilities and successful administration. He was crowned king with his father, Louis VII, in 1179 and, on the death of the latter, in 1180, came into full possession of the kingdom. He was one of the greatest monarchs of the Capetian dynasty.

Following the accession of Richard the Lion-hearted to the throne of England in 1189, Philip and he set out together on the Third Crusade. After staying three months in the Holy Land, Philip returned home and waged war against Richard's dominions in France. He conquered Normandy, Anjou, Maine, Poitou, and Touraine and was one of the chief consolidators of the French monarchy. The first charter of the University of Paris was granted in his reign.

Philip II (1527-1598), king of Spain, son of Charles V, was born at Valladolid. After the death of his first wife, Maria of Portugal, he married Mary, the queen of England, in 1554. He spent over a year in England and, in 1556, succeeded his father in the sovereignty of Spain, Sicily, Milan, the Netherlands, Franche Comte, Mexico, and Peru. A league between Henry II of France and the pope was overthrown by Philip, and, on the death of Mary, he married the French princess Isabella and retired to Spain, 1559. Devoting himself to the cause of the Church, Philip determined to crush all opposition to it in his dominions. This policy caused a revolt in the Netherlands, which, after a long struggle, achieved independence in 1579. His effort to overthrow Protestant England ended in the disaster of the Armada, 1588. He fatally injured Spain by crushing the spirit of liberty, by persecuting the industrious Moors, and by destroying her commerce by heavy taxation. See *Armada.*

Philip, King (? - 1676), sachem of the Wampanoag tribe of Indians, was the son of Massasoit, who, for nearly 30 years, was the stanch ally of the Pilgrim settlers. In 1662, Philip succeeded his elder brother and, for several years, kept the treaties of his father. But at length, goaded by the encroachments of the whites, he formed a confederation of tribes and, in 1675, "King Philip's war" broke out. The Indians surprised and murdered a great many colonists, but were eventually overcome and, in 1676, Philip himself was captured and slain in Rhode Island. See *King Philip's War.*

Philip Neri, Saint (1515-1595), was born of a distinguished family at Florence. From 1533 to 1537, he studied theology and philosophy in Rome. In 1548, he established the confraternity of the Holy Trinity for aiding the sick and founded a hospice which later became one of the finest at Rome. He entered the priesthood and, in 1574, established the famous congregation of the Oratory, where instruction was given to the uneducated. For their benefit sacred musical entertainments were given in the Oratory and hence were designated by the name oratorio.

At first these entertainments consisted of hymns set to popular tunes, but later Neri introduced sacred dramas with music composed by Palestrina and other leading musicians of Rome. From these musical productions developed the modern form of composition known as oratorio. Philip Neri was beatified in 1615 and was canonized in 1622. The apostle of Rome, as he is called, is the most popular saint of the Roman people.

Phillips, Stephen (1868-1915), English poet, was born at Somertown, near Oxford. He entered Queen's College, Cambridge, in 1886, but, at the end of the first term, joined Benson's company of Shakespearean players. After six years, he left the stage and soon devoted himself entirely to literature.

In 1897, his volume of *Poems* containing "Christ in Hades," "Marpessa," and the fine lines "To Milton, Blind" established his rank as a poet of a high order. This volume was followed by *Paolo and Francesca, Herod, Ulysses, The Sin of David, Nero, The Last Heir, Pietro of Siena,* and *The King,* a series of beautiful poetic dramas which stand unsurpassed in recent English verse. His writings also include *Iole, Lyrics and Dramas, Panama and Other Poems,* and *Armageddon.* See *Paolo and Francesca.*

Phillips, Wendell (1811-1884), American orator and reformer, was born in Boston, Mass. He was graduated from Harvard in 1831; studied law there; was admitted to the bar in 1834; but soon withdrew from this profession and began the real work of his life.

A remarkably eloquent speech in Faneuil Hall in 1837 made him at once the principal orator of the Antislavery party, and thenceforth he was William Lloyd Garrison's loyal and valued ally in the struggle for abolition. He also championed the cause of temperance and woman's rights and advocated the rights of the Indians. As an orator Phillips ranked with Clay, Webster, and Everett, and for effectiveness in the face of hostile audiences his eloquence was unsurpassed. His Faneuil Hall speech has been classed with Patrick Henry's oration at Williamsburg and Lincoln's Gettysburg address.

Phillpotts (*fĭl'pŏts*), **Eden (1862-),** English novelist, was born at Mount Aboo, India. He was educated at Plymouth, England; was a clerk in the Sun Fire Insurance Company's office, 1880-90; studied for the stage; but soon adopted literature. In his earlier novels *Lying Prophets* and *Children of the Mist,* he described Devonshire life in the charming manner of Blackmore, with tragic elements resembling Hardy. His later writings include *The Human Boy, Sons of the Morning, The Secret Woman, The Whirlwind, The Virgin in Judgment, Dance of the Months, The Joy of Youth, The Bronze Venus, Circe's Island, Thorn in Her Flesh,* and poems under the title *Brother Beast.*

Phipps, Henry (1839-1930), American steel manufacturer and philanthropist, was born in Philadelphia. He was educated in the public schools of Allegheny City, now a part of Pittsburgh. He worked as office boy and clerk in Pittsburgh and, within five years, became a partner in a powder distributing agency and in a small iron mill. Later he became associated with Andrew Carnegie in iron and steel manufacture, amassing great wealth and having, next to Carnegie, the largest individual interest in the United States Steel Corporation, of which he was a director. A multimillionaire, he devoted much time and money to artistic and philanthropic undertakings. He contributed $1,000,000 to the University of Pennsylvania for the establishment of Phipps Institute and built a psychiatrical clinic for Johns Hopkins Hospital, Baltimore. He gave $1,000,000 also to New York City for the construction of tenement houses.

Picasso (*pē-käs'sō*), **Pablo (1881-),** Spanish painter and sculptor, was born at Malaga. He received his early art training from his father. In 1903, he took up his residence in Paris. There he founded the school of painting known as cubism, in which an attempt is made to create an abstract language of form divorced from the visual appearance of objects. After 1918, he returned to more orthodox ways of painting, specializing in scenes of circuses or aspects of poorer life in the city. By his directness, rigid economy of means, and audacity of subject, he became an outstanding figure in 20th century art, being numbered among the leaders of the post-impressionist school. In sculpture, he was one of the earliest to adapt characteristics of primitive statues to modern purposes.

Piccard (*pē'kär'*), **Auguste (1884-),** Swiss physicist and aeronautist, was born at Basel. Educated chiefly in Switzerland and Germany, he was appointed in 1922 to a chair in physics at Brussels University. In order to obtain data on cosmic rays he carried through a series of balloon ascents in 1931-34 which took him to the greatest altitude then reached by man—54,120 feet, or more than 10 miles above sea level. The balloons were specially constructed to meet the conditions encountered in the stratosphere and to permit many kinds of observations. On his ascent in 1934 he was accompanied by his twin brother, Jean Felix, who taught chemistry at the University of Lausanne, 1916-26, and then came to the United States, where he engaged in explosive research and, in 1936, began teaching aeronautical engineering at the University of Minnesota.

Pickering, Edward Charles (1846-1919), American astronomer, was born at Boston. He was graduated at Harvard, 1865. He was instructor in mathematics at Harvard, 1865-67, and professor of physics at the Massachusetts Institute of Technology from 1867 to 1876, when he was appointed director of the Harvard Observatory.

At the Institute of Technology he established the first physical laboratory in the United States. Under his administration, the work of the observatory was extended to photometry and photography as applied to astronomical observations. He established also an important Astronomical Observatory at Arequipa, Peru. His writings include *Elements of Physical Manipulation.*

Pickett, George Edward (1825-1875), American soldier, was born at Richmond, Va. He was graduated from West Point, 1846, and entered the army as second lieutenant in the war with Mexico, during which he was brevetted captain for conspicuous bravery. Between 1848 and 1861, he served for the most part on the western frontier.

At the outbreak of the Civil War, Pickett resigned from the United States army and entered the Confederate service. Beginning as colonel in July 1861, he rose to the rank of major general by October 1862. He was engaged in several desperate battles under Lee, but won especial distinction at Gettysburg, July 3, 1863, as the leader of the unsuccessful assault upon which the fate of the Confederacy hung. The point reached by his troops in this charge is marked upon the field of Gettysburg by a granite monument. In the campaign of 1864-65, he made the final stand at Five Forks. Pickett was one of the finest infantry soldiers of the war.

Pickford, Mary (1893-), motion picture actress, was born at Toronto, Ont. Her family name was Gladys Smith. She made her debut on the regular stage at the age of five, but her chief successes were in motion pictures. She starred in *Tess of the Storm Country, Madame Butterfly*, and numerous other pictures that made her the most popular favorite in the early history of the motion picture drama. Her later pictures include *Coquette, The Taming of the Shrew*, and *Secrets*. She wrote *My Rendezvous with Life*.

Pierce, Franklin (1804-1869), 14th president of the United States, was born in Hillsboro, N. H. His father, General Benjamin Pierce, was a soldier in the war for independence and governor of New Hampshire. Franklin Pierce was educated at Bowdoin College, where he formed a lifelong friendship with his biographer, Nathaniel Hawthorne. In 1837, he was elected to the United States Senate, of which he was the youngest member. At the commencement of the Mexican War, he volunteered as a private, but was appointed brigadier general and led his brigade in the battles of Contreras and Churubusco.

In 1852, Pierce was nominated Democratic candidate for the presidency against General Scott, the Whig nominee, and received the votes of all but four states. He appointed an able cabinet and one of the very few that have remained unchanged throughout the administration. The chief events of Pierce's administration were the Kansas-Nebraska Bill, specifically repealing the Missouri Compromise; the Gadsden Purchase; the Koszta incident; and commercial treaties with Great Britain and Japan.

Pike, Zebulon Montgomery (1779-1813), American soldier and explorer, was born in Lamberton, N. J. At 15, he was cadet in his father's regiment, and was made first lieutenant in 1800. In 1805, he set out from Saint Louis to explore the sources of the Mississippi, returning in 1806. He then immediately began the exploration of the Arkansas river, which he ascended to Pueblo, Colo. He discovered Pike's Peak, which is named in his own honor, and visited the site of the present town of Leadville. He was promoted to the rank of major in 1808, colonel in 1812, and brigadier general in 1813. He died of wounds received in the expedition against York, now Toronto, Ont.

Pilsudski (*pĭl-sōōt'skē*), **Joseph (1867-1935)**, Polish soldier and statesman, was born at Zulou, near Vilna, Poland. He organized the Polish Socialist party which aimed, in part, at the freeing of Poland, then divided among Russia, Austria, and Germany. The Russian government, which had exiled him to Siberia, 1887-92, imprisoned him in 1900. He simulated insanity and escaped through an ingenious plot by his supporters. During World War I, he commanded a brigade in the Austrian army. On Austria's defeat in 1918, he organized the Polish army, with which he maintained the independence of Poland and, in 1920, inflicted a crushing defeat on the Russian armies advancing against Warsaw. He was made chief of state and first marshal of Poland. Prompted by fear of national chaos, he assumed a dictatorship of Poland in 1926.

Pinchot (*pĭn'shō*), **Gifford (1865-1946)**, American forester and politician, was born in Simsbury, Conn. He was graduated from Yale in 1889 and studied forestry extensively in Europe. At Biltmore, N. C., he began the first systematic forest work ever done in America. He was chief of the forest service in the United States Department of Agriculture, 1898-1910. He became professor of forestry at Yale in 1903 and, with his mother and his brother, founded the Pinchot School of Forestry at that university. In 1920, Pinchot became commissioner of forestry for Pennsylvania. He was governor of the state from 1923 to 1927 and 1931 to 1935.

Pinckney (*pĭngk'nĭ*), **Charles Cotesworth (1746-1825)**, American statesman, was born at Charleston, S. C. He fought during the Revolution; assisted in framing the Constitution of the United States; acted as special envoy to France, 1796-97; and was an unsuccessful Federalist candidate for vice president of the United States in 1800 and for president in 1804 and 1808. He is the author of the famous sentiment "Millions for defense, but not one cent for tribute," in answer to Talleyrand's insulting proposal from the French Directory.

Pindar (*pĭn'dər*) **(c. 522 B.C.-443 B.C.)**, Greek lyric poet, was born at Cynoscephalæ, near Thebes. He began his career as a poet at an early age. Infused with marked piety and true Homeric spirit, Pindar's work illustrates the spiritual unity of Greek art. Of his many works—which consisted of hymns, poems, odes, songs, dirges, and encomiums on princes—only his *Epinicia*, or *Odes*, have come down to us entire. These odes, commemorating victories in the public games, are characterized by great nobility and splendor of style.

Pinero (*pĭ-nĕr'ō*), **Sir Arthur Wing (1855-1934)**, English dramatist, was born in London. He was educated in private schools; was an actor from 1874 to 1881; and then became a playwright. He produced a long series of cleverly written plays, including several of the most popular successes of the modern English stage. He excelled in technical construction, and, as a dramatic craftsman, he had no superior among English playwrights of his time. His works include *Dandy Dick, Sweet Lavender, The Profligate, The Cabinet Minister, Lady Bountiful, The Princess and the Butterfly, Iris, His House in Order, The Thunderbolt, The econd Mrs. Tanqueray*, and *The Enchanted Cottage*.

Pinkerton, Allan (1819-1884), detective, was born in Glasgow, Scotland. He emigrated to America in 1842 and, in 1850, opened a detective agency in Chicago. He guarded President Lincoln on his inaugural journey to Washington and was authorized to organize the United States Secret Service, which he conducted until the close of the Civil War. Later his recovery of $700,000 for the Adams Express Company, the arrest of some noted English bank forgers, and the breaking up of the "Molly Maguires" in the coal districts gained him an international reputation. His work for corporations against labor organizations brought him bitter hostilities from unions. After his death, his sons carried on his work under the name of the Pinkerton detective agency.

Pisistratus (*pĭ-sĭs'trā-tŭs*) **(c. 612 B.C.-527 B.C.)**, tyrant of Athens. He won popularity as a private citizen by his charm of manner and generosity and by the part he took in a successful war with Megara about 570-565 B. C. In the turbulent politics of the time, he adopted the cause of the laborers and seized the government in 560 by means of an artifice. Inflicting wounds on himself, he claimed that his political enemies had done it and asked for a bodyguard to defend him. His fellow citizens voted him a guard, which he armed and used to crush opposition to his government.

Pisistratus was twice expelled, but he regained his power and ruled with mildness and justice. He enforced the laws of Solon, who was his friend and relative; reduced taxation; made provision for the disabled and aged; and greatly extended Athenian influence, notably by occupying the ports controlling navigation to the wheat producing territory about the Black Sea. Pisistratus also encouraged literature and the arts.

Pitcher, Molly (c. 1744-1832), is the sobriquet of Mary Ludwig, American heroine of the Revolutionary War. She was born probably near Carlisle, Pa. She married John Hays, an artillerist, and accompanied him in his campaigns.

At the battle of Monmouth in 1778, she acquired her sobriquet from the soldiers, to whom she brought water in a pitcher, ignoring the danger. To her is frequently attributed an act performed by another heroine of the period, Margaret Corbin, who took her wounded husband's place at his gun and prevented its capture. Molly Pitcher was granted a pension by Pennsylvania in 1822.

Pitman, Sir Isaac (1813-1897), English educator and inventor of the Pitman system of stenography, was born at Trowbridge. He became master of a school at Barton on Humber, Lincolnshire, in 1832. In 1837, he published *Stenographic Soundhand*, his first studies of the art which made him famous. A few years later, he issued a second volume, called *Phonography, or Writing by Sound*.

About 1840, Pitman won a prize of £200 offered by the British government for the best method of collecting the proposed "penny postage" on prepaid letters. His suggestion was the use of postage stamps, which have since been universally employed. In 1843, he founded the phonetic society and soon afterward began the publication of the weekly *Phonetic Journal*.

Pitt, William (1708-1778), first earl of Chatham and often referred to as the Elder Pitt, an English statesman, was born in Westminster. He was educated at Eton and at Trinity College, Oxford. In 1735, he entered Parliament. From the beginning, his oratory made him a leader, and he contributed greatly to Walpole's downfall in 1742. He later became a member of the privy council and, in 1756, was called upon to form a new cabinet, of which the Duke of Devonshire was prime minister. Pitt's vigorous war policy brought England successfully through the Seven Years' War with France and earned for Pitt the title of the "Great Commoner."

Pitt resigned in 1761, but, five years later, was called upon to form a new cabinet and became Viscount Pitt and Earl of Chatham. Ill health forced his retirement in 1768; but he kept up an active interest in public affairs; opposed Lord North's policy of taxing the colonies; and, upon the alliance of the colonies and France, protested, in a last great effort, against the proposal to make peace. At the close of this speech, he fell into the arms of his friends and died a few days later.

Pitt, William (1759-1806), English statesman, son of William Pitt, the "Great Commoner," and called the Younger Pitt, was born at Hayes. He was educated at Cambridge; studied for the bar; and entered Parliament in 1781. His first speech, favoring Burke's plan of economic reform, was made in the same year. At the age of 23, he became chancellor of the exchequer and, at 25, was regarded as one of England's most powerful prime ministers. He ruled

absolutely over the cabinet and was at once the favorite of the sovereign, of the Parliament, and of the nation.

From this time, the life of Pitt becomes the history of England. For 17 years, he held his great position without a break. The year 1793 saw the beginning of the Anglo-French War. His successful leadership of the government during one of the most trying periods of British history led his admirers to confer on him the title of "the pilot that weathered the storm." His persistent enmity to Napoleon contributed much toward the emperor's final overthrow.

In 1800, Pitt effected the union with Ireland, but, chagrined because the king had frustrated his Catholic Emancipation measures, he resigned office in 1800. In 1804, he again became prime minister. He effected the third great coalition against France, but the defeat of Austria and Russia at Austerlitz proved his deathblow, and he died soon after.

Pius IX (1792-1878), (Giovanni Maria Mastai-Ferretti), pope, was born at Sinigaglia, Italy. He was educated at Volterra and Rome; was ordained priest, 1819; was created archbishop of Spoleto, 1827; became cardinal in 1840; and was made pope in 1846.

Shortly after his accession, Pius granted a constitution to the Italian states. After the insurrection at Rome, 1848, he fled to Gaeta, but was restored by French aid two years later. In 1859-60, he lost the greater part of his dominions, but was maintained in Rome by a French garrison. In 1870, the infallibility dogma was promulgated by the ecumenical council held at Rome. In that year, Rome was occupied by the troops of Victor Emmanuel, the pope being held practically a captive in the Vatican.

Pius X (1835-1914), (Giuseppe Melchiorre Sarto), pope, was born at Riese, Treviso, Italy, the son of a postman. He was educated at Castelfranco and at the diocesan seminary of Padua and was ordained priest, 1858. He officiated nine years as curate at Tombolo; was parish priest of Salzano for nine years; and was made canon and chancellor of the diocese of Treviso in 1875. In 1884, he was appointed bishop of Mantua, and, in 1893, Leo XIII made him a cardinal and patriarch of Venice.

On the death of Leo XIII, 1903, the conclave elected him pope. As priest and bishop, his life had been spent in the pastoral and episcopal service of the Church rather than in the paths of diplomatic and official service and he continued to display deep interest in social questions and in bettering the life of the poor. In 1907, he issued an encyclical against the Modernist movement in the Church. He was beatified in 1951, and was canonized in 1954.

Pius XI (1857-1939), (Achille Ratti), pope, was born at Desio, near Milan, Italy, the son of a weaver. He was educated for the Church, finishing his studies at Rome, where he celebrated his first mass, 1879. Returning to Milan in 1882, he taught theology and sacred eloquence. In 1888, he became a director, and later prefect, of the Ambrosian Library at Milan. He was appointed subprefect, 1900, and, prefect, 1914, of the Vatican Library, Rome. At a critical period in World War I, 1918, he was designated apostolic visitor to Poland. In recognition of services performed there, he was named papal nuncio, 1919, and was appointed titular archbishop of Lepanto, 1920. Succeeding Cardinal Ferrari, he was elevated, July 3, 1921, to the cardinalate as archbishop of Milan. Upon the death of Benedict XV, Cardinal Ratti was elected pope, Feb. 6, 1922.

Pius XII (Eugenio Pacelli) **(1876-),** pope, was born in Rome, Italy. Ordained a priest at 23, he was employed in the secretariat of Pope Leo XIII. As papal nuncio to Munich in 1917, he laid the groundwork for peace proposals from Pope Benedict XV to the German government. He was the papal nuncio to the German republic and negotiated concordats with Bavaria and Prussia. In 1929, he was made cardinal and also papal secretary of state. In 1936, he made an airplane tour of the United States. He was chosen pope March 2, 1939, on the third ballot of the conclave. He proclaimed the dogma of the Assumption of the Virgin Mary in 1950.

Pizzaro (*pĭ-zär′rō*; Sp., *pê-thär′rō*), **Francisco (c. 1470-1541),** Spanish conquistador, was born at Trujillo. He received little education; entered the army; and, in 1509, embarked with other adventurers for America. Having distinguished himself in Panama, he set out in 1524 by way of the Pacific on a voyage of discovery with another soldier named Almagro; landed on the island of Gallo, on the coast of Peru; and afterward returned to Spain for authority to conquer the country. In 1529, he obtained the royal sanction and, in 1531, set sail from Panama with three ships.

On his arrival at Peru, Pizarro found a civil war raging between the two sons of the emperor, who had just died. With overtures of peace he approached the victorious Atahualpa, who had become the reigning Inca, and was admitted into the interior of the country. He then invited Atahualpa to a banquet; had him imprisoned; and commenced a wholesale butchery of his subjects, after which he forced Atahualpa to disclose his treasures and then perfidiously put him to death.

Pizarro's power, by virtue of the mere terror he inspired, was now established and he might have continued to maintain it, had not a contest arisen between him and his old comrade Almagro, whom he put to death. Finally the sons and friends of the latter rose against Pizarro, seized him in his palace at Lima, and executed him.

Planck, Max (1858-1947), German physicist, was born at Kiel, and was educated at the universities of Munich and Berlin. He taught at Munich, at Kiel, and later at Berlin, where he became professor of mathematical physics and director of the institute of theoretical physics. Planck won for himself a distinguished place in the history of science by his so-called quantum theory of radiant energy, according to which such energy is "not emitted continuously but in discrete atomic quantities." He received the Nobel prize in physics for 1918. He published many technical works on thermodynamics and radiation.

Plato (c. 429 B.C.-347 B.C.), Greek philosopher, was born of noble parents in Ægina. His own name was Aristocles, the surname Plato, "Broad," being applied to him as indicative of his broad shoulders. He was of robust constitution and thoroughly trained in gymnastics. His mind was no less carefully cultivated. He made rapid progress in mathematics, mastered all the philosophies of his day, and wrote many poems, most of which he afterward burned.

Association with Socrates. The outstanding fact of his life was his connection with Socrates, in whose society Plato spent the ten years from 409 to 399 B. C. After the trial and execution of his beloved teacher, in 399 B. C., Plato quitted Athens and resolved to keep clear of politics and to give himself wholly to philosophy.

The Academy. He retired first to Megara, where he resided with Euclid. He then visited Cyrene and Egypt, returning to Athens about 395 B. C. Some years later he visited Italy and Sicily. In 387 B. C., he settled at Athens in a small house adjoining the "Academia," one of the principal gymnasiums of the city. Here he founded his school of philosophy, known as the Academy, which attracted pupils from all parts of Greece, among them Aristotle. This school was endowed and became the first university known to history. It flourished for about 900 years, and was finally closed by Justinian in 529 A. D.

Experiences in Sicily. Upon the death of Dionysius the Elder, tyrant of Syracuse, Plato, at the instance of his friend Dion, again went to Sicily, about 367 B. C., planning to assist the younger Dionysius in establishing a model state. The project failed. A second visit likewise ended in disappointment. These relations with the tyrant of Sicily brought down severe censure on the philosopher. His last years were saddened both by the failure of his hopes and by the reproaches of his enemies.

Writings. Plato was the most Socratic of all the disciples of Socrates. His reverence for his master is shown by the place that he assigned to him in his works, all of which are written in the form of dialogue with Socrates in the leading role. The well-known *Phædo*, for example, gives the last conversations of Socrates on the immortality of the soul. The fullest account of Plato's own philosophy and social theories are given in the *Republic*, the *Timæus*, and the *Laws*.

One of the most notable of Plato's doctrines is his theory of ideas. These ideas are not mere concepts of our minds; they are realities of which material objects are copies. His picture of the ideal state in the *Republic* entitles him to be called the first scientific socialist.

Influence. Plato's writing exercised an inestimable influence on Aristotle, the Stoics, Cicero, Plutarch, the Neoplatonists, the Christian fathers, the earlier scholastics, the philosophy and poetry of the Renaissance in Italy and England, and on the 19th-century revival of historical and philosophical studies in Germany. See *Educational Reformers*.

Platt, Charles Adams (1861-1933), American painter, etcher, and architect, was born in New York City. He studied in art schools of New York and Paris. His early paintings are largely views in New England, smooth in surface and sympathetically handled. These include "Snow" and "Clouds." He later turned to architecture and etching. The subjects of his etchings are drawn largely from scenes in the Netherlands and from the life of fishermen. Among the buildings he designed are the University of Illinois and the Freer Gallery of Art at Washington, D. C. He was elected to the American Academy of Arts and Letters in 1919.

Plautus (*plô′tŭs*), **Titus Maccius (c.254 B.C.-184 B.C.),** comic poet of ancient Rome, was born at Sarsina in Umbria. He early associated himself with actors, and, while employed to turn a baker's mill, wrote three plays. From the proceeds of these he was enabled to devote himself to the work of a playwright.

Twenty-one comedies legitimately assigned him are extant, though several are incomplete. They are based on

Greek comedies, but the genius of Plautus imparted to them an essentially Roman quality. They present great vivacity, well constructed plots, and humorous, lifelike characters and situations. His Latin is particularly pure and vigorous. He has found noteworthy imitators in Shakespeare, Molière, Dryden, Addison, and Lessing. His literary career continued uninterrupted until his death.

Pletho, Georgius Gemistus (c. 1355-1450), Byzantine humanist and philosopher, was born at Istanbul and, after a period of exile spent among the Turks, settled at Mistra, the site of ancient Sparta. There he spent most of his life as a judge. He became known early as a vigorous exponent of the Neoplatonic philosophy, which he adapted into a creed for a religion that he hoped would supersede Christianity and Mohammedanism. On an official visit to Italy in 1438, he lectured and wrote a tract on the works of Plato, thereby arousing a wide interest in this philosopher among the scholars of the West.

Pliny (*plĭn'ĭ*) **the Elder,** known in Latin as **Gaius Plinius Secundus (23 A.D.-79 A.D.),** Roman naturalist and encyclopedist, was born probably at Como, Italy. Of his many works, his famous *Historia Naturalis* is the only one that has come down to us. This comprises 37 books, embracing 20,000 topics collected from about 2000 different volumes. This work was the greatest encyclopedia of ancient times. He was an intimate friend of the Roman emperor Vespasian. He was admiral of the fleet when the eruption of Vesuvius in 79 A. D. overwhelmed Herculaneum and Pompeii. He approached this volcano during the eruption partly to rescue victims and partly to investigate the phenomenon, but was overcome by poisonous fumes and perished. See *Biology, History of.*

Pliny the Younger, known in Latin as **Gaius Plinius Cæcilius Secundus (c. 61 A.D. -c.113 A.D.),** nephew and adopted son of Pliny the Elder, was born at Como. He is celebrated chiefly for his *Letters,* of which ten books are extant. In 100, he was appointed consul; he then composed his *Panegyricus,* an eulogy of Trajan, which is also extant. In 111, he was appointed governor of the provinces known as Bithynia and Pontica; in this capacity, he wrote to Trajan, with respect to the Christians in his province, an interesting letter which is one of the earliest historical references to Christianity. The *Letters* of Pliny are remarkable, not only for their elegance, but for the light they throw upon the history of the period in which they were written.

Plotinus (c. 205 A.D.-270), Neoplatonic philosopher, was born of Roman parents at Lycopolis, Egypt. At 8 years of age, he went to Alexandria to study philosophy. For some time he listened unsatisfied to the different lecturers, but, having heard the Platonic philosopher Ammonius Saccas, he zealously embraced his teachings and subsequently elaborated them. He set out in 242 to visit Iran and India, but was compelled by circumstances to turn back to Antioch, whence he went to Rome in 244. There he spent the remainder of his life lecturing on philosophy to enthusiastic audiences.

Plotinus' system was based mainly on Plato's "theory of ideas,"and he taught that from the invisible world of ideas emanate powers which produce, at various stages, pure intelligence, the soul of the world, the souls of men and of animals, and, finally, matter. Man, according to Plotinus, belongs to the world of intelligence and to that of the senses, and the character of his life determines the world to which he will incline the more strongly. The supreme goal of human life is union with pure intelligence and with God.

The emperor Gallienus assigned to Plotinus two cities in Italy in which to establish an ideal state to be called Platonopolis and to be modeled after the commonwealth described in Plato's *Republic.* The project was prevented, however, by the interference of courtiers.

Plutarch (c. 45 A.D. -c. 125 A.D.), Greek moralist and biographer, was born at Chæronea in Bœotia. He belonged to a good family and received an excellent preliminary education in Athens under Ammonius of Alexandria. Subsequently, he traveled and accumulated in Egypt vast stores of historical and mythological lore. He acquired the habit of diligently examining public and private records and of carefully writing down his observations.

On his return to Greece, he visited the principal academies, studied the government of Sparta, and collected much historical information from books, statues, medals, inscriptions, and paintings. Plutarch studied in turn the positive sciences and medicine. Apparently, he remained ignorant of nothing connected with the history and development of the philosophic sects known in his time.

His fellow citizens sent him as proconsul to Achaia. This and other public offices that he held give evidence of the high public esteem he enjoyed. During his residence in Rome, he gave courses in philosophy and developed his ideas and doctrines through conversations.

Later, Plutarch returned to establish himself in his native Chæronea, where he continued to live a public-spirited and laborious life. His renown as a sage had spread through Greece; Athens accorded him the right of citizenship; Corinth and Elis invited him to their great civic feasts; and he was made priest of the oracle of Apollo at Delphi.

Plutarch was a moralist of the old school. His ethical writings, bearing the Latin title of *Moralia,* are most valuable pictures of antique manners and thoughts; but they are surpassed by the *Parallel Lives,* in which Plutarch made a character study of illustrious Greeks and Romans in pairs, from Theseus to his own age. This book is one of our best records of antiquity.

Pocahontas (*pō'kə-hŏn'təs*), **(c. 1595-1617),** Indian princess, the daughter of Powhatan, an Indian chief of Virginia. In 1612, she was enticed aboard a British ship, taken to Jamestown, and held as a hostage for the return of white prisoners. Converted to Christianity, she was baptized in 1613. In the following year, she was married to John Rolfe, with whom, in 1616, she went to England, where she was received as the daughter of an American king.

In a letter to the Queen of England, Captain Smith related how Pocahontas, in 1607, saved him from death at the hands of the Indians. It is on account of this dramatic rescue, further elaborated by Captain Smith in his *Generall Historie,* 1624, that Pocahontas is chiefly known. Pocahontas died at Gravesend, England, leaving a son, Thomas Rolfe, who later settled in Virginia. From him several noted Virginia families trace their descent.

Poe, Edgar Allan (1809-1849), American poet, short story writer, and critic, was born in Boston, Mass. He was adopted by John Allan of Richmond. He entered the University of Virginia in 1826, but left after a term and became a private in the regular army. In 1827, Poe published a volume of poems, his first attempt in literature, under the title of *Tamerlane and Other Poems.* He entered the Military Academy at West Point, but was cashiered in 1831.

Thrown now upon his own resources, Poe devoted himself to literature as a profession. In the same year, he published a volume containing the poems "The Valley of Unrest," "The City in the Sea," "Lenore," "To Helen," and "Israfel." In a magazine competition in 1833, he won a prize for the best prose story. This led to his employment in connection with the *Southern Literary Messenger.* In 1837, he removed to New York, where he lived by contributing to the New York *Quarterly Review* and other periodicals. In 1839, he became associate editor of *The Gentleman's Magazine* at Philadelphia and, in 1840, published a collection of his best stories, with the title *Tales of the Grotesque and Arabesque.* The year 1845 was marked by the appearance of his famous poem *The Raven.*

While Poe's criticism was of great importance in his day and while his prose tales have become a part of the world's literature, his poems, which are marked by exquisite fancy and felicity of language, remain the most distinctive expression of his genius. He was elected to the American Hall of Fame in 1910.

Poincaré (*pwăN'kä'rā'*), **Raymond (1860-1934),** French statesman, was born of a distinguished family in Bar le Duc. He made a brilliant record as a law student in Paris; practiced his profession; wrote articles for political journals; and, at the age of 27, was elected to the Chamber of Deputies. Appointed prime minister in 1912, he became an energetic supporter of the alliance with Russia and of the entente with England. In 1913, he was elected president of France. At the outbreak of World War I, his effective appeals aroused the nation to supreme efforts of patriotism.

On the expiry of his term as president, Poincaré was made president of the reparations committee, from which he subsequently resigned on account of its alleged leniency to Germany. In 1922, he became premier of France and sponsored the policy of the seizure of the Ruhr. Following his defeat at the polls in 1924, the country drifted to the brink of financial ruin. He was called on to head a coalition ministry in 1926 and, by 1928, had placed French finances and credit on a stable basis.

Polk (*pōk*), **James Knox (1795-1849),** 11th president of the United States, was born in North Carolina. He was educated at the University of North Carolina; was admitted to the bar; and began practice at Columbia, Tenn., in 1820. He was a Democratic member of Congress from Tennessee, 1825-39; was speaker of the House of Representatives, 1835-39; served as governor of Tennessee, 1839-41; and was elected to the presidency in 1844.

The outstanding event of Polk's administration, 1845-49, was the Mexican War, by which the United States acquired Texas, California, and New Mexico. Texas was annexed by Congress just before Polk's inauguration.

During his administration, by a compromise treaty with England, the northern boundary line of Oregon territory—now the state of Washington—was fixed at 49° north latitude despite the fact that his platform in the campaign had promised to carry the line up to 54° 41′, "with or without war with England," which was condensed into the famous

watchword "Fifty-four forty or fight." The low tariff act of 1846 was a favorite measure of Polk's, being passed in the Senate by the vote of Vice President Dallas. Other features of Polk's administration were the admission of Wisconsin as a state in 1848; the adoption of the subtreasury system, by which some portion of the government funds is kept in vaults in Washington instead of in banks; the creation of the Interior Department, its secretary being added to the cabinet of the president; and the establishment of the Naval Academy at Annapolis.

Polo, Marco (c. 1254-1324), Italian traveler, was born of a noble family in Venice. In 1271, he accompanied his father and his uncle to the court of the famous Kublai Khan, Tartar emperor of China, by whom he was received with favor in 1275 and was employed on several embassies as well as being given a territory to rule. After spending many years in the service of the emperor, who was unwilling to part with them, the three Europeans finally obtained permission to accompany an embassy to Iran, whence they proceeded to Venice in 1295, laden with rich presents.

In 1298, Polo was captured by the Genoese and was put in prison. There he dictated to another captive, Rustichello of Pisa, the story of his adventures. This story, later published under the title of *The Book of Marco Polo*, revealed to a wondering Europe the magnificence of the Eastern world. It was one of the most important compilations in the history of geographical discovery. A golden statue of him, erected in a temple at Soochow, China, still bears witness to his visit to the Orient.

Polybius (*pō-lĭb'ĭ-ŭs*) **(c. 205 B.C.-c. 122 B.C.)**, Greek historian, was born at Megalopolis in Arcadia. He was educated for a public career and was one of the thousand distinguished Achæans carried as prisoners to Rome, 168, where he remained in exile for about 17 years. While in Rome, he moved in the society of the most distinguished citizens, being a member of the coterie known as the Scipionic circle.

After his return, Polybius undertook numerous journeys into foreign countries and spent the remainder of his life writing his celebrated *History* in 40 books. Of this work, which was a general history of Rome and adjacent countries from 266 to 146 B. C., only the first five books and some fragments remain. It is, apart from the work of Thucydides, the best example in the ancient world of a history which endeavors obstinately to obtain the facts and to learn their causes. His style is one of the earliest examples of the so-called common dialect, that was used in nearly all late Greek compositions.

Pompey, known in Latin as **Gnæus Pompeius Magnus (106 B.C.-48 B.C.)**, Roman general and statesman. He was the son of Gnæus Pompeius Strabo, under whom he served in the Italian campaigns. He was an ally of Sulla and aided him in crushing the forces of the Popular leader, Marius. These services won him the title of "The Great." He later obtained credit for suppressing the forces led by Sertorius and by Spartacus and, in 67-66 B. C., cleared the seas of pirates.

The most important of Pompey's foreign military successes were his campaign against Mithridates, which made Pontus a Roman province, and his capture of Jerusalem, which added Syria to the Empire. Shortly after this, he joined the party of Cæsar and formed with him and Crassus the First Triumvirate.

Finding his dominant position threatened by Cæsar's growing influence, Pompey headed a party opposed to Cæsar, who was driven to take up arms against his former ally. The final struggle took place at Pharsalus, 48, when Pompey was defeated and fled to Egypt, hoping for protection. But, by the order of Ptolemy, king of Egypt, a former centurion of the general slew Pompey as he was landing. His body was left on the sands, his head was taken to Cæsar, who had the murderer put to death.

Ponce de Leon (*pōn'thā dā lā-ōn'*), **Juan (c. 1460-1521)**, Spanish explorer, was born at San Servas, Leon. He accompanied Columbus on his second voyage and, in 1500, began the conquest of Puerto Rico, of which he was governor from 1512 to 1515, enriching himself by means of gold and slaves.

Having heard of a rich land called Bimini containing a fountain which possessed the property of restoring youth, he set out in search of it in 1513 and, on Easter Sunday, discovered and named Florida. On a subsequent expedition to Florida he was wounded by the Indians and died on the return voyage to Puerto Rico.

Pons, Lily (1904-), French singer, was born at Cannes. She was at first a pianist and actress, then studied singing in Paris. She made her debut in 1927 at Mulhouse in *Lakme* and her New York debut three years later in *Lucia di Lammermoor*, her coloratura soprano voice winning high praise. She appeared later in *Rigoletto*, *Tales of Hoffman*, *Mignon*, and *La Sonnambula*; starred also in motion picture plays, including *That Girl from Paris*, *I Dream Too Much*, and *Hitting a New High*. She took up her residence in America, marrying André Kostelanetz.

Ponselle, Rosa Melba (1897-), American singer, was born at Meridan, Conn., of Italian parents (Ponzillo). She obtained her musical education in New York and made her debut as a member of the Metropolitan Opera Company in 1918 as Lenora in *La Forza del Destino*, appearing with Caruso. Possessed of a natural skill in florid music and of a soprano voice especially rich in its lower notes, she became a favorite in *Il Trovatore*, *William Tell*, *Carmen*, and *L'Africaine*. She married Carle A. Jackson of Baltimore in 1936.

Pontiac (*pŏn'tĭ-ăk*), **(c. 1720-1769)**, chief of the Ottawa Indians. At an early age he won distinction fighting in the service of the French, and, at Braddock's defeat in 1755, he is said to have led the warriors of his own tribe.

After the French had surrendered Canada, his hostility to the English prompted him to organize a combined attack upon all the English garrisons and settlements from Pennsylvania to Lake Superior. The attack, which was made early in May 1763, was in most places successful; but, at Detroit, where Pontiac led in person, the English commander was forewarned, and a five months' siege ensued. Pontiac resorted to every means known to the Indians to reduce the place, but was unsuccessful. Peace was finally made in 1766, Pontiac being forced to submit to British rule. He was killed at Cahokia, Ill.

Pontoppidan (*pŏn-tŏp'ĭ-тнăn*), **Henrik (1857-1943)**, Danish novelist, was born in Fredericia. He was educated at the University of Copenhagen. His trilogy on the life of a Danish clergyman—*Soil*, *The Promised Land*, and *The Day of Judgment*—established his reputation as an outstanding figure among the contemporary writers of Europe. He produced many short stories, novels, and plays, of which his *Lucky Per*, also a trilogy, is outstanding. With Karl Gjellerup, he was awarded the Nobel prize in literature for the year 1917.

Pope, Alexander (1688-1744), English poet, was born in London. His father was a prosperous linen draper. Pope was of small frame and of delicate constitution. The groundwork of learning he acquired at two private schools and from two priests who were his tutors; his further education resulted from his own persevering efforts.

Pope was a poet from his earliest years. His *Essay on Criticism*, in 1711, is a poem on literary standards abounding in aphorisms that have lived on. His *Rape of the Lock* illustrates Pope's peculiar gift of satire, ingenuity, and skillful versification. From 1715 to 1726, he was engaged chiefly on his translations of the *Iliad* and the *Odyssey*. In 1728-29, he published his greatest satire, the *Dunciad*, an attack on all poetasters and pretended wits. Of his many productions, the most widely known is the *Essay on Man*.

Pope's rank as a poet has been variously estimated. To his contemporaries among whom perfection of form was highly regarded, he was considered the greatest English poet. The romanticists, however, who value sincerity of sentiment most highly, are inclined to grant him little recognition as a poet.

Pope, John Russell (1874-1937), American architect, was born in New York City. He was educated at the College of the City of New York and Columbia University. In 1895, he was a fellow of the American Academy in Rome and studied later at the School of Fine Arts, Paris. He began practice in New York in 1900. Among the monuments of Pope's architectural skill are the National Gallery of Art and the Scottish Rite Temple, Washington; the MacDonough Memorial, Plattsburg; the Lincoln Memorial, at Hodgenville; the Richmond, Va., Terminal Station; and many fine residences. He was elected to the American Academy of Arts and Letters in 1927.

Porter, Cole (1893-), composer and lyricist of many successful musical comedies, was born in Peru, Indiana, and was educated at Yale and Harvard. Among his more than twenty-five Broadway musical shows and motion pictures are the following, with the hit song from each: *The Gay Divorcee*, 1932 ("Night and Day"); *Anything Goes*, 1934 ("You're the Top"); *Jubilee*, 1935 ("Begin the Beguine"); *Rosalie*, 1937 ("In the Still of the Night"); *Leave It to Me*, 1938 ("My Heart Belongs to Daddy").

More recent Cole Porter successes include *Kiss Me Kate*, 1948; *Can-Can*, 1953; and *Silk Stockings*, 1955.

Porter, David Dixon (1813-1891), American admiral, was born at Chester, Pa. He entered the navy as midshipman in 1829. From 1836 to 1841, he was employed in the coast survey of the United States and held various other appointments until the outbreak of the Civil War.

Porter was then made commander of the sloop of war *Powhatan*; distinguished himself in the capture of New Orleans; and commanded the gunboat and mortar flotilla which co-operated with the squadron of Admiral Farragut in the first attack on Vicksburg. In the fall of 1862, as acting rear admiral, he was placed in command of all the naval forces on the river above New Orleans. At the termination of the war, he was appointed superintendent of the United States Naval Academy, Annapolis. He was made vice admiral in 1866 and admiral in 1870.

Porter, Gene Stratton (1868-1924), American novelist and ornithologist, was born in Wabash county, Ind. She was privately educated and, in 1886, married Charles Darwin Porter. In her novels, some of which attained great popularity, she reveals a remarkably intimate knowledge of the plant and the bird life of her region. Her works include *The Song of the Cardinal, At the Foot of the Rainbow, A Girl of the Limberlost, Friends in Feathers, Music of the Wild, Laddie, Homing with the Birds,* and a book of poems entitled *The Fire Bird.*

Porter, Jane (1776-1850), English novelist, was born in Durham. She was educated in Edinburgh. Her first work, *Thaddeus of Warsaw,* published in 1803, was immensely popular and continued to be reprinted for over a century. *Scottish Chiefs,* a historical romance dealing with the heroic times of Bruce and Wallace, established her fame throughout Europe. With her sister Anna Maria, she wrote *Tales Round a Winter Hearth* and *The Field of Forty Footsteps.*

Porter, William Sydney (1862-1910), commonly known by the pen name "O. Henry," American short story writer, was born in Greensboro, N. C. He spent his early life as a wandering journalist, finally settling in New York in 1901 after having served a prison term for alleged embezzlement of funds while cashier in a bank at Austin, Texas. His most notable work is found in tales of shop girls, office boys, clerks, tramps, and the floating and outcast life of New York City.

Porter was an exceedingly prolific author with a remarkable gift of story telling. He ranks among the foremost modern American short story writers. The list of his books includes *The Trimmed Lamp and Other Stories, The Gentle Grafter, The Voice of the City, Strictly Business, Two Women, Cabbages and Kings,* and *Rolling Stones.* See *Gift of the Magi.*

Post, Emily (c. 1880-), née Price, American novelist and writer on etiquette, was born in Baltimore, Md. She began writing novels in European settings which contrasted European and American standards. Her *Etiquette,* published in 1922, was a handbook of American standards in social intercourse which attained to great popularity and made her name a household word. Its success was due partly to the distinctions she drew between essentials and non-essentials.

Post, George Browne (1837-1913), American architect, was born in New York City. He was graduated in civil engineering at New York University, 1858, and studied architecture under Richard Morris Hunt. Enlisting as a volunteer in the Civil War, he rose to the rank of colonel. In 1865, he began the practice of his profession in New York.

With Hunt, Mead, McKim, and Richardson, he became prominent in the revival and advance of American architecture between 1875 and 1890. Among the structures designed by him were the original Equitable and Western Union buildings, the buildings of the College of the City of New York, and the Cornelius Vanderbilt residence, in New York; the Prudential building in Newark, N. J.; and the Wisconsin State Capitol. He was elected to the American Academy of Arts and Letters in 1911.

Potter, Paul (1625-1654), Dutch painter, was born at Enkhuizen. His best pictures are pastoral scenes with animal figures, the life-size "Young Bull" being especially celebrated. His "Dairy Farm" was sold in London in 1890 for £6090. The Rijks Museum at Amsterdam possesses his widely known "Bear Hunt." His pictures of animals and landscapes show great power and fidelity.

Pound, Ezra (1885-), American poet, was born at Hailey, Idaho. After being graduated from the University of Pennsylvania, he went to Europe in 1906, traveling in Spain, Italy, and France and finally settling in London. Here he became the leading spirit in a school of poetry, members of which were known as "Imagists." The group included Amy Lowell and Richard Aldington. Pound professed himself a follower of Ovid and Confucius, and his poetry is, for the most part, intellectual and esoteric. Most of it was collected and published under the title of *Cantos.* Radio broadcasts made in Italy led to a charge of treason, and he was committed to an asylum in 1945.

Pound, Roscoe (1870-), American jurist, was born at Lincoln, Nebr. He was educated at the University of Nebraska and Harvard University. He was admitted to the bar in 1890 and practiced at Lincoln, Nebr., until 1901, when he became assistant professor of law at the University of Nebraska. After acting as dean of the law department there from 1903 to 1907, he served successively as professor of law at Northwestern University, the University of Chicago, and Harvard University, becoming dean of the Harvard Law School in 1916. He retired in 1937.

Powell, John Wesley (1834-1902), American geologist, was born at Mount Morris, N. Y. He attended Oberlin College, 1857-58, and became interested in natural science. He enlisted as a private in the Civil War; rose to the rank of major; and lost his right arm at the battle of Shiloh.

In 1865, Powell became professor of geology at Illinois Wesleyan University and, in 1867, made his first journey of exploration to the Colorado Rockies. In 1869, he made a voyage of great danger and hardship through the Grand Canyon of the Colorado River, the valuable results of which brought him into scientific prominence. Congress voted him funds to continue explorations, and, 1871-73, he made a second voyage down the Colorado River, surveying an area of 100,000 square miles. Largely upon his recommendation, Congress established, in 1879, the United States Geological Survey, of which he was director from 1881 until 1894.

Powers, Hiram (1805-1873), American sculptor, was born at Woodstock, Vt. In early youth, he was apprenticed to a clockmaker in Cincinnati; was later taught by a German sculptor to model in plaster; and was employed for several years in making wax figures for a dime museum. In 1835, he went to Washington, where he executed busts of the most distinguished persons of the day. In 1837, he established his residence in Florence, Italy, where he passed the remainder of his life. In 1838, Powers produced his statue "Eve," and, in 1843, the still more popular "Greek Slave."

Praxiteles (*prăk-sĭt'ê-lēz*), Greek sculptor, a citizen of Athens, flourished in the 4th century B. C. He executed statues in both bronze and marble and was unrivaled in his treatment of the beauties of the human figure. His statues of gods are less august than those by earlier Greek sculptors, but they present a finer and more human type.

The most celebrated work of Praxiteles is the marble Aphrodite of Cnidus, which Pliny called the finest statue in the world. He is known also for his satyrs, one of which has been made familiar to readers of English by Hawthorne's *Marble Faun.* He executed famous statues of Eros and Apollo, which have perished. His statue of Hermes of Olympia was found during the excavation of the Heræum at Olympia in 1877.

Prescott, Orville (1906-), editor and literary critic, was born at Cleveland, Ohio. After graduation from Williams College, he engaged in newspaper work, conducting columns on sports, art, and books. He served for a time on the staff of *Newsweek* magazine, was literary editor of *Cue,* and more recently has been co-editor of the section "Books of the Times" for *The New York Times.* He is the author of *In My Opinion, An Inquiry into the Contemporary Novel.*

Prescott, William Hickling (1796-1859), American historian, was born at Salem, Mass. During his college course at Harvard, he accidentally lost the sight of an eye, the other being so seriously affected that he was nearly blind. He was then sent abroad for his health, traveling in England, France, and Italy. On his return to America, he gave his attention to literature and, in 1825, selected materials for a *History of Ferdinand and Isabella,* which appeared in 1837. He next devoted six years to the *History of the Conquest of Mexico* and four years to the *Conquest of Peru.* He left his *History of Philip II* unfinished. Prescott's histories rank high as literature.

Priestley, John Boynton (1894-), English novelist and playwright, was born in Yorkshire. He served in the British army in World War I and was an honor student at Cambridge University. His earliest writings consisted largely of essays ranging from off-hand personal opinions and preferences to more formal criticism, as in *George Meredith, The English Comic Characters,* and *The English Novel.* Following the success of his most popular novel, *The Good Companions,* he wrote several other works of fiction, best known of which is *Angel Pavement.* Later he turned his attention chiefly to the writing of plays, successful examples of which are *Dangerous Corner, Time and the Conways, I Have Been Here Before,* and *An Inspector Calls.* Radio broadcasts and political articles have occupied much of his time, but during a relaxed interval in Arizona he returned to his personal essay manner in the very readable volume, *Midnight on the Desert.*

Priestley, Joseph (1733-1804), English chemist and clergyman, was born at Fieldhead. He was educated at Daventry and was subsequently pastor to various congregations. In 1774, he announced the discovery of oxygen, which he called "dephlogisticated air." In 1780, he settled at Birmingham and proceeded actively with experiments, which led to the discovery of many chemicals common today. The naming of rubber is credited to him, the name being based on its erasing qualities, to which he called attention. He became the associate of Boulton, Watt, and Erasmus Darwin, grandfather of Charles Darwin; and was also pastor of a Unitarian congregation.

In 1791, Priestley's fortunes changed. His religious principles and his avowed partiality to the French Revolution excited the hatred of the High Church and Tory party, and, in the riots of July in that year, his house, library, manuscripts, and apparatus were committed to the flames. Conceiving himself to be insecure from popular

rage, he embarked for America in 1794, settling at Northumberland, Pa. His writings include more than 130 separate works, covering a vast range of subjects.

Protagoras (*prō-tăg'ō-răs*), **(c. 485 B.C.-c. 411 B.C.),** Greek educator and philosopher, was born at Abdera, Thrace. He settled in Athens and gained a reputation as a teacher of literature, sociology, and philosophy. He was the first to call himself a sophist, and he made a considerable amount of money by offering courses in general culture. He was a friend of the statesman Pericles.

As a philosopher, Protagoras is often regarded as the forerunner of pragmatism. In his famous saying "Man is the measure of all things," he crystallized the doctrine, developed in his *Truth*, that all things actually are only what they appear to each person. He wrote also a work entitled *On the Gods*. It expressed doubt regarding the existence of divinities and led to its author's banishment from Athens. Protagoras is credited with being the first to systematize grammar and to distinguish the parts of speech, the tenses, and the modes. He perished at sea.

Proust (*prōōst*), **Marcel (1871-1922),** French novelist, was born of wealthy parents in Paris, where as a young man he frequented the most aristocratic salons. Becoming bored with Parisian high society, he withdrew to apply himself to serious writing and spent seventeen years composing his multi-volume masterpiece, *A la recherche du temps perdu* (*Remembrance of Things Past*), published in France in 16 volumes between 1913 and 1927. Partly autobiographical, it deals psychologically and in the minutest detail with the decaying aristocratic society he knew. While writing it, Proust, a sufferer from asthma since boyhood, lived the life of a recluse in a small cork-lined room. His work has influenced later novelists to a remarkable degree.

Przhevalski (*pĕr-zhĕ-vàl'y'skĭ*), **Nikolai Mikhailovitch (1839-1888),** Russian explorer, was born at Kimbrovo. He was educated at Smolensk and Leningrad. During 1870-73, he made his first important journey to the west central part of China, giving the results in his *Travels in Mongolia*. In his second journey, 1876-77, described in his book *From Kulja across the Tian-Shan to Lob-nor*, he rediscovered the large lake Lobnor, until then unvisited by Europeans since the time of Marco Polo. In his third journey, he explored the sources of the Hwang and eastern Tibet, and, on his fourth, he crossed the great desert of Gobi, locating the watershed between the Hwang and Yangtze rivers.

During these explorations, he secured valuable collections of animals and plants and made many remarkable discoveries, including the wild camel and a true wild horse, now known as Przhevalski's horse.

Ptolemy (*tŏl'ĕ-mĭ*), astronomer and geographer, whose proper name is Claudius Ptolemæus, was a native of Egypt and flourished in Alexandria about 139-161. Both as an astronomer and as a geographer, he held supreme sway over the minds of almost all the scientific men from his own time down until about the 15th century.

Ptolemy collected the astronomical learning of the ancient world and, by adding improvements, arrived at the astronomical system which he described in his Greek work known best by its medieval title of the *Almagest*. This system, known as the Ptolemaic system, in which the earth is assumed to be the fixed center of the universe, was superseded by the Copernican system within the past four centuries. Ptolemy's *Geography* contains a calculation of the size of the sphere of the earth, a description of the surface of the earth as then known, a list of places, each located by its latitude and longitude and followed by a brief description with notes on interesting features. See *Astronomy*.

Ptolemy I (c. 367 B.C.-283 B.C.), king of Egypt, known by his surname Soter, "Preserver." Ptolemy was a Macedonian and acted as one of Alexander's generals in his Eastern campaigns. When Alexander's possessions were divided after his death, Egypt fell to Ptolemy.

Wars followed the partition. Ptolemy was a man of energy and valor and not only warded off danger from his own realm, but also extended his dominions by the addition of Phœnicia and made his influence paramount in the Mediterranean Sea. His capital, Alexandria, became the foremost city of the world, and its museum and library, founded by Ptolemy, attracted numerous scholars, making Alexandria a rival of Athens as a center of culture.

Ptolemy II (c. 309 B.C.-247 B.C.), surnamed Philadelphus, son of Ptolemy I. His reign, which began in 285 B. C., is remarkable for the successful cultivation of the arts of peace rather than for the practice of war. He carried on the work of his father by enriching the library of Alexandria with all the literary treasures which he could procure.

Tradition alleges that it was by his orders that the Hebrew Scriptures were translated into Greek and that the version called the Septuagint was formed. He is said to have induced Manetho to write, in Greek, a political history of Egypt and an account of the religious tenets of the Egyptians. He expended large amounts on public works and was the builder of a famous lighthouse on the island of Pharos, which became known as one of the seven wonders of the ancient world.

Puccini (*pōōt-chē'nē*), **Giacomo (1858-1924),** Italian composer, was born at Lucca. He received his musical education at Lucca and at the conservatory at Milan. Puccini's first opera, *Le Villi*, attracted much notice in Italy. The success of *Manon Lescaut* in 1893 was surpassed in 1896 by that of *La Bohême*, which immediately became favorably known throughout the musical world. In 1904, he won a still greater triumph with *Madame Butterfly*, the libretto of which is based on the novel by J. L. Long. *The Girl of the Golden West*, a typical American subject, was first produced at the Metropolitan Opera House in 1910. Puccini is the chief representative of the Italian veristic school of opera. See *Madame Butterfly*.

Pulaski, Casimir (1748-1779), Polish soldier and American revolutionary general, was born at Podolia. He assisted his father in revolts against King Stanislaus. Forced to flee, he came to America in 1777 and, joining Washington's army, distinguished himself at Brandywine. The next year he organized an independent cavalry brigade—the Pulaski legion—which fought losing battles at Egg Harbor, N. J., and Charleston, S. C. While leading a cavalry charge in an attack on Savannah, Pulaski was mortally wounded, dying shortly thereafter.

Pulitzer (*pōō'lĭt-sĕr*), **Joseph (1847-1911),** journalist, was born in Budapest, Hungary, and was educated by private tutors. He came to the United States in 1864 and served until the end of the Civil War in a cavalry regiment with the Union forces. He went to Saint Louis, where, in 1868, he became a reporter and later managing editor and part owner of the *Westliche Post*. In 1878, he bought the Saint Louis *Dispatch*, combining it with the *Evening Post*.

Having previously served as a member for the Missouri state legislature, he removed to New York and was elected to Congress in 1884 as a Democratic member. He resigned shortly, however, in order to devote himself to editing the New York *World*, which he had acquired in 1883. By appealing to popular taste in his news items and editorials, he built up a circulation unrivaled before the advent of the Hearst papers. In 1903, he endowed with $1,000,000 a school of journalism at Columbia University. He donated funds also for the Pulitzer prizes—$500 to $2000 to be awarded annually for the year's best American novel, play, book of poetry, historical work on the United States, biography, cartoon, editorial, and newspaper reporting.

Pullman, George Mortimer (1831-1897), American inventor, was born in Chautauqua County, N. Y. For a time he worked as a cabinetmaker and, in 1853, became engaged in moving buildings which obstructed the widening of the Erie Canal. In 1859, he located in Chicago as a building contractor and, in 1863, began constructing the sleeping cars now called by his name throughout the world. A few years later he organized the Pullman Palace Car Company and, in 1880, he founded the town of Pullman, now part of Chicago, where the coaches were built. In 1887, he added the vestibule to his sleeping cars, thereby greatly increasing their comfort. He amassed a fortune from his inventions and his business enterprises.

Pupin (*pû-pēn'*), **Michael Idvorsky (1858-1935),** physicist and electrician, was born in Idvor, Hungary. He came to America in 1874; was graduated from Columbia, 1883; and studied physics and mathematics at Cambridge and at Berlin. In 1901, he was appointed professor of electromechanics at Columbia University. His researches in electrical resonance and wave propagation greatly extended the range of long-distance telephony. In 1923, he published his autobiography *From Immigrant to Inventor*.

Pusey (*pū'zē*), **Nathan M. (1907-),** educator, was born at Council Bluffs, Iowa, and was educated at Harvard University (1928). He became an assistant in history at Harvard, tutored at Lawrence College, Appleton, Wis., and from 1938 to 1940 was assistant professor of history and literature at Scripps College, Claremont, Cal. He served as assistant professor and later associate professor of classics at Wesleyan University, Middletown, Conn., 1940 to 1944. Appointed president of Lawrence College in 1944, he filled that position until he was made president of Harvard University in 1953.

Pŭshkin (*pŏŏsh'kĭn*), **Alexander Sergéievitch (1799-1837),** Russian poet, the son of a nobleman, was born at Moscow. In 1817, he became a government clerk, but, having written an *Ode to Liberty* which offended the emperor, he was banished to southern Russia. In 1825, Emperor Nicholas reinstated him and appointed him to write a history of Peter the Great. His greatest work, *Yevgény Onegin*, is a romance in verse. Among his other writings are *The Gypsies*, *Poltava*, *Dubrovsky*, and a novel entitled *The Captain's Daughter*. His drama *Boris Godounov* was used as the basis of Mussorgsky's opera. Pushkin ranks as the foremost poet of Russia. He was killed in a duel.

Putnam, Amelia Earhart (1898-1937), American aviator, was born at Atchison, Kansas. She was educated at Ogontz School for Girls, Rydal, Pa., and at Columbia University. In 1926, she was the first woman to cross the Atlantic in an airplane, flying as a passenger. In 1931 she married George Palmer Putnam, publisher. The next year she made a solo flight across the North Atlantic, the first woman to accomplish this feat. In 1935, she made the first solo Pacific flight, flying from Honolulu to Oakland, Cal. in 18.5 hours. In an attempted flight around the world in 1937, she disappeared, lost, it is believed, in mid-ocean.

Putnam, Herbert (1861-1955), American librarian, was born in New York City. He was graduated from Harvard and Columbia universities and was admitted to the bar in 1886. He was librarian of the Minneapolis Public Library 1887-91 and of the Boston Public Library 1895-99. He then became librarian of the Library of Congress, serving until 1939, when he was made librarian emeritus. In 1937, he was elected to the American Academy of Arts and Letters.

Putnam, Israel (1718-1790), American soldier, was born at Danvers, Mass. Removing to Pomfret, Conn., he became a farmer and woolgrower. In 1755, he helped to repel a French invasion of New York and was present at the battle of Lake George. In 1758, he was captured by a force of French and Indians and narrowly escaped death. He was later exchanged. In 1762, he served as colonel in the West Indian campaign and, in 1764, aided in the relief of Detroit, then besieged by Pontiac.

In 1775, after the battle of Concord, Putnam took command of the forces of Connecticut; was at Bunker Hill; held the command at New York; and, in August 1776, fought at Brooklyn Heights, where he was defeated by Howe. In 1777, he was appointed to the defense of the highlands of the Hudson.

Pyle, Ernest T. (1900-1945), columnist and war correspondent, was born on a farm near Dana, Indiana. He studied for a while at Indiana University, then became a reporter, chiefly for Scripps-Howard papers. He tried desk assignments as copy reader, telegraph editor, and managing editor, but the lure of travel was irresistible. His realistic stories of London under bombardment, of American soldiers in camp, on the march, and in action in North Africa and Italy, were like letters home for countless G.I.'s and their families back in the states. The books, *Here Is Your War* and *Brave Men*, contain many of these "snapshots" from the war zone. He was doing a similar service for the American forces in the Pacific area when he was killed on the island of Ie, near Okinawa.

Pyle, Howard (1853-1911), American illustrator and author, was born at Wilmington, Del. He was educated in private schools and at the Art Students' League, New York. He became one of the foremost American illustrators, excelling in work for children. Possessing marked literary ability, he often wrote the text for his illustrations. He wrote and illustrated *The Merry Adventures of Robin Hood.*

Pyrrhus (*pĭr'ŭs*), **(c. 318 B.C.-272 B.C.),** Greek general, king of Epirus, came to the throne in 306. He was expelled a few years later, but was restored by the help of Ptolemy Soter in 295; held the kingdom of Macedonia for a short time; and, in 281, went to Italy to help Tarentum against the Romans.

He was at first successful, winning several victories. That at Asculum, in 279 B. C., gave rise to the phrase "Pyrrhic victory," meaning a victory won at great cost. The origin of the phrase is to be found in Pyrrhus's answer to congratulations on his victory, "Another such victory and Pyrrhus is destroyed." After successes against the Carthaginians in Sicily, Pyrrhus was finally defeated by the Romans in 275 B. C.

Pyrrhus is regarded as one of the ablest of Greek generals, being one of the few who ever defeated a Roman army in the field. Returning to Macedonia, he recovered that kingdom, but was killed.

Pythagoras (*pĭ-thăg'ô-răs*), **(c. 582 B.C.-c. 500 B.C.),** Greek philosopher and mathematician, was born probably at Samos. He is said to have traveled from Persia to Gaul, and even to India, seeking wisdom, and to have resided many years in Egypt.

About 530, he settled at Crotona, in Italy, and established a theosophical sect, the members of which sought release from "the wheel of change" by an ascetic regimen and by mathematical studies. One of its doctrines was the so-called transmigration of souls, according to which the soul resides successively in different bodies of men or other animals. His mathematical interests gave rise to the proof of the geometrical proposition regarding the square upon the hypotenuse of a right-angled triangle and the discovery of the numerical relations between the musical notes. He propounded the theory that the basis of the universe is number and originated the idea of the harmony of the spheres.

Quesnay (*kĕ'nĕ'*), **François (1694-1774),** French economist and physician, was born at Mere, France. He studied medicine at Paris and rose to be first physician to the king. His chief title to fame, however, rests on his essays in political economy. Around him gathered the famous group of economists known as the physiocrats, who insisted on the folly of governmental interference with the operation of economic laws. His views are set forth in *Tableau économique.* See *Physiocrat.*

Quezon, Manuel Luis (1878-1944), Filipino statesman, was born at Baler, Tayabas Province. He was admitted to the bar in 1903. In the revolt against Spain and opposition to American sovereignty, Quezon served under Aguinaldo. He later was a provincial prosecuting attorney but did not cease to work for independence of his country while provincial governor, 1906-07, and then as resident commissioner to the United States. He was president of the Philippine senate, 1916-35. On the passage of the act granting gradual independence, he was elected the first president and was re-elected in 1941. After the Japanese invasion he removed to the United States.

Quincy, Josiah (1772-1864), American statesman, was born in Boston, Mass. He was graduated from Harvard, 1790; studied law; and entered politics. From 1805 to 1813, he was a member of Congress. He opposed the War of 1812 and was one of the first to denounce the slaveholding interest as a rising and dangerous tyranny. In 1813, he was elected to the Massachusetts State Senate, in which he remained until 1820. He was then elected to the State House of Representatives, of which he became speaker. He was mayor of Boston, 1823-28, and president of Harvard, 1829-45. He published *History of Harvard University, The Municipal History of the Town and City of Boston, The Life of John Quincy Adams,* and other works.

Quintilian (*kwĭn-tĭl'ĭ-ăn*), or **Marcus Fabius Quintilianus,** Latin rhetorician and educator, was born in Spain about 35 A. D. Going to Rome in the train of Galba, he began practice at the bar. However, he achieved fame chiefly as a teacher of rhetoric, in which, for 20 years, he instructed the foremost youth of Rome.

As the first public teacher benefited by the endowment established by the Emperor Vespasian, Quintilian received a fixed salary from the government. His famous *Institutes of Oratory,* comprising 12 books, contains all that he considered most valuable in earlier rhetorical treatises, both Greek and Latin. In addition, the work contains the only practical exposition of the whole field of education given by a Roman.

Rabelais (*răb'ĕ-lā'*), **François (c. 1490-1553),** French humorist and satirist, was born near Chinon. In 1530, he began the study of medicine at Montpellier; took his degree; and, in 1532, was appointed hospital physician at Lyons, there publishing several works on medical science.

He achieved fame through two romances, in which are narrated the adventures of *Gargantua* and *Pantagruel,* and which rank among the world's masterpieces of humor and grotesque invention. The work abounds in good sense and folly, delicate thoughts and gross obscenities; it is, in effect, a protest, in the interests of humanism, against Christian asceticism and faith and represents a return to nature. It brought him into conflict with the Church, and, on several occasions, he found it prudent to disappear. See *Gargantua, Pantagruel, Panurge.*

Rabi (*rä'bē*), **Isador Isaac (1898-),** American physicist, was born at Rymonow, Austria, and was brought to the United States in infancy. Educated at Cornell University and in Germany, he became professor of physics at Columbia University in 1937. He received the Nobel award in physics in 1944 for his resonance method of recording the magnetic properties of atomic nuclei.

Rachmaninov (*răĸ-mä'nĕ-nôf*), **Sergei Vassilievitch (1873-1943),** Russian pianist and composer, was born near Ilmen Lake, Novgorod. He was educated at Leningrad and Moscow and won a gold medal for composition when 19 years of age, touring Russia the same year. He gave performances at London, Vienna, Dresden, and, in 1909 and 1910, in the United States, where he appeared as pianist and as conductor of his own works. For several years following 1912, Rachmaninov was chief conductor of the Imperial Opera at Leningrad. He took up his residence in the United States. His operas include *Aleko* and *The Parsimonious Knight.* One of his best-known compositions is the Prelude in C-Sharp Minor.

Racine (*rä'sēn'*), **Jean Baptiste (1639-1699),** French dramatic poet was born at La Ferte Milon. He completed his education at the seminary of Port Royal, intending to become a priest. Abandoning this plan, he began writing plays. His tragedy *Andromache* placed him above all his contemporaries except Corneille. *Britannicus, Berenice, Iphigenia,* and other tragedies as well as his comedy *The Pleaders* increased his fame. On completion of his *Phaedra,* he experienced a reawakening of his earlier faith, which turned him from the theater. However, after a lapse of

12 years, he wrote the dramas *Esther* and *Athalie*, to be performed at the seminary of Saint Cyr. Racine usually assigned to women the principal roles. See *French Literature: The Seventeenth Century.*

Raeburn, Sir Henry (1756-1823), Scottish portrait painter, was born at Stockbridge. He was apprenticed to a goldsmith, but early devoted himself to art, producing first water-color miniatures and then portraits in oil. After studying in Rome, 1785-87, he settled in Edinburgh and soon attained pre-eminence among Scottish artists. His portraits, which are painted in full light, are realistic and intense, resembling in some respects the work of Frans Hals and Velasquez. See *Painting.*

Raleigh (*rô'lĭ*; *răl'ĭ*), or **Raleigh, Sir Walter (c. 1552-1618),** English courtier, navigator, and man of letters, was born at Budleigh and was educated at Oxford University. Between 1569 and 1581, he served with distinction in the army of the French Protestants, in the Netherlands, and in Ireland and accompanied his half brother, Sir Humphrey Gilbert, on a voyage to America.

Shortly after his return, he attracted the attention of Queen Elizabeth and soon rose high in her favor. In 1585, he fitted out an expedition, which resulted in the discovery and the temporary occupation of Roanoke Island, Va. It was through Raleigh that the potato and tobacco were introduced into England at this time. He held the post of admiral in an expedition against Cadiz, 1596. With the death of Elizabeth, in 1603, the brilliant and successful portion of his career ended.

From the first, King James regarded him with suspicion and dislike. Accused of complicity in a plot against the king, Raleigh was sentenced to death. He was sent to the Tower, where, for 13 years, he remained a prisoner. During his imprisonment, he devoted himself to literary and scientific pursuits and wrote a *History of the World.* In 1616, he procured his release and sailed for Guiana. Upon his return, in 1618, he was arrested and executed.

Ramée (*rà-mā'*), **Louise de la (1839-1908),** better known as "Ouida," English novelist, was born at Bury Saint Edmunds. Most of her life after 1860 was spent in Italy. Her first novel, *Held in Bondage*, appeared in 1863. Ouida was a picturesque and dramatic story-teller, and she enjoyed great popularity, to which her descriptions of Italian peasant life and her sympathetic sketches of animals contributed. Two of her stories of childhood, *The Nürnberg Stove* and *A Dog of Flanders*, have become classics.

Rameses I (*răm'ê-sēz*), the first king of the 19th Egyptian dynasty, ruled about 1355 B. C. and maintained the conquests of Egypt as far as Wady Halfa.

Rameses II, his grandson, usually called the Great, after defeating the Hittites at Kadesh, formed a peace with them and married a Hittite princess. He subjected Ethiopia and is known also as the builder of some of the largest of the Egyptian edifices. He had at least 162 children, the names of that number being found on monuments. His name and reputation formed the basis of the legendary Sesostris. His mummy was discovered in 1881 A. D.

Ramsay, Sir William (1852-1916), British chemist, was born at Glasgow. He was educated at Glasgow University and at Tübingen. He was professor of chemistry at University College, Bristol, 1880-87, and at University College, London, 1887-1913. With Lord Rayleigh, he discovered argon in 1894 and, in 1895, he obtained helium from cleveite. In 1904, he was awarded the Nobel prize for chemistry. He also discovered other gaseous elements of the air, including neon, xenon, and krypton. His writings include *The Gases of the Atmosphere, Elements and Electrons*, and *Essays Biographical and Chemical.* See *Argon, Helium.*

Randolph, John (1773-1833), of Roanoke, American orator and statesman, was born in Chesterfield County, Va. At the age of 26, he was elected a member of Congress and at once became a leader in politics. He was United States senator, 1825-27; member of Congress, 1827-29; United States minister to Russia, 1830; and member of Congress again in 1832. He was conspicuous for his many odd ways and for a wit so sharp that he terrorized in Congress all who opposed him. Randolph prided himself on his descent from Pocahontas, and his marked Indian features bore witness to his origin. See *Quids.*

Ranke (*răng'kĕ*), **Leopold von (1795-1886),** German historian, was born at Wiehe, Saxony. He was educated at Leipzig. At 23, he became headmaster of the high school at Frankfort on the Oder and devoted his leisure to historical studies. In 1824, he published the *History of the Roman and Germanic Peoples from 1494 to 1535*, thus winning, in 1825, the chair of history at Berlin, which he retained until 1871.

Ranke was the founder of the modern historical school, and his fame rests upon his scientific method of studying history from original sources. He prepared many valuable works on the period of the Reformation. One of his works has been translated several times into English under the title of *History of the Popes.* In his 84th year, he published the first volume of his *History of the World*, writing a volume annually.

Rankin, Jeannette (1880-), first woman member of the United States Congress, was born on a ranch near Missoula, Mont. She was graduated from the University of Montana; studied music at Seattle; and later pursued a course at the school of philanthropy in New York City. She then continued study at the University of Washington, making special preparation for suffrage work.

When the suffrage amendment was first submitted in Montana, she conducted a campaign throughout the mining camps of the state and appeared before the legislature in behalf of the cause. Later she became president of the state suffrage organization. In 1916 she was elected representative at large from Montana as a Republican. She voted against war with Germany in 1917; in 1918 she failed of renomination. Again elected to Congress in 1940, she refused on principle to vote for war with Japan.

Raphael (*răf'â-ĕl*; *rā'fâ-ĕl*), or **Raffaelo Santi (1483-1520),** Italian painter, was born at Urbino. Upon the early death of his parents, Raphael found a sincere friend in his maternal uncle Simone Ciarla.

Earliest Works. It is probable that Raphael received his first instruction from his father, a poet and painter. He seems also to have studied under Timoteo Viti, and then, from 1500, at Perugia under Pietro Perugino, who was at that time engaged on the Cambio frescoes. Here Raphael adopted and carried to its highest point the tender grace and mystical development of that master, often surpassing him in beauty, simplicity, and charm. He was in some degree influenced by other Umbrian artists, particularly by Justus van Ghent and Fra Carnevale, who was one of the earliest to attempt perspective and to whom Raphael may have been indebted for a knowledge of architecture. During this period at Perugia, he produced "The Crucifixion." In 1502, he was employed at Siena in helping Pinturicchio with the library frescoes. His "Coronation of the Virgin" was finished in 1503; the celebrated "Espousal of the Virgin," in the following year.

Life in Florence. Raphael's career is usually divided into three periods, of which the first terminated with his visit to Florence in the autumn of 1504. His amiability and talents soon procured him the admiration and notice of the Florentine artists. Among his chief friends were Taddeo Gaddi, Ghirlandajo, and Fra Bartolommeo. Inspection of the works of Michelangelo and of Da Vinci increased his knowledge of form and execution, but he never imitated them as he imitated the first models he studied in his Perugian period. A picture he painted at Florence in this period, "Madonna of the Grand Duke," so called because Ferdinand III always took it with him on his travels, is almost entirely in his earlier style.

With the exception of a few months spent in Perugia in 1505 and a short interval at Bologna and Urbino in 1506, the whole period from 1504 to 1508 was spent by Raphael at Florence. His principal works executed in this period are "Saint Catherine of Alexandria," "The Beautiful Gardener," and "The Entombment."

Activity at Rome. The third and last period of his work comprises the time from his invitation to Rome by Pope Julius II, about the middle of 1508, until his death. He was first employed on the frescoes of the *Stanzas*, or lower chambers beneath the Apartamento Borgia in the Vatican. The first of these works was the "Dispute on the Sacrament," painted in his second, or Florentine, manner. His later works, including all the other Vatican frescoes, are painted in that style which peculiarly characterizes him and constitutes the Roman school at its highest development. They are distinguished for dramatic composition and expression, for correct and vigorous design, and, at least in the frescoes, for an appropriate tone of coloring. Among these later frescoes are the famous "School of Athens" and "Parnassus."

Leo X, who succeeded Julius II in 1513, continued his predecessor's patronage of Raphael. The enthusiasm for classical antiquity that prevailed among the learned men whom Leo X attracted to his court strongly influenced those productions of Raphael which date from the accession of this pope. They became more allied to the antique and less imbued with the purely religious spirit.

Under Leo X, the works in the Vatican were continued, of which "Attila" is considered to be the most perfect example of fresco painting. The celebrated "Cartoons" are the original designs executed by Raphael and his pupils, 1515-16, as copies to be used in tapestry work for the pope. Among the numerous commissions executed by Raphael for other patrons are many frescoes, a long list of portraits, many interesting designs in architecture, and some productions in sculpture. In 1517-20, he painted the celebrated "Sistine Madonna" and "Saint Cecilia." "The Transfiguration" occupied his last years.

Genius. Among all the painters of the world, none has ever been so universally popular as Raphael. Apart from

his combined merits as draftsman, colorist, and master of graceful composition, he owes the constancy of the admiration felt for him partly to the wide range of his subjects, but still more to the extraordinary varieties of his style. He was buried in the Church of the Pantheon near his betrothed bride, Maria di Bibbiena. See *Painting*.

Rasputin (*rȧs-pōō'tĕn*), **Gregory Efimovitch (1871-1916)**, Russian monk, was born near Tyumen, Siberia. At 33 years of age, he professed conversion, left his family, and preached the doctrine that, since salvation comes through repentance from sin, sin is necessary for salvation. Possessed of phenomenal strength and great personal magnetism, he made his way into the highest circles, including the Russian court. Believing that he had cured her son when the physicians had given up hope, the empress took Rasputin into her counsels and appointments were seldom made without Rasputin's approval even during the first years of World War I. Being unable to read and ignorant of politics, he was a tool of reactionary interests. Finally, several nobles shot him to death after a draught of poison had failed to kill him.

Rawlinson, Sir Henry Creswicke (1810-1895), English Oriental scholar and diplomat, was born at Chadlington. He was educated in Ealing; entered the East India military service in 1827; and served in the Bombay presidency until 1833. The following six years were spent in Iran, where he began the study of the cuneiform inscriptions and made a translation of the famous Behistun inscription of Darius. Rawlinson's successful decipherment of these ancient writings paralleled in importance the reading of hieroglyphics on the Rosetta Stone. His works include *England and Russia in the East*, *The Cuneiform Inscriptions of Western Asia*, and *Outline of the History of Assyria*.

Rayburn, Samuel (1882-), American politician, was born in Rome County, Tenn. After studying law at the University of Texas, he began to practice at Bonham in that state. He was a member of the Texas House of Representatives for six years, serving as speaker for two years, and since 1913 has represented the 4th Texas District in Congress. He was speaker of the U. S. House of Representatives 1940-46, 1949-53, and 1955-57. He has also served as Democratic leader of the House. He is often popularly referred to as "Mr. Democrat."

Rayleigh (*rā'lĭ*) **John William Strutt, Baron (1842-1919)**, English physicist, was graduated from Trinity College, Cambridge, 1865, and became a fellow in the following year. He succeeded to the title of baron in 1873; was professor of experimental physics at Cambridge, 1879-84, and of natural philosophy at the Royal Institution, London, 1887-1905.

In 1894, with Sir William Ramsay, he discovered argon. His experimental work in physics, characterized by the most extreme care, extended to almost every branch of the science. Much of it was done in co-operation with his son Robert John Strutt, who is known especially for his researches on radioactivity. Lord Rayleigh was awarded the Nobel prize for physics in 1904.

Read, Thomas Buchanan (1822-1872), American poet and painter, was born in Chester County, Pa. He devoted himself chiefly to painting; visited Europe several times; and finally settled in Rome. He made many portraits, including those of Mrs. Browning, Longfellow, and George Peabody, the last named being now in the Peabody Institute, Baltimore. His best-known poem is "Sheridan's Ride," written at Cincinnati, Ohio, in 1864.

Reade, Charles (1814-1884), English novelist, was born in Oxfordshire. He was graduated from Oxford in 1835 and, in 1843, was admitted to the bar. He began his literary career by play writing and first made his mark as a novelist in 1852 by the publication of *Peg Woffington*. This was followed by *Christie Johnstone*, *It Is Never Too Late to Mend*, and *The Cloister and the Hearth*, his best and most popular work. His later writings include the problem novels *Hard Cash* and *Foul Play*.

Réaumur (*rā'ō'mür'*), **René Antoine Ferchault de (1683-1757)**, French naturalist and physicist, was born at La Rochelle. He was educated at Poitiers, Bourges, and Paris and subsequently devoted himself to biological study. He discovered the method of tinning iron and invented the Reaumur thermometer still used in many countries. His most important work is *Memoires pour servir a l'histoire des insectes*.

Récamier (*rā'kȧ'myā'*), **Madame (1777-1849)**, French society woman, was born at Lyons. At 15, she married Jacques Recamier and, during the Consulate and the Empire, attracted a brilliant circle to her salon at Paris. She was beautiful and possessed in rare measure a Frenchwoman's indefinable fascination and brilliancy. A record of the social triumphs of Mme. Récamier would include mention of nearly all celebrities in Paris during a period of 50 years. She was a power in France in spite of all changes of fortune.

Reclus (*rē-klü'*), **Jean Jacques Elisée (1830-1905)**, French geographer, was born in the Gironde. He was educated at Montauban and Berlin. An extreme Democrat, he left France after the *coup d'état* of 1851 and spent seven years in England, Ireland, and America. For his share in the Commune of 1871, he was banished. Going to Switzerland, he spent 20 years writing his 19-volume masterpiece *Nouvelle géographie universelle*, translated into English under the title of *The Earth and Its Inhabitants*. He wrote also *Les phénomènes terrestres* and *La Terre*.

Red Jacket, Sa-go-ye-wat-ha (c.1751-1830), or "He Keeps Them Awake," a chief of the Seneca tribe of Indians, was born at Old Castle, on Seneca Lake, N. Y. In early life, he was noted for his swift running and, during the Revolution, the British officers employed him as a messenger. One of them gave him a bright red coat, hence his name Red Jacket.

He was a friend of the whites, although he wished to have the Indians keep their own lands; and, in 1784, in an eloquent speech, he strongly opposed the Treaty of Fort Stanwix, by which the six nations ceded some of their land to the United States. During the War of 1812, he several times gave advice which proved of great service to the American army. Later in life, he visited New York and Washington, and the speeches he made there are among the finest examples of Indian eloquence. Died at Seneca Village, near Buffalo, N. Y.

Reed, Philip Dunham (1899-), American business executive, was born at Milwaukee, Wis. He received his engineering degree at the University of Wisconsin in 1921 and his law degree from Fordham University in 1924. He became a patent lawyer, and in 1926 joined the legal department of the General Electric Company, where his rise was rapid. He was chairman of the board, 1940-42, and has been chairman again since 1945. During World War II, he held various important government positions concerned with industrial production. In 1942 he went to London as deputy chief of the U. S. Mission for Economic Affairs, and the following year became chief of the mission with ministerial rank, serving in that capacity until 1945. Reed is a director of a number of large corporations.

Reed, Thomas Brackett (1839-1902), American lawyer and legislator, was born at Portland, Me., and was graduated from Bowdoin College in 1860. After serving a short time as paymaster in the navy, he studied law, and began legal practice in 1865. He was a member of the Maine legislature; became attorney general of the state; and was elected to Congress in 1876.

His conspicuous ability led to his appointment as floor leader of the Republican party. He served in Congress until 1899 and was thrice elected speaker of the House of Representatives, 1889-91 and 1895-99, winning the sobriquet "Czar Reed." His ruling, as speaker, that all members present, though not voting, should be counted toward a quorum, won national attention and approval. He published *Reed's Rules* in 1894.

Reed, Walter (1851-1902), American surgeon, was born in Gloucester County, Va. Educated at the University of Virginia, he entered the Medical Corps of the army and, in 1893, was made professor of bacteriology in the Army Medical School with the rank of major. Six years later he was named chairman of a committee to investigate the cause of yellow fever, then prevalent in Cuba. With his associates Carroll, Lazear, and Agramonte, he proved that the disease is transmitted by the mosquito *Aedes ægypti*. This knowledge made it possible to stamp out the disease at Havana in three months and to control it throughout tropical America. A large military hospital in Washington was named in his honor. He was elected to the American Hall of Fame in 1945.

Reid, Whitelaw (1837-1912), American journalist and diplomat, was born at Xenia, Ohio. He was graduated from Miami University, Oxford, Ohio, 1856. He entered newspaper work; became a war correspondent; and, in 1868, joined the editorial staff of the New York *Tribune*, of which he was editor and principal owner, 1872-1905. In 1892, he was Republican nominee for vice president. During 1889-92, he was minister to France and, from 1905 to 1912, he was ambassador to England. His writings include *Schools of Journalism*, *The Scholar in Politics*, *Some Newspaper Tendencies*, *Town Hall Suggestions*, *The Monroe Doctrine*, and *The Scot in America*.

Reinhardt, Max (1873-1943), Austrian theatrical producer, was born at Raden, near Vienna. He studied acting at Vienna. While acting at Salzburg in 1893, his playing of elderly roles attracted the attention of the director of a Berlin theater, and he was engaged to play in Berlin. Here he began directing plays in 1903 and founded several theaters, chief of which was the Kammerspielhaus. From 1905 to 1932, this theater was the world's most famous dramatic center. Shakespearean plays, Greek dramas, and German works were produced in settings which relied uniquely on painting, lighting, mass effects, and a moveable stage. Impoverished on Hitler's rise to power, he

settled in the United States, where he produced the motion picture *A Midsummer Night's Dream.*

Remarque (*rē-märk'*), **Erich Maria** (**1898-**), German novelist, was born at Osnabrück. Having fought in World War I he came home in 1919 to face a period of maladjustment. Ten years later he wrote *All Quiet on the Western Front*—a brutally realistic war story with a pacifist bent. He wrote later *The Way Back, Three Comrades,* and *Arch of Triumph.* The Hitlerian government outlawed his books; he escaped to Switzerland and came to the United States in 1939, becoming an American citizen in 1947.

Rembrandt Harmenszoon van Rijn (**1607-1669**), Dutch painter, was born at Leiden, The Netherlands. At the age of 12, Rembrandt was placed under Van Swanenburch, a painter of moderate talent in Leiden, and there he attended the university. From Leiden he went to study at Amsterdam under Lastman, then to Haarlem, to frequent the studio of Pinas. From 1623 to 1630, he devoted himself to solitary study in his father's house.

At the age of 23, Rembrandt established himself at Amsterdam and never left that city until his death 39 years later. In his first year there, he painted the "Portrait of an Old Man." Thereafter followed in great numbers portraits, landscapes, and historical and *genre* subjects as well as hundreds of etchings that have served almost as much as his paintings to immortalize him. There are two pictures dated by him 1631, a "Portrait of a Young Man" and "Simeon in the Temple." In the following year, he finished his famous "The Anatomist Nicholas Tulp and His Pupils," which placed him in the first rank of the Dutch masters.

Commissions flowed in upon him faster than he could execute them, and, from the beginning, pupils came clamoring to his doors. In 1633, Rembrandt finished "The Naval Architect and His Wife." The next year occurred his marriage to Saskia, with whom the happiest period of his life was spent. She died in 1642, leaving a son named Titus. In the year of Saskia's death, he produced the famous "Sortie of the Civic Guard," usually known as "The Night Watch."

The decade following his wife's death brought disastrous changes in the financial fortunes of Rembrandt, though in it he produced some of his best work. "Christ at Emmaus" was painted in 1648. "The Cloth Syndics," probably his greatest work, was completed in 1661. Never before had Rembrandt achieved such perfection. He painted more than forty portraits of himself. Of his landscapes, a very characteristic specimen is his well-known work entitled "The Mill." Rembrandt is one of the most perfect of colorists; in *chiaroscuro,* or contrasts of light and shade, he has no equal. Because of his aerial gradations, the figures in his pictures appear to be raised from the canvas. Mentally he was keen to observe, assimilate, and synthesize. His conception was localized with his own people and time. He never built up the imaginary, nor followed Italy, but into types taken from the streets and shops of Amsterdam he infused his large sympathy with man. See *Painting.*

Remington, Frederic (**1861-1909**), American illustrator, sculptor, and author, was born in Canton, N. Y. He studied at Yale Art School and at the Art Students' League, New York, after which he led the life of a cowboy and stockman and became noted as an animal painter and an illustrator of Western scenes. He subsequently achieved distinction as a magazine illustrator of military subjects and ranching life and, after the Spanish-American War, of Cuban scenes and characteristics. His best-known paintings are "A Dash for the Timber," "The Last Stand," "Past All Surgery," "The Emigrants," and "Conjuring the Buffalo Back." Among his works in sculpture are "The Broncho Buster" and "The Wounded Bunkie." His writings include *Pony Tracks, Crooked Trails,* and *The Way of an Indian.*

Remsen, Ira (**1846-1927**), American chemist and educator, was born in New York City. He was graduated from College of the City of New York in 1865 and at the University of Göttingen in 1870. From 1872 to 1876, he was professor of chemistry in Williams College, and, from 1876 to 1913, he was professor of chemistry in Johns Hopkins University, of which he was president from 1901 to 1912. He founded, in 1879, the *American Chemical Journal,* which he edited for more than 40 years. Among his many contributions to chemical science is the discovery of saccharin.

Renan (*rē-nän'*; E., *rē-nän'*), **Joseph Ernest** (**1823-1892**), French philologist, historian, and critic, was born at Treguier. He began preparation for the priesthood at Paris, but, as the result of the study of Hebrew and of German criticism, he renounced traditional Christianity and, in 1845, abandoned all thoughts of the Church as a profession. At 25 he received his doctorate at the University of Paris; in 1850, he obtained a post in the Bibliothèque Nationale. In 1862, he was chosen professor of Hebrew in the Collège de France and was later elected to the French Academy.

Renan's European reputation dates from the publication, in 1863, of the *Life of Jesus,* the first in the series entitled *History of the Origin of Christianity,* in which he held that Christianity was the most beautiful of the religions and Jesus the most remarkable of men. He rejected the supernatural elements. He wrote also *The Future of Science* and several volumes of essays.

Reni (*rā'nē*), **Guido** (**1575-1642**), Italian painter of the Eclectic School, was born at Calvenzano, near Bologna. He studied under Calvaert, but subsequently followed the more refined and ideal school of the Carracci prior to originating a style for himself. In 1602 he went to Rome, where he remained for 20 years, a rival of Caravaggio.

Reni's "Aurora," a famous fresco in the Rospigliosi palace, Rome, is usually considered his masterpiece. Most of his paintings are Biblical scenes. They include "The Crucifixion of St. Peter," at the Vatican; "Massacre of the Innocents," at Bologna; and "The Penitent Magdalen," at the Louvre. See *Painting.*

Renoir (*rē-nwar'*), **Pierre Auguste** (**1841-1919**), French artist, was born at Limoges, France. He began his career as a painter by decorating porcelain in a Paris factory. Later he studied at Gleyre's Art Academy, where he met and came under the influence of the early impressionists, Monet, Sisley, and Cezanne. He exhibited at the first impressionist show in 1874, and most of the later ones, but soon developed his own style. Renoir painted portraits, landscapes, and still-life pictures, but is best known for his figure paintings, including many nudes and bathers. Renoir's pictures hang in the leading art galleries of America and other countries. His early "Mme. Charpentier and Her Children" is in the Metropolitan Museum of Art, New York, "Girl Doing Her Hair" is in the Barnes Collection, Philadelphia, and "Lady Sewing" and others are in the Art Institute, Chicago. The Louvre in Paris also possesses some of his most notable pictures.

Renwick, James (**1818-1895**), American architect, was born in New York. He was graduated at Columbia in 1836. He built the distributing reservoir of the Croton aqueduct, New York City, and was for some years employed as architect for the Erie Railroad. His work shows marked versatility, his mastery of the French Gothic style being reflected in two of the noblest exteriors in New York—Grace Church, completed In 1845, and Saint Patrick's Cathedral, opened in 1879. Among other notable buildings designed by him were the original structure for Vassar College at Poughkeepsie, N. Y., and the first Corcoran Art Gallery and the Smithsonian Institution, Washington.

Repplier (*rēp'lēr*) **Agnes** (**1855-1950**), American author and critic, of French extraction, was born at Philadelphia and was educated at Sacred Heart convent, Torresdale, Pa. She received the honorary degree of doctor of letters from the University of Pennsylvania in 1902 and, in 1912, the Lætare medal from the University of Notre Dame. She was elected to the American Academy of Arts and Letters in 1941. Her works include *Books and Men, Under Disputes, Père Marquette, In Pursuit of Laughter,* and *Decades.*

Reston, James Barrett (**1909-**), American author and newspaper correspondent, was born in Scotland, but was educated chiefly in the United States. After completing his studies at the University of Illinois, he was employed first by the Springfield, Ohio, *Daily News* and then as publicity director, by the Cincinnati Baseball Club. He has served as London correspondent for the Associated Press and as both Washington and Foreign correspondent for *The New York Times.* He is the author of *Prelude to Victory.*

Reuther, Walter Philip (**1907-**), labor leader, born in Wheeling, W. Va. Attended Wayne University; later spent three years touring Europe and the Orient by bicycle, visiting machine shops and automobile plants. Began serving his apprenticeship as tool and die maker at 17 in Wheeling. He then became an automobile worker in Detroit for General Motors and for Ford. In 1935 he began organizing automobile workers, establishing and becoming president of the local union of United Automobile Workers, Congress of Industrial Organizations. In 1946 he became president of the International Union of Automobile, Aircraft and Agricultural Workers of America, and in 1953 president of CIO. Following the merger of CIO with the American Federation of Labor in December 1955, Reuther was, in 1956, made vice president of AFL-CIO.

Revere (*rē-vēr'*), **Paul** (**1735-1818**), American patriot and metallurgist, was born in Boston, Mass. He learned the business of a goldsmith. He was conspicuous for his zeal in behalf of the Revolutionary cause and became famous for his ride from Boston to Lexington to arouse the minutemen, April 18-19, 1775. Longfellow made this the subject of his poem "The Midnight Ride of Paul Revere."

In 1801, when he was over 65 years of age, Revere built the first copper rolling mill in America. He built also the

first gunpowder mill in New England; cast cannon from iron and brass; and engraved on copper and printed the first United States paper money.

Reymont, Wladislaw Stanislaw (1868-1925), Polish novelist. He was expelled from several schools in Russian Poland for using the Polish language, then under a ban by the Russian authorities. After working successively as a clerk, railway employee, telegraph operator, and actor, he devoted himself exclusively to literature from 1894, when his story *The Death* was favorably received. *The Promised Land* brought him national recognition, which was widened to international fame by his *Peasants*, consisting of four volumes entitled respectively *Autumn*, *Winter*, *Spring*, and *Summer*. These volumes, published in 1904-09, won for him the Nobel prize award for literature in 1924.

Reynaud (*rā'nō'*), **Paul (1878-),** French statesman, was born in Basses Alpes. Educated in Paris, he was admitted to the bar but practiced little. He made several trips around the world and, in 1918, was liaison officer in the Siberian campaign against the Russian government. Returning to France, he was elected to the Chamber of Deputies, where he favored rapprochement with the German republic. He was minister of justice in 1932 and again in 1938-39, in which capacity he abrogated many labor laws passed by the Blum government, his purpose being to speed up rearmament against the threat from Hitler in Germany.

When Germany conquered Norway in 1940, Reynaud, as an uncompromising opponent of appeasement of Germany, was chosen premier. It was then too late, however, to retrieve time lost, and Germany crushed the French armies in six weeks of battle. Reynaud resigned rather than make peace. He was taken into custody by the Vichy government and tried for complicity in the French downfall. Removed to Germany after the invasion of North Africa, he was released by the German defeat. In 1948 he became finance minister. In 1952, he was made chairman of the Economic Committee of the Council of Europe.

Reynolds, Sir Joshua (1723-1792), English painter, was born at Plympton. When about 20 years of age he began his career as a portrait painter at Devonport. In 1746, he established himself in London, where, except three years in Italy, he passed the rest of his life. When the Royal Academy was instituted in 1768, he became its president and was knighted by George III.

Reynolds was especially famous for his portraits, of which he is said to have painted more than 2000. Although he preferred historical painting, his works of this class are relatively unimportant. His widely known "Angel Heads" are portrait studies. Many examples of his paintings are found in American collections. He was the friend of Johnson, Burke, Goldsmith, and other eminent literary men of his time. See *Painting*.

Rhee, Syngman (1875-), Korean political leader, was educated partly in his native country and partly in the United States. While a student at George Washington University, he became well acquainted with American history and American political traditions. As President, first of the Korean Provisional Government and later of the Republic of Korea and its successor the Republic of South Korea, he has stood firmly and sometimes intransigently for Korean independence. He is the author of *Spirit of Independence, Neutrality as Influenced by the United States of America*, and *Japan Inside Out*.

Rhodes, Cecil John (1853-1902), South African statesman and financier, was born at Bishop Stortford, England. He was sent to Natal for his health and subsequently made a fortune at the Kimberley diamond mines. He then returned to England, entered Oriel College, Oxford, and took his degree, 1881. In 1890, he was made prime minister of Cape Colony; but before this he had become a ruling spirit in the extension of British territory, having secured in 1889, the charter for the British South Africa Company, of which, until 1896, he was managing director. This territory is now known as Rhodesia. His aim was the establishment of a federal South African dominion under the British flag.

In 1896, Rhodes resigned the Cape premiership in consequence of complications arising from Dr. Jameson's raid into the Transvaal. He was a conspicuous figure during the South African War of 1899-1902. In a remarkable will he left nearly his entire fortune to the foundation of the Rhodes scholarships at Oxford.

Rhodes, James Ford (1848-1927), American historian, was born at Cleveland, Ohio. He was educated at New York University, the University of Chicago, and the Collège de France. He engaged in coal mining and the manufacture of pig iron from 1870 to 1885, when he retired from business to devote himself to historical writing. His *History of the United States from the Compromise of 1850*, published between 1893 and 1906, placed him in the foremost rank of American historians. In 1905, he was elected member of the American Academy of Arts and Letters.

Rhondda (*rŏnd'dă*), **David Alfred Thomas, Viscount (1856-1918),** Welsh coal mine operator and public administrator, was born in Aberdare, Wales; was educated at Clifton College and Cambridge University; and, later, joined his father in the coal business. He soon became a leading figure in the Welsh coal industry, having organized a coal combine which produced an annual output of six million tons. From 1888 to 1910, he sat as a Liberal member of the House of Commons. At the outbreak of World War I, he aided in placing British industry on a war basis and, in 1917, as food controller, he instituted a system of compulsory rationing. Lord Rhondda was rescued from the sinking *Lusitania*.

Ribbentrop, Joachim von (1893-1946), German statesman, was born at Wesel. Having studied in England, he went to Canada and engaged in mercantile trade but returned to Germany in 1914. He was wounded during World War I and was later attached to the war ministry. After the war, he became a wine merchant with a large import and export trade. In 1930, he espoused the Nazi cause. Hitler made him ambassador-at-large in 1935 and ambassador to London the next year. Shortly before Hitler annexed Austria, Ribbentrop was appointed foreign minister. He had negotiated the Anti-Comintern pact with Japan and Italy in 1937 and, in 1939, signed for Germany the Nazi-Soviet anti-aggression treaty. He was sentenced to death by the Nuremberg tribunal, October 1946.

Ricardo (*rĭ-kär'dō*), **David (1772-1823),** British political economist, of Jewish extraction, was born in London. After receiving a common school education he entered upon a mercantile life. He gained a large fortune, obtained a seat in Parliament, and, through his *Principles of Political Economy and Taxation*, *Essay on Rent*, and other writings, made his name second only to Adam Smith's among the classical economists. He held that wages cannot rise above subsistence level, rents are determined by prices and not vice versa, and value of goods is set by the amount of labor required for their production.

Rice, Alice Caldwell Hegan (1870-1942), American novelist and humorous writer, was born at Shelbyville, Ky. She was educated in private schools and, in 1902, married Cale Young Rice. She became interested in philanthropic work and was one of the founders of the Cabbage Patch Settlement House at Louisville, Ky. Her writings include *Mrs. Wiggs of the Cabbage Patch*, *Lovey Mary*, *Sandy*, *Captain June*, *A Romance of Billy-Goat Hill*, *The Honorable Percival*, *Calvary Alley*, *The Inky Way*, and *The Happiness Road*.

Rice, Grantland (1880-1954), journalist and poet, was born at Murfreesboro, Tenn. Following his graduation from Vanderbilt University, he went into newspaper work, supplementing the usual reporting assignments with inspirational verse and with comments on sports. Papers for which he wrote included the *Nashville News*, *The Atlanta Journal*, *The Cleveland News*, *The New York Tribune*, and *The Nashville Tennessean*. Not only participation but also experience as umpire and referee gave him a special interest in sports and a background for authoritative criticism. In his sports articles as well as in his verse, he emphasized the drama and the morale-building effects of clean competition. Popular collections of his verse are *Only the Brave*, *Songs of the Stalwart*, and *Songs of the Open*. Two books he wrote on golf are *The Duffer's Handbook* and *The Winning Shots*.

Richard I (1157-1199), surnamed Cœur de Lion, king of England, was born probably at Oxford. After his accession to the throne in 1189, he flung himself with characteristic ardor into the Crusade movement. In 1190, he joined his forces with Philip Augustus of France in the Third Crusade and upheld the claims of Tancred in Sicily. In 1191, he captured Cyprus. In the Holy Land he won great renown for personal valor, particularly by his defeat of Saladin in 1192. After shipwreck on the coast, on his way home, he was captured by Leopold, archduke of Austria, and was handed over to the emperor Henry VI in 1193. Ransomed by his subjects at a heavy price, he returned to England in 1194. His later years were spent in his French possessions warring against Philip. He died of an arrow-wound at the siege of Chaluz.

Richardson, Henry Hobson (1838-1886), American architect, was born at Priestley's Point, La. After he was graduated from Harvard in 1859, he studied architecture at the Ecole des Beaux-Arts in Paris. He began the practice of his profession in New York, but removed to Boston in 1878. He appreciated to a high degree the value of sculpture in its application to buildings, successfully established artistic adaptations of the Romanesque style, and rose to foremost rank among American architects.

Among the important structures designed by Richardson are Trinity Church and Brattle Square Church, Boston; the Law School for Harvard University; county buildings, Pittsburgh; and many public library buildings and railway stations.

Richardson, Sir Owen Willans (1879-), English physicist, was born in Dewsbury. Educated at Cambridge University, he came to the United States and was professor of physics at Princeton University from 1906 to 1914. He then returned to England, and held the Wheatstone chair in physics at the University of London until 1924, when he was made Yarrow research professor of the Royal Society and director of research in physics at King's College, London. He made important discoveries in the emission of electricity from hot bodies, establishing a formula, known as Richardson's law, which proved extremely valuable in the study of atomic structure. His work received recognition in the award of the Nobel prize in physics for 1928. He was knighted in 1939.

Richardson, Samuel (1689-1761), English novelist, was born in Derbyshire. He was early apprenticed to a printer in London. After some years he became a master printer, and was successively printer to the House of Commons, master of the Stationers' Company, and law printer to the king. When more than 50 years of age, Richardson published his first novel, *Pamela, or Virtue Rewarded.* In 1747-48 appeared his second work, *The History of Clarissa Harlowe,* which gave him a secure place in the history of the English novel. His works are in letter form and moralistic in tone. They excel in delineation of the character of women. See *Clarissa Harlowe, Pamela.*

Richelieu (*rē'shĕ-lyû'*; E., *rēsh'ĕ-lōō'*), **Armand Jean du Plessis, Duc de (1585-1642),** French statesman and cardinal, was born of a noble family at Paris. He was educated for the military profession at the Collège de Navarre. He then pursued ecclesiastical studies and, in 1607, was consecrated bishop of Luçon. Appointed one of the representatives of the clergy at the States-General in 1614, he attracted notice by an address which he delivered in the presence of the young king, Louis XIII. By his appointment in 1616 as secretary of war and foreign affairs, the way was opened to Richelieu's political success. In 1622 he became a cardinal and from 1624 to 1642 was the principal minister of Louis XIII.

The administration of Richelieu forms an epoch in the history of France and her relations with other countries. It is memorable for the completeness with which the absolute authority of the sovereign was established. At the close of his career, Richelieu delivered up the royal authority, which he had wielded for 18 years, almost without a single constitutional check upon its arbitrary exercise. Another of Richelieu's great enterprises was the overthrow of the Huguenot party as a political power. Richelieu was a generous patron of literature and founded the famous French Academy. See *Academy, French.*

Rickenbacker, Edward V. (1890-), aviator and air lines executive, was born in Columbus, Ohio. By the beginning of World War I, he had become well known as a winning driver in automobile races, so when he enlisted in the U. S. Army he was assigned as chauffeur to General Pershing. Later he became a member of the 94th Aero pursuit squadron, brought down 26 planes and escaped uninjured. Among the decorations he received was the Congressional Medal of Honor. After the war he organized an automobile company, then worked for the Cadillac Motor Company and was assigned by General Motors to the Fokker Aircraft Corporation of America. In 1935 he became general manager for Eastern Air Lines, Inc., and in 1938 president. He is now chairman of the board. On one of his missions for the War Department during World War II, he was forced down in the Pacific and was rescued after spending three weeks on a life raft. He is the author of *Fighting the Flying Circus* and *Seven Came Through.*

Ridgway, Matthew Bunker (1895-), army officer, was born at Fort Monroe, Virginia. On being graduated from West Point in 1917 he was commissioned a lieutenant in the U. S. Army, and between the World Wars fulfilled various overseas assignments. When World War II broke out he was in the war plans division of the War Department. He became assistant commander, later commander, of the 82nd infantry division, which was converted into an air-borne unit. He led the division in the invasion of Sicily in 1943 and Normandy in 1944. In 1950 he took command of the U. S. 8th Army and U. N. ground forces in Korea. He replaced General MacArthur in the Far East Command in 1951, and was made a general. In 1952 he succeeded General Eisenhower as supreme commander of Allied forces in Europe, and in 1953 was made U. S. Army chief of staff.

Ridley, Nicholas (c. 1500-1555), English reformer, was born in Northumberland. He was educated at Cambridge and later studied at Paris and at Louvain. Returning to Cambridge, he became in 1537 chaplain to Cranmer and, about 1540, was made master of Pembroke Hall. He was appointed bishop of Rochester in 1547, of London in 1550, and took a leading part in composing the liturgy and in drawing up the 39 articles. He favored the attempt to place Lady Jane Grey on the throne and was imprisoned in the Tower. Condemned to death for heresy, he was burned with Latimer at Oxford.

Riesel, Victor (1915-), American newspaperman specializing in labor news, was born in the crowded tenement section of New York City's lower East Side. His father, a worker in the garment trade, died in 1947 as the result of a beating attributed to labor racketeers. In 1956 Victor Riesel was himself the subject of an acid-throwing attack by labor hoodlums which blinded him for life. The motive for the attack was apparently to intimidate him from giving evidence before a Federal grand jury engaged in investigating labor rackets. Riesel is widely known as a labor writer through his syndicated newspaper column which he began writing for the New York *Daily Mirror* in the early 1940's.

Riggs, Mrs. George C. See *Wiggin, Kate Douglas.*

Riley, James Whitcomb (1849-1916), American poet, was born at Greenfield, Ind. He received a common school education. Several years of his life were spent as itinerant sign painter, actor, and musician. This experience gave him opportunity to remodel plays and to compose songs, and brought him into intimate touch with the life and the speech of the common people, whom he later portrayed in prose and in verse.

About 1873, Riley began to contribute poems to Indiana newspapers and for some time served as reporter. His many poems, partly in dialect and partly in purest English, reflect with true feeling and kindly insight the faith, humor, pathos, and sentiment of the "old folks at home." Riley is pre-eminent as an interpreter of simple life, of childhood, and of common, homely scenes. He has been styled the "poet laureate of democracy."

Riley's works include *The Old Swimmin' Hole and 'Leven More Poems, The Boss Girl and Other Sketches, Rhymes of Childhood, Home Folks, Book of Joyous Children, An Old Sweetheart of Mine, A Defective Santa Claus, Raggedy Man, Morning, Knee Deep in June,* and *Old Times.* In 1911, he was elected a member of the American Academy of Arts and Letters.

Rilke, Rainer Maria (1875-1926), Austrian poet, was born at Prague. Education received in his native city was supplemented by study at Munich and Berlin. A mystical approach to religion showed in his early writing, and during much of his life he was preoccupied with problems of life and death. A meeting with Tolstoy influenced his views of religion but close contact with Rodin gave him an appreciation of beauty which is reflected in his "Sonnets to Orpheus," in the *Duineser Elegien,* and in *Späte Gedichte,* a posthumously published collection of his latest poems. His mood of troubled questioning shows most conspicuously in his early works, *Traumgekrönt* and *Buch der Lieder.*

Rimbaud, Arthur (1854-1891), French poet, was born at Charleville. As a precocious college student, he showed a spirit of revolt against conventional poetic forms and a wanderlust that took him to England and led him to spend an interval of bohemian life in Belgium with the poet Paul Verlaine. Comparable to the English prodigy Chatterton, he produced nearly all his poetry in a brief period of intensive writing which came between the ages of 17 and 19. He is credited with having paved the way for symbolism, particularly in his epic poem *Bateau ivre* and in the collection entitled *Les Illuminations.*

Rimski-Korsakov (*rĭm'skĭ-kôr'sà-kôf'*), **Nicholas Andreyevitch (1844-1908),** Russian composer, was born at Tikhvin, Novgorod. Although he displayed remarkable musical gifts at an early age, his parents sent him to the naval academy at Leningrad, where he was graduated in 1862. While a midshipman he composed his first symphony, produced by Balakirev in 1865. He then decided to leave the navy, and, devoting himself entirely to music, became the leader of the new Russian nationalistic school. In 1871, he was made professor of composition in the Conservatory at Leningrad and held this place until his death.

Rimski-Korsakov ranks among the greatest Russian masters, excelling in brilliant instrumentation and in the skillful development of folk themes. His best-known operas are *The Snow Maiden, Sadko, Mlada,* and *The Czar's Betrothed.* His compositions also include symphonies, overtures, choruses, and piano pieces. His *Bumble Bee* is an outstanding example of realistic imitation.

Rinehart, Mary Roberts (1876-), American author, was born in Pittsburgh, Pa. She was educated in the public schools and in the training school for nurses at Pittsburgh. In 1896 she married Dr. Stanley Marshall Rinehart. Her earlier writings, through which she won wide popularity, were chiefly entertaining mystery stories. Later, she became widely known as a novelist and as a playwright.

Among her writings are *The Man in Lower Ten, When a Man Marries, Where There's a Will, The After House, Tenting Tonight, The Amazing Interlude, Love Stories, Dangerous Days, A Poor Wise Man, Affinities, Sight Unseen, The Confession, Lost Ecstasy,* and *The Wall.*

She wrote also the one-act play *The Avenger,* with her husband; the farces *Seven Days* and *Cheer Up;* and the plays *Double Life, Tish, Bab, Spanish Love,* and *The Bat.*

Rinehart, William Henry (1825-1874), American sculptor, was born in Carroll County, Md. He received a common school education. At the age of 21 he began his career as a marble worker in Baltimore. In 1855, he went to Florence for further study and later located permanently in Rome. He completed Crawford's bronze doors for the Capitol at Washington. His best-known works are "Latonia and Her Children" and "Rebecca" in the Metropolitan Museum, New York; "Clytie," "Strewing Flowers," "Hero," "Day," and "Night" in the Corcoran Gallery, Washington; and the marble statue of Chief Justice Taney at Annapolis. While classic in tendency, Rinehart's sculpture displays poetic charm and refined technique.

Rivera, Diego (1886-), Mexican mural painter, was born at Guanajuato. When six years of age, he was brought to Mexico City, where he studied drawing and became interested in Aztec sculpture. He studied later in Spain, Paris, and London. His sympathies always remained close to the soil and to the life of laboring people. He became a convinced socialist, and, returning to Mexico in 1910, he took an active part in the revolution then in progress.

After a further period of study in Europe, he definitely adopted the mural fresco as the best medium for his art, which, by a candid realism, often brutal in effect, and a powerful symbolism, depicts life in its multitudinous aspects. His proletarian sympathies appear clearly in his paintings, which have often been criticized severely for this reason. Among his first large paintings were those in the Ministry of Education Building, Mexico City, and in the Agricultural Academy at Chapingo. He executed many frescoes in the United States, including one in the Detroit Institute of Art.

Rizal (*rē-säl'*), José Mercado (1861-1896), Philippine patriot, was born in the province of Laguna, Luzon, of Tagalog parentage. He acquired a broad education in medicine, ethnology, and linguistics, studying at Manila and European universities. In 1886, he published *Noli Me Tangere*, in which he attacked the Spanish administration of the islands and the religious orders. A sequel, *El Filibusterismo*, followed in 1891. Although compelled to leave his native island a few months after entering in 1887, he returned in 1892, but was arrested and banished to Mindanao, where he continued to labor for the social improvement of the nation. Volunteering in 1896 to act as a physician in Cuba, where yellow fever was raging, he was seized, condemned, and shot as a traitor. His influence among the Filipinos is enormous. By many he is regarded as the ablest man whom the Malay race has produced. His day of execution, December 30, was made a Philippine national holiday.

Robbia (*rôb'byä*), Lucca della (1399-1482), Italian sculptor, was born at Florence. He decorated the campanile of the cathedral at Florence and also made a bronze door for the sacristy. His master creation is his series of "Singing Galleries," consisting of ten panels executed in high relief for one of the organ galleries in the cathedral of Florence. These panels represent groups of children singing, dancing, and playing musical instruments and are notable for their naturalness and grace.

Robert I, king of Scotland. See *Bruce, Robert.*

Roberts, Sir Charles George Douglas, (1860-1943) Canadian poet and novelist, was born at Douglas, N. B. He was graduated from the University of New Brunswick, 1879. He taught English in King's College, Windsor, N. S., from 1885 to 1895, when he resigned to devote himself to literature. He was knighted in 1935. His reputation rests chiefly on his highly imaginative and artistically finished poetry, though his novels present exquisite descriptions of nature and some of his animal stories are masterpieces. His numerous writings include *Orion and Other Poems, The Book of the Rose, The Canadians of Old, Earth's Enigmas, Red Fox, The Secret Trails, Canada in Flanders, New Poems,* and *Eyes of the Wilderness.*

Roberts, Sir Frederick Sleigh (1832-1914), earl of Kandahar and Waterford, British general, was born at Cawnpore, India. At 19 he joined the Bengal artillery, serving through the Indian Mutiny and receiving the Victoria cross for his heroism. In the Afghan War of 1878-80, Roberts made a famous march from Kabul to Kandahar, effecting the relief of the latter place. For this military feat he was created a baronet and earned from his soldiers the familiar sobriquet of "Little Bobs" or "Bobs Bahadur." In 1895, he was made field marshal, and, in 1899, he proceeded to South Africa to take supreme command during the Boer War, where he turned the fortunes of that struggle in favor of the British.

With keen military foresight, Roberts anticipated World War I and endeavored in vain to persuade England to prepare for it. He died while reviewing the British army in France. See *Roberts's March.*

Roberts, Kenneth Lewis (1885-), American novelist and journalist, was born at Kennebunk, Me. After being graduated from Cornell University in 1908, he joined the staff of the Boston *Post*, conducting a humorous column, and later wrote for *Life* and *Puck*. He took part in the Siberian expedition against the Russian soviet government in 1918-19 and then served as staff writer for the *Saturday Evening Post*. Meanwhile he began writing novels based on painstaking research into early American history, which included *Rabble in Arms* and *Northwest Passage*. Following these highly successful novels, he reconstructed events of the Revolutionary War showing the Tory or Loyalist side in *Oliver Wiswell*. His other works include *Black Magic, Florida, Captain Caution,* and *Boon Island.*

Robespierre (*rō'bĕs-pyâr'*; E., *rō'bĕs-pēr'*), Maximilien Marie Isidore (1758-1794), French Revolutionist, was born at Arras. After studying law and gaining some distinction as an advocate, he entered the States-General in 1789. As a popular leader in the Jacobin club, his influence became powerful. After the death of Mirabeau, Robespierre's biography is in effect the history of the Revolution. He was elected to the National Convention as head of the Paris deputies, and was one of the chief agents in procuring in 1792, the execution of the king. In 1793 occurred the final struggle with the Girondists, the chief men among whom he sent to the scaffold.

A period of terror followed: Marie Antoinette and the Duke of Orleans were the first victims; Danton and Camille Desmoulins were next immolated; and for months Paris was the scene of an indiscriminate quasi judicial slaughter, in which thousands of lives were sacrificed. With these atrocities the name of Robespierre remains peculiarly associated. A conspiracy was organized against "the tyrant," and, in July, 1794, Robespierre closed his career on the scaffold. See *Terror, Reign of.*

Robinson, Edwin Arlington (1869-1935), American poet, was born at Head Tide, Me. He was educated at Harvard University. His first volume of poems, *The Torrent and The Night Before*, appeared in 1896. Robinson's verse, which displays high intellectual quality, won him prominent rank among American poets. His other books of verse include *The Children of the Night, Captain Craig, The Town Down the River, The Man Against the Sky, Merlin, Lancelot,* and *Dionysus in Doubt*. He published also a comedy, *Van Zorn*, and a tragic drama, *The Porcupine*. His *Poems, The Man Who Died Twice*, and *Tristram* won Pulitzer prizes. He was elected to membership in the American Academy of Arts and Letters in 1927.

Robinson, James Harvey (1863-1936), American historian and educator, was born at Bloomington, Ill. He was educated at Harvard and the University of Freiburg. In 1891, he was lecturer on European history in the University of Pennsylvania. From 1892 to 1919, he was a professor of history at Columbia University and, 1919-21, lecturer and organizer for the new School of Social Research, New York City.

Robinson's textbooks, which have profoundly influenced the teaching of history in America, emphasize the thought element in world changes and the importance of considering social, scientific, intellectual, and artistic development in connection with the study of politics and wars. His writings include *Introduction to the History of Western Europe, The New History, Medieval and Modern Times, The Mind in the Making,* and *The Humanizing of Knowledge.*

Rochambeau (*rō'shäN'bō'*), Jean Baptiste Donatien de Vimeur, Comte de (1725-1807), marshal of France, served in the War of the Austrian Succession; distinguished himself in the Seven Years' War; and co-operated with Washington at the siege and capture of Yorktown in the American war for independence. In 1790, he became commander of the French army of the North, but resigned in 1792. He narrowly escaped execution during the Reign of Terror.

Rockefeller, John Davison (1839-1937), American capitalist, was born at Richford, N. Y. At the age of 14, he moved to Cleveland, Ohio. He received a public school education; was clerk in a forwarding and commission house; and, at 19, became a partner in the firm of Clark and Rockefeller, commission merchants. Subsequently the firm engaged in the oil business. In 1865, the firm, then William Rockefeller and Company, built the Standard Oil works at Cleveland and, in 1870, was consolidated with others to form the Standard Oil Company. Still other interests were later acquired and the Standard Oil trust was formed in 1882, but was dissolved in 1892 pursuant to a court decision under the Sherman Antitrust Act.

Thereafter the various Standard Oil companies were operated separately with Rockefeller at the head until 1911, when he retired, without a near rival, the wealthiest man in the world. He devoted much time and money to the promotion of various educational, religious, and charitable interests. In 1892, he established the University of Chicago, to which he made gifts exceeding $46,000,000.

It is estimated that Rockefeller's total benefactions exceeded $540,000,000. About four-fifths of this amount was given to the four great philanthropic and charitable corporations founded by him which are as follows: The Rocke-

feller Foundation, $180,000,000; General Education Board, $130,000,000; The Laura Spelman Rockefeller Memorial, $73,000,000; and The Rockefeller Institute for Medical Research, $39,000,000. The Laura Spelman Rockefeller Memorial Fund was consolidated with the Rockefeller Foundation in 1929, making it one of the largest single philanthropic endowments in existence.

Rockefeller, John Davison, Jr. (**1874-**), capitalist, son of John Davison Rockefeller, was born in Cleveland, Ohio. He was graduated from Brown University, 1897. He was associated in various business enterprises established by his father and actively directed the work of the Rockefeller foundations until 1940. During 1913-15, a strike in Colorado against one of his mining companies led to his intervention and the establishment of the first employee representation plan. This type of labor organization spread rapidly in industry until checked by the Wagner Act of 1935, which forbade employer influence in labor unions. He erected Rockefeller Center, covering several blocks in New York City. Begun in 1932, this was the largest single commercial building enterprise in the world.

Rodgers, Richard (**1902-**), composer, was born in New York City. As a sixteen-year-old freshman student at Columbia University, he submitted a score which was accepted for the annual "varsity show," an original musical play. This venture into musical composition introduced him to Lorenz Hart, with whom he later collaborated on many popular productions. Among these were *Dearest Enemy*, *The Connecticut Yankee*, and *The Boys from Syracuse*. In collaboration with lyricist Oscar Hammerstein, Rodgers produced the outstanding success *Oklahoma*. Equaling and even surpassing this popular classic have been *South Pacific* and *The King and I*, two other musical plays by the same composer.

Rodin (*rô'dăN'*), **Auguste** (**1840-1917**), French sculptor, was born at Paris. He studied under Barye and was influenced strongly by Greek and Italian masters and by the writings of Dante. Many of his most famous works were based on studies for an unfinished decoration for bronze doors, *The Gates of Hell*. They include "Adam," "Eve," "Les Bourgeois de Calais," "La Guerre," "The Kiss," "The Age of Bronze," and "The Thinker." In him culminated the naturalistic sculpture of the 19th century.

Rodney, George Brydges Rodney, Baron (**1719-1792**), English admiral, entered the navy as letter boy in 1732 and after 27 years of active service was made rear admiral. In 1762, he became vice admiral and, in 1764, was made a baronet. During the Seven Years' War he captured the French West India islands of Martinique, St. Lucia, and Grenada. In the American Revolution he defeated the French near Martinique; took St. Eustatius from the Dutch; and, in 1782, totally defeated the French under De Grasse off Dominica. Rodney's victory saved Jamaica, ruined the naval power of France and Spain, and dealt the final blow of the war.

Roebling (*rōb'lĭng*), **John Augustus** (**1806-1869**), American civil engineer, was born in Mühlhausen, Prussia. In 1831 he emigrated to the United States. He was the pioneer designer of large suspension bridges. Among those erected from his design were the suspension aqueduct across the Allegheny River and the Monongahela suspension bridge, both at Pittsburgh; a suspension bridge over Niagara River; the Ohio bridge at Cincinnati; and the Brooklyn bridge connecting New York and Brooklyn.

Roentgen (*rŭnt'gĕn*; *rĕnt'-*), **Wilhelm Konrad** (**1845-1923**), German physicist, discoverer of the X- or Roentgen, rays, was born at Lennep, Prussia. He was educated at the University of Zurich, where he studied under Kundt. After holding professorships at Hohenheim, Strasbourg, and Giessen, he was made professor at Würzburg in 1885 and at Munich in 1899. At Würzburg, in November 1895, he announced the discovery of the X-rays, now called Roentgen rays. In honor of this important discovery, he received the Rumford medal and the Barnard medal, and, in 1901, he was awarded the Nobel prize for physics.

Rogers, Will (**1879-1935**), American actor and humorist, was born at Oolagah, Okla. After a secondary school education, he entered vaudeville in New York, 1905. In 1914 he joined Ziegfield's Follies and Night Frolics, usually taking the part of a cowboy while entertaining his audience with humorous or satirical remarks. His books of "Rogerisms" and contributions to the press gave still wider publicity to his humor and helped to win him an established reputation as America's leading political and social satirist. He wrote also *Illiterate Digest* and *Letters of a Self-made Diplomat to His President*. He was killed when the plane in which he and Wiley Post were riding crashed in Alaska. A monument to his memory, called "Shrine of the Sun," and built by Spencer Penrose, stands on Cheyenne Mountain, near Colorado Springs, Col. It is 200 feet high, a replica of the Tower of London.

Rohde, Ruth Bryan. See *Bryan, Ruth.*

Roland (*rô'lăN'*), **Marie Jeanne** (**1754-1793**), heroine of the French Revolution, wife of Jean Marie Roland de la Platière, was born at Paris. From 1791 to 1793, preceding and during the French Revolution, her salon in Paris was the headquarters of the Republicans and Girondists. Upon the fall of the Girondists she was arrested and imprisoned. Summoned before the Revolutionary tribunal, she was condemned and on November 8, 1793, was guillotined. Her last words are said to have been: "O Liberty, what crimes are committed in thy name!"

Rolland (*rô'lăN'*), **Romain** (**1866-1944**), French author, was born at Clamecy. He received his education at the Ecole Normale Supérieure, Paris, in which he later became professor of the history of art. He wrote numerous plays and historical works and also biographical and critical studies, chiefly of musicians and other artists, including *Beethoven*, *Life of Michelangelo*, and *Masters of Music*. *Jean-Christophe*, published originally in 10 volumes, brought Rolland world-wide fame. Rolland was awarded the Nobel prize in literature for 1915. His pacifist attitude during World War I was expressed in his collection of essays entitled *Above the Battle*.

Romains, Jules (**1885-**), is the pseudonym of Louis Farigoule, French novelist, who was born at St. Julien-Chapteuil. He taught philosophy for ten years in various colleges and from 1919 devoted himself exclusively to writing. Giving little thought to closely constructed plots, he wrote novels showing intimate knowledge of nearly all aspects of modern life but having predominantly a social implication. His trilogy *The Body's Rapture* foreshadowed in a small way the ambitious *Men of Good Will*, which is an episodic novel depicting with uncanny fidelity French life at nearly every level of society, extending down to the psychology of domestic animals. His other works include *The Boys in the Back Room* and *The Dictator*. He escaped to America in 1940, and later taught at Bennington College.

Romberg, Sigmund (**1887-1951**), composer, was born in Hungary. He studied to be a civil engineer but was more interested in music. After coming to America in 1909, he became very successful as a composer of operettas and musical comedies. His best-known works are *The Student Prince*, *The Desert Song*, and *Blossom Time*, which was adapted from Franz Schubert. These and many others written over a period of nearly forty years provided a repertoire of popular melodies with which everyone is familiar. Although his music is considered by some critics to be naively sentimental, it has a lasting appeal for the general public.

Rommel, Erwin (**1900-1944**), German general, was born in Swabia. He assisted Hitler in organizing the national socialist party. His mastery of tank warfare and the strategy of the blitzkrieg, exhibited in the German drive to the Channel in May 1940, led to his selection to command the German and Italian forces in North Africa. He achieved several brilliant victories, driving the British back into Egypt, but was defeated at El Alamein, 1942. After a brilliant retreat across Libya he was transferred, now a field marshal, to Italy, and later to northern France, where he died of wounds received in Normandy. See *Desert Fox*.

Romulo, Carlos P. (**1901-**), U. S. Army officer, journalist, and author, was born in Manila. He studied at the University of the Philippines, to which he returned as teacher after spending some time at Columbia University. Before the attack on Pearl Harbor he was head of a chain of newspapers at Manila. When the war came he entered the U. S. service as press aide to General MacArthur. His *Voice of Freedom* broadcasts from Corregidor dramatized the desperate situation of the American troops, and he was decorated for his part in the delaying action that preceded the fall of Bataan. As interpreter of both American and Philippine public opinion, he has helped to build good will between the two countries. Recently he was president of the United Nations General Assembly and Philippines secretary of foreign affairs. He is author of *Mother America* and *I Saw the Fall of the Philippines*.

Romney (*rŭm'nĭ*), **George** (**1734-1802**), English painter, was born at Dalton. He studied art in London and Paris, and, during 1773-75, in Italy. On his return to London, he became the rival of Reynolds as a portrait painter. Most of his finest paintings are privately owned. His "Lady Hamilton as Daphne" is in the Metropolitan Museum, New York, and other representative examples are found in American galleries. See *Painting*.

Roosevelt (*rō'zĕ-vĕlt*), **Anna Eleanor** (**1884-**), American social and political leader and wife of the 32nd president of the United States, was born in New York City. In 1905, she married her fifth cousin, Franklin Delano Roosevelt. Prior to his election to the presidency in 1932, she was active in the Democratic party, both in New York and national campaigns. Her public activities while in the White House were characterized by numerous personal contacts with individuals in all classes of society and the

use of regular press conferences and a newspaper column to express her views on public affairs. Her advice was credited with having no small part in the shaping of the "New Deal." From 1949 to 1952 she was United States representative to the United Nations General Assembly.

Roosevelt, Franklin Delano (1882-1945), 32nd president of the United States and the only one to be elected for more than two terms, a fifth cousin of Theodore Roosevelt, was born at Hyde Park, N. Y. He was graduated from Harvard University in 1904 and from Columbia Law School in 1907. He began the practice of law in New York City. In 1910, he was elected to the New York State senate, and, in 1912, was re-elected. He strongly supported Woodrow Wilson for president, and, in 1913, he was appointed assistant secretary of the navy. He supported the League of Nations, woman suffrage, and civil service reform. In 1920 he was a candidate for the vice presidency of the United States on the Democratic ticket, but was defeated.

In 1921, he suffered an attack of infantile paralysis which left his right leg partially paralyzed. Rising superior to this handicap, he was successful candidate for governor of New York State in 1928, and again in 1930. In 1932, he was nominated by the Democratic party for president, and in the ensuing election, defeated his Republican opponent, Herbert Hoover, by an overwhelming majority.

First Administration. Roosevelt took office at a time when nearly four years of economic depression were culminating in a nation-wide bank panic. With decisive boldness, he assumed war-time powers to end the emergency and called a special session of Congress, from which he secured virtually dictatorial powers over agriculture, industry, and finance. These powers he put into effect to raise price levels, cut agriculture surpluses, and impose industrial codes having the effect of increasing employment at higher wages. These powers were later ruled invalid by the Supreme Court. Many other changes introduced by his administration, popularly known as the "New Deal," remained intact. These included Federal responsibility for supporting the needy jobless, regulation of security markets, protection of collective bargaining rights, and a program of social security.

Re-election in 1936. The New Deal was made the issue in a hard-fought presidential campaign in 1936, Roosevelt's Republican opponent, Alfred M. Landon, pledging the repeal of many of the new laws and a more or less passive role for the Federal government. Roosevelt was re-elected by an electoral vote of 523 to 8, the most decisive majority since 1820.

To avert the threat of further unfavorable verdicts of the Supreme Court, Roosevelt in 1937 sought authority to enlarge its membership up to 15 if incumbents failed to retire on full salary after 70. The attempt failed by a narrow majority in Congress, but the court reversed some of its earlier positions and upheld the validity of later New Deal laws coming before it. The result was a radical shift in constitutional interpretations, Congress obtaining power to regulate nearly all aspects of economic life. A law requiring payment of minimum wages and also overtime for hours worked in excess of 40 weekly was passed in 1938, and the president received authority, within limits, to reorganize government agencies. In general, however, Roosevelt's second administration was a period of consolidation and defense against efforts to weaken earlier measures.

Third Term and World War II. Events abroad led to Roosevelt's decision, put off until the national convention had nominated him, to run for a third term. Germany had conquered France and threatened a complete upset of the world's balance of power if Britain should be subdued. Roosevelt took the position that American interests required British victory. A change in administration might, he thought, be highly dangerous. Accepting nomination, he defeated Wendell L. Willkie by an electoral vote of 449 to 82.

Roosevelt's leadership in the international crisis was directed toward immediate and decisive aid to Britain. A selective service draft law was passed. Appropriations of huge proportions were made to double the navy and create the world's largest air fleet. In exchange for 50 overage but fully equipped destroyers, he obtained from Britain sites for eight naval bases for protection of the Americas. By agreement with Latin American countries, he translated the Monroe doctrine from a unilateral policy to a mutual pact for defense. Congress voted him power to lease or give instruments of war to other nations so as to make the country "the arsenal of democracies."

In December 1941, Japanese attacks upon Hawaii and the Philippines brought the country fully into the war against the Axis powers. Roosevelt's task then became that of shifting the defense organization to an offensive basis and mobilizing the whole country, the civilian population as well as the army, for total war. Notable in his conduct of the war and in his planning for peace, were his personal conferences with the heads of the Allied nations, not only in Washington, but on the Atlantic, and at Casablanca, Quebec, Cairo, Tehran, and the Crimea. See *World War II.*

He was renominated in 1944 and was re-elected over Thomas E. Dewey by an electoral vote of 432 to 99.

Roosevelt died of cerebral hemorrhage at Warm Springs, Ga., April 12, 1945. After funeral services at the White House, he was buried on his estate at Hyde Park, N. Y.

Roosevelt, Theodore (1858-1919), American statesman and author, 26th president of the United States, was born in New York City of a distinguished family of Dutch origin. Though physically delicate in youth, he entered Harvard University at 18 and was graduated in 1880. In 1881, he began the study of law, but in the same year was elected to the New York legislature, of which he was the youngest member. He was twice re-elected. He spent 1884-86 in North Dakota raising cattle.

In 1886, Roosevelt was an unsuccessful candidate for mayor of New York. In 1889, President Harrison appointed him member of the United States Civil Service Commission, in which capacity he served until 1895, when he resigned to accept the presidency of the police commission of New York City. In 1897, President McKinley appointed him Assistant Secretary of the Navy. Upon the outbreak of the Spanish-American War, in April 1898, he resigned to assist in organizing a regiment of volunteer cavalry, afterwards known as Roosevelt's roughriders.

In November 1898, Roosevelt was elected governor of New York. Two years later he was elected vice president of the United States on the Republican ticket. Upon the death of President McKinley in 1901, he succeeded to the presidency. He was elected for the term of 1905-09.

Roosevelt's efforts in bringing about the treaty of peace between Japan and Russia in 1905 were important and effective, and, in 1906, he was awarded the Nobel prize for peace, the first American to be so honored. An enthusiastic hunter of big game, he led in 1909 an expedition to East Africa for the Smithsonian and National museums. In 1912, he was presidential candidate of the Progressive party, which he organized. During the campaign he was shot and slightly wounded by a fanatic at Milwaukee.

In 1914, he engaged in an exploring expedition in South America, discovering the large tributary of the Madeira River named for him the Roosevelt river. He wrote numerous books and contributed widely to periodicals and to general literature. Among his writings are *The Rough Riders*, *The Strenuous Life*, and *The Great Adventure*. In 1905, he was elected member of the American Academy of Arts and Letters. In 1950 he was elected to the American Hall of Fame.

Roosevelt, Theodore, Jr. (1887-1944), American administrator and editor, was born at Oyster Bay, N. Y., son of Theodore Roosevelt, 26th president of the United States. He was graduated from Harvard in 1908 and entered commercial life, becoming identified with motor manufacturing and oil refining interests. When the United States entered World War I in April 1917, he joined the army and became a major and later lieutenant colonel of infantry in the American expeditionary forces. In 1919, he was elected member of the assembly in the New York State legislature. He was Assistant Secretary of the Navy in Harding's cabinet, 1921-24; unsuccessfully contested the governorship of New York State in 1924; in 1925 headed a Field Museum expedition into central Asia; and was governor of Puerto Rico in 1929-32 and of the Philippine Islands in 1932-33. He returned to the army in 1940 and was commissioned brigadier-general. He died on the "invasion front" in Normandy, 1944.

His publications include *Rank and File*, *All in the Family*, and *Colonial Policies of the United States*. In co-operation with his brother Kermit (1889-1943), who, in 1939, gave up his American citizenship to assist actively in British defense, he wrote *East of the Sun and West of the Moon* and *Trailing the Giant Panda*.

Root (*rōōt*), **Elihu (1845-1937),** American statesman and lawyer, was born at Clinton, N. Y. He was graduated from Hamilton College in 1864, taught at Rome Academy in 1865, and was graduated from the law school of New York University, 1867. Admitted to the bar in 1867, he began practice in New York City, and rose to eminence.

In 1899, Root was appointed secretary of war by President McKinley and served until 1904. After the Spanish-American War he represented the United States government in all official relations with Cuba, Puerto Rico, and the Philippine Islands. During 1903, he was member of the Alaskan Boundary Tribunal. In 1905, President Roosevelt appointed him secretary of state, and in that office he did much to unify the Pan-American countries. In 1908, he was elected U. S. senator from New York for the term 1909-15. In 1912, he was awarded the Nobel prize for peace.

Root was chairman of the Republican National Convention of 1912 and, in 1915, was president of the New York State constitutional convention. In 1917, he was appointed by President Wilson to a special diplomatic mission to Russia. He drew up, in 1920, the plan on which the organi-

zation of the World Court was based. In 1929, he aided in revising the statutes of the World Court to facilitate the entry of the United States. In 1917, he was elected member of the American Academy of Arts and Letters.

Rorimer, James J. (1905-), curator and art researcher, was born at Cleveland, Ohio. Encouraged by his father, who was a teacher at the Cleveland School of Art, he began his studies early. He showed special aptitude in drawing and design, in which he received two years of training in Paris before he entered Harvard University as an undergraduate. In 1927, having finished his course at Harvard, he joined the staff of the Metropolitan Museum in New York and worked for several years in the Department of Medieval Art. He was among the first users of ultraviolet light in determining the authenticity of art works. During World War II, he was made chief of the Monuments, Fine Arts, and Archives section of the Seventh Army in the Western Military District. His book, *Survival: The Salvage and Protection of Art in War Time*, is an outgrowth of his experience in discovering and preserving art works hidden by the Nazi leaders. In 1955, Rorimer was appointed Director of the Metropolitan Museum.

Rosenwald (*rō'zĕn-wâld*), **Julius (1862-1932)**, American merchant and philanthropist, was born at Springfield, Ill. He was educated in the public schools and, at the age of 17, became connected with a wholesale clothing firm of New York City, with which he was engaged for six years. From 1885 to 1906, he was president of Rosenwald and Weil, clothing manufacturers of Chicago. He was vice president and treasurer of Sears, Roebuck and Company from 1895 to 1910, when he was made president. Under his management, the mail order sales of this firm increased from somewhat less than $2,000,000 in 1896 to approximately $350,000,000 in 1928.

Among his many benefactions is the creation of a 30 million dollar Julius Rosenwald fund "for the well-being of mankind." He made substantial gifts for the building of Negro schools and for the colonization of Jews in Russia.

Ross, Betsy (1752-1836), maker of the first American flag adopted by Congress, was born in Philadelphia, Pa. She was a daughter of Samuel Griscom, who aided in building Independence Hall. In 1773, she married John Ross, a nephew of George Ross, signer of the Declaration of Independence. On June 14, 1777, the Continental Congress decided upon the design for a national flag. A committee requested Mrs. Ross to make the flag. She accepted and her suggestion that five-pointed instead of six-pointed stars be used in the design was adopted. She was awarded a contract to make all government flags. When she died the business was continued by her daughter, Mrs. Wilson, until 1857. In 1905, the Betsy Ross Memorial Association opened to the public the old home of Betsy Ross in Arch Street, Philadelphia, as the American Flag House.

Ross, Sir Ronald (1857-1932), British physician, was born at Almora, India. He received his medical education at Saint Bartholomew's Hospital, London, and, in 1881, he entered the Indian Medical Service. As the result of researches in malaria, which he began in 1892, he revealed the life history of the malaria-producing parasites found in certain mosquitoes. In recognition of the importance of this contribution to medical knowledge, he was awarded the Nobel prize for medicine in 1902. He became professor of tropical sanitation in the University of Liverpool and, in 1913, physician for tropical diseases at King's College hospital, London. Later he was made director in chief of the Ross Institute and Hospital for Tropical Diseases, London. His published works include *Mosquito Brigades and How to Organize Them* and *The Prevention of Malaria*.

Rossetti (*rô-sĕt'ē*), **Christina Georgina (1830-1894)**, British poet, was born at London, the youngest of the four children of Gabriele Rossetti, an Italian poet, who settled in England, and sister of Dante Gabriel Rossetti, the painter. She was educated at home and led a life of retirement. At an early age she began writing verse. In 1848, she contributed poems to the *Athenæum*, and, in 1850, she published under the pen name Ellen Alleyne several beautiful lyrics in the *Germ*. Her published volumes of verse, *Goblin Market and Other Poems*, *The Prince's Progress and Other Poems*, *A Pageant and Other Poems*, and *New Poems*, entitle her to high rank among the English women writers of the 19th century. Her short and intense lyrics, as, for example, *After Death* and *Passing and Glassing*, are by many regarded as her most successful poems.

Rossetti, Dante Gabriel (1828-1882), British painter and poet, was born at London, son of Gabriele Rossetti, an Italian poet, and brother of Christina Rossetti, also a poet. He first became prominent by his association with Millais and Holman Hunt in the Pre-Raphaelite brotherhood. His chief paintings include "Girlhood of Mary, Virgin," "Boat of Love," "Dante's Dream," "Proserpina," "The Blessed Damozel," "Beata Beatrix," and "Lady Lilith." As an author he is well known by his *Early Italian Poets*, *Ballads and Sonnets*, *Dante and His Circle*, and *Hand and Soul*. See *Painting: The Pre-Raphaelites*.

Rossini (*rôs-sē'nē*), **Gioacchino Antonio (1792-1868)**, Italian composer, was born at Pesaro. At the age of 15 he was sent by the Countess Perticari to the Lyceum of Bologna for musical instruction. In 1813, he produced the opera *Tancredi*. Three years later, he produced *Il Barbiere di Siviglia*, "The Barber of Seville." *La Cenerentola*, *Otello*, *Mose in Egitto*, *La Donna del Lago*, *Semiramide*, *Guillaume Tell*, *Stabat Mater*, and many other works followed. Rossini's music is stirring, melodious, and brilliant. He ranks as the greatest Italian composer of the *bel canto* school of opera.

Rostand (*rôs'tăN'*), **Edmond (1868-1918)**, French poet and dramatist, was born at Marseilles. He was educated at the Lycée de Marseilles and at the College Stanislas. Early in his career he settled in Paris and began to write verse. His first successful drama was *Les Romanesques*, produced in 1894. It was followed by *La Princesse Lointaine* and *La Samaritaine*. *Cyrano de Bergerac*, the most notable contribution to French poetic drama since the production of Victor Hugo's *Hernani* in 1830, was presented in 1897 with Coquelin and Bernhardt in the leading roles. This romantic tragedy immediately became the success of two continents. Rostand's later dramas include *L'Aiglon* and *Chantecler*. As a poet and as the most gifted representative of the modern romantic school, Rostand occupies foremost place in recent French letters. He was elected to the Academy in 1901. See *Bergerac, Cyrano de*.

Rothschild (*rŏths'chīld*) is the name of a celebrated Jewish family of bankers and financiers. The founder, Mayer Anselm, named from his father's signboard, Rothschild, or "Red Shield," was born at Frankfort on the Main in 1743. He was educated for a rabbi, but founded a business as a money-lender and became financial adviser of the landgrave of Hesse. The house received a heavy commission for transmitting money from the English government to Wellington in Spain, paid the British subsidies to continental princes, and between 1802 and 1812 negotiated loans for Denmark.

At his death, in 1812, the founder left five sons, all of whom were made barons of the Austrian empire in 1822. Mayer Anselm (1773-1855), eldest son, succeeded as head of the firm at Frankfort. Solomon (1774-1855) established a branch at Vienna; Nathan (1777-1836), a branch at London; Karl (1788-1855), a branch (discontinued about 1861) at Naples; Jacob, or James (1792-1868), a branch at Paris.

The Rothschilds negotiated many of the great government loans of Europe in the 19th century, and Nathan raised the house to be first among the banking houses of the world. He staked his fortunes on the success of Great Britain in her duel with Napoleon, and, receiving the first news of Waterloo, bought and sold stock which brought him a million pounds profit. His son Lionel (1808-79) did much for the civil and political emancipation of the Jews in Great Britain.

Lionel's son Nathaniel Mayer (1840-1915) succeeded to the baronetcy conferred in 1846 on his uncle and was made Baron Rothschild in 1885. At the time of his death the aggregate wealth of the various branches of the Rothschild family was estimated at $2,000,000,000. Lionel Walter (1868-1937) and Nathaniel Mayer Victor (1910-) succeeded in the family title. Wherever German authority was in the ascendancy after Hitler's rise to power, Rothschild fortunes were confiscated because of their Jewish ownership.

Rouault, Georges (1871-), French painter, began his art career as a worker in stained glass in his native Paris, where he also studied at the *École Nationale des Arts Decoratifs*. Later he studied under Gustave Moreau, and eventually he became Director of the Moreau Museum. Under Moreau's influence, he painted religious subjects, but to show the hideousness of evil he also painted brothel types and other wicked characters in coarsely realistic style. Like his paintings, his lithographs, wood engravings and etchings all show vigor and intensity. Among his best-known works are *Biblical Landscape* and *The Infant Christ Among the Doctors*. He designed settings for a ballet, *The Prodigal Son*, with music by Prokofieff.

Rouget de Lisle (*rōō'zhĕ' dē lēl'*), **Claude Joseph (1760-1836)**, French soldier and poet, was born in Lons le Saunier. In 1792, when stationed as captain of engineers at Strasbourg, he wrote the *Marseillaise*, by its author called *Chant de guerre de l'armée du Rhin*, which was made known in Paris by troops from Marseilles and became the national anthem. In 1796, he left the army and devoted himself to poetry and music.

Rousseau (*rōō'sō'*), **Jean Jacques (1712-1778)**, French social philosopher and writer, was born at Geneva, Switzerland. He was apprenticed to an engraver, but made his escape in 1728 and for many years found a home with Madame de Warens at Annecy.

In 1741, he went to Paris, whence in 1742 as secretary he accompanied the French ambassador to Venice. In 1750, he gained a prize, offered by the academy of Dijon, for an essay attacking the influence of the arts and sciences on society. Later he removed to Montmorency, to Switzerland, to England, and back to France, where he remained until his death.

Rousseau was a renewer of the force of the imagination and the feelings in an artificial time. He loved nature and praised its beauties; he broke with the arid traditions of the past and formed a new ideal for the future, with an eloquence and a warmth that had great influence in bringing on the French Revolution. He wrote on education and profoundly modified its tendencies, and, in literature, he led the way to the romantic reaction against the cold copying of classicism. His personal character is a puzzle to moralists. The vices and meannesses which stained his life are set forth with melancholy sincerity in his *Confessions.*

The most famous of Rousseau's writings are *Discourse on the Origin of Inequality among Men*; *Julie, or The New Héloïse*; *The Social Contract*; and *Emile, or Education.* See *Educational Reformers.*

Rousseau, Théodore (1812-1867), French landscape painter, was born at Paris. He studied at the Ecole des Beaux-Arts. At 19 he revolted against the prevailing classicism and joined the romanticists, later becoming one of the leaders. In 1833, he settled at Barbizon, at the edge of the forest of Fontainebleau, where he was soon joined by Diaz and later by Millet, who became his intimate friend, Rousseau was the pioneer and leader of a group known as the Barbizon school of painters, the most important in the history of landscape art.

Depicting every phase of nature with remarkable harmony of the intellectual and emotional elements, Rousseau ranks as the epic poet of landscape art. His best paintings are in the Louvre, Paris, and in the Metropolitan Museum, New York.

Rowland (*rō'lănd*), **Henry Augustus (1848-1901),** American physicist, was born at Honesdale, Pa. He was graduated from Rensselaer Polytechnic Institute, Troy, N. Y., in 1870. He then taught chemistry at Wooster, Ohio, and physics at Troy. In 1876, after a brief period of study under Helmholtz at Berlin, he became the first occupant of the chair of physics at Johns Hopkins University, a position which he filled with distinction until his death, taking rank among the greatest physicists of the 19th century.

Among Rowland's important contributions to science are his determination of the mechanical equivalent of heat and of the ohm, his discovery of the magnetic effect of electric convection, and especially his researches in spectroscopy, leading to his discovery of the principle of the diffraction grating.

Rowlandson, Thomas (1756-1827), English caricaturist, has been regarded as a continuator of Hogarth, though his drawings do not emphasize moral lessons and his depiction of the contemporary scene usually takes the form of political cartoons rather than sketches expressing social satire. He is remembered especially for his illustrations of *Dr. Syntax's Three Tours*, Sterne's *Sentimental Journey*, the novels of Smollett, and *The Travels of Baron Munchausen.*

Royce, Josiah (1855-1916), American philosopher, was born at Grass Valley, Cal. After he was graduated from the University of California and Johns Hopkins University, he was instructor in English literature and logic in the University of California. He was then at Harvard University from 1882 until his death.

Royce became one of the foremost American metaphysicians. He developed a philosophy of idealism in which emphasis is placed on individuality and upon will rather than upon intellect. The key to his system of ethics was loyalty, which in its ultimate form was loyalty to the world of individuals. His philosophical writings include *Religious Aspect of Philosophy, The Spirit of Modern Philosophy, The Conception of Immortality, Studies of Good and Evil, Outlines of Psychology, Herbert Spencer, Philosophy of Loyalty*, and *Sources of Religious Insight.*

Royden, Agnes Maude (1876-), English preacher and social worker. She engaged in social work in Liverpool and gave extension lectures on English literature for Oxford University prior to 1908, when she began active support of the woman suffrage movement. She edited its organ, *The Common Cause*, until 1914. In 1917, she was appointed preacher at the City Temple, London. Later she organized and conducted fellowship services, through which she became one of the most influential exponents in England of the social gospel. Her publications include *Women and the Sovereign State, Sex and Common-sense, Political Christianity*, and *Here and Hereafter.*

Rubens, Peter Paul (1577-1640), Flemish painter, was born at Siegen, Prussia. He was educated at the Jesuit College in Antwerp. He was intended for the law, but he was allowed to enter the studio of Otto Van Veen about 1596.

In the spring of 1600, Rubens set out for Italy, where he spent eight years at Venice, Mantua, Rome, Florence, and Genoa and painted numerous pictures. He was especially attracted by the Venetian colorists. At Mantua, he was appointed court painter, and here he became familiar with the manners of courts.

In 1608, he returned to Antwerp and accepted the title of official painter to Archduke Albert. The next year, he married Isabella Bran. With the exception of the months occupied by embassies to Spain and England and some other short journeys, he dwelt in Antwerp the rest of his life.

His colorful "Adoration of the Magi" was followed in 1612 by his acknowledged masterpiece, "The Descent from the Cross." At this time, he was also teaching extensively and collaborating with Breughel and Frans Snyders. In 1621, he received a commission from Marie de' Medici to adorn the Luxembourg Palace at Paris. He visited Philip IV of Spain on a diplomatic mission in 1628. Here he met Velasquez and renewed his study of Titian, who so greatly influenced his later works. In 1630, his wife, Isabella, died, and he married Helena Fourment, whose features he never tired of painting. In 1635, he designed the decorations that celebrated the entry of the infant Ferdinand into Antwerp, and, in 1639, he completed the "Crucifixion of Peter."

In extent of range Rubens is unrivaled; history, portrait, landscape under the aspect of every season, animal life in every form—all are familiar to him. In addition to his paintings, he etched a few plates and made some designs for printers, silversmiths, and tapestry weavers. Rubens wanted only a purer style in designing the human form to have been a perfect, as well as a universal, painter. After a career marked by all the distinction that fame, riches, and universal admiration could bestow and distinguished in the triple character of painter, diplomatist, and man, Rubens died at Antwerp. See *Painting.*

Rubinstein (*rōō'bĭn-stīn*), **Anton (1829-1894),** Russian pianist and composer, was born in Russian Bessarabia. In 1840 he entered the Paris Conservatory, soon attracting the attention of Chopin and Liszt. In 1844, he began the study of composition under Dehn at Berlin. In 1848, he settled in Leningrad, studying and writing music. He founded the Leningrad Conservatory of Music in 1862 and remained its director until 1867. As a pianist he was Liszt's only rival and ranks as one of the world's greatest masters. His compositions include the operas *Ivan the Terrible, Feramors, Nero*, and *The Demon*; and the oratorios *Paradise Lost* and *The Tower of Babel.*

Rudolf I, or **Rudolph (1218-1291),** founder of the Habsburg dynasty, was born at Limburg. He was the son of Albert IV, Count of Habsburg and landgrave of Alsace, whom he succeeded in 1239. Partly by inheritance and partly by seizure, he acquired large estates in what is now Alsace and Switzerland, and became the most powerful prince in southwest Germany. In 1273, the electors chose him king of Germany, the first monarch of the Habsburg line.

Rumford, Benjamin Thompson, Count (1753-1814), American physicist, was born at Woburn, Mass. He began the study of medicine at 13 and later taught school. Accepting an appointment in the militia from the English governor, he innocently incurred the distrust of the colonists. Although acquitted of all charges of disloyalty, he left America in 1776 for England, where he rose to high place in the British foreign office, made notable scientific experiments, and became a fellow of the Royal Society.

In 1785 Rumford entered the service of the elector of Bavaria at Munich, where he inaugurated important reforms and reorganized the army. For these valuable services he was made minister of war and Count of the Holy Roman Empire. Returning to England in 1795, he made notable experiments on heat, which he was the first to recognize as a mode of motion.

With Sir Joseph Banks, in 1799, Rumford founded the Royal Institution. About 1802 he located in Paris. He founded, and was the first to receive, the Rumford medal of the Royal Society; he also established the Rumford professorship at Harvard.

Ruskin, John (1819-1900), English author, art critic, and social reformer, was born at London. He studied at Christ Church, Oxford, where he gained the Newdigate prize for English poetry in 1839 and took his degree in 1842. In the year following appeared the first volume of his *Modern Painters*, whose aim was to prove the superiority of modern landscape painters, especially Turner, to the old masters.

In 1849 appeared *The Seven Lamps of Architecture* and, in 1851-53, *The Stones of Venice*, both being efforts to introduce a new and loftier conception of the significance of domestic architecture. They were exquisitely illustrated by the author himself. At this time Pre-Raphaelitism

began to develop as a distinctive phase of modern art, and Ruskin warmly espoused its cause.

About 1860 Ruskin became deeply interested in social problems and published *Unto this Last* and *Munera Pulveris*. Among his later works are *Sesame and Lilies, The Ethics of the Dust, The Crown of Wild Olive*, and *Præterita*, a charming autobiography. In 1870, he became professor of art at Oxford. Ruskin did much to increase the appreciation of the beautiful in nature and in art.

Russell, Bertrand Arthur William, Earl (1872-), English mathematician and philosopher, was born at Trelleck, England. He was educated at Cambridge University, where he remained as lecturer and fellow until 1916. In that year, he was deprived of his appointment on account of his pacifist views and his opposition to World War I and was imprisoned for six months. He was visiting professor of philosophy at the universities of Chicago and California in 1938 and 1939.

His philosophy, designated as logical atomism, stresses the importance of the individual. In his publications he brought a clear and trenchant style to bear in criticism of social institutions. He received the 1950 Nobel prize for literature.

Rutherford (*rŭTH'ĕr-fĕrd*), **Ernest Rutherford, Baron** (**1871-1937**), British physicist, was born in Nelson, New Zealand. He was educated at Nelson College, Canterbury College, New Zealand University, and the University of Cambridge. He became professor of physics at McGill University, Montreal, in 1898 and at the University of Manchester in 1907. In 1919, he was made a fellow of Trinity College, Cambridge. Rutherford formulated the theory of the atomic nucleus, about which electrons revolved. He produced hydrogen by bombarding atoms of nitrogen with helium particles, thus transforming one element into a different one. In 1908, he received the Nobel prize for chemistry.

Rutledge, Wiley Blount (**1894-1949**), American jurist, was born at Cloverport, Ky. He was educated at the universities of Wisconsin and Colorado. He practiced law in Colorado, and taught in Washington University and the University of Iowa. After serving on the bench of the United States Court of Appeals for the District of Columbia from 1939, he was appointed in 1943 associate justice of the United States Supreme Court.

Ruysdael (*rois'dāl*), **Jacob** (**c. 1628-1682**), Dutch painter, was born at Haarlem and about 1657 removed to Amsterdam. He traveled in various parts of the Netherlands, also in Germany and Switzerland. While given scant recognition during his lifetime, he now ranks among the greatest Dutch painters of landscape. Excellent examples of his work are found in the Metropolitan Museum, New York.

Ryan, Abram Joseph (**1839-1886**), known as "Father Ryan," American priest and poet, was born at Norfolk, Va. Soon after his ordination he was made chaplain in the Confederate army and served throughout the war. His lyrics of the conflict, *The Deathless Dead, The Sword of Lee*, and especially *The Conquered Banner*, became well known.

Ryan, John Augustine (**1869-1945**), American theologian, was born in Dakota County, Minn. On being graduated from St. Paul Seminary in 1898, he was ordained a Roman Catholic priest and made professor of moral theology and economics there. In 1915, he accepted the professorship of political science at Trinity College, Washington D. C., and lectured later also on moral theology and industrial ethics at the Catholic University in Washington. He interested himself deeply in social and industrial problems and the application of Christian principles to them but took a strong position against Socialism. He wrote *A Living Wage, Distributive Justice, The Church and Labor*, and *Social Doctrine in Action: A Personal History*.

Saarinen, Eero (**1910-**) American architect, was born at Kirkhonummi, Finland, son of the famous Finnish architect and city planner Eliel Saarinen. He was brought to America in 1923, when the elder Saarinen joined the Cranbrook Foundation at Bloomfield Hills, Mich., where he taught in the Art Academy and designed many of the school buildings and faculty houses. The younger Saarinen was graduated from the Yale School of Architecture in 1934, and then spent two years abroad on a traveling fellowship. Not long after his return to the United States, he became associated with his father in many architectural projects. Like his father, Eero Saarinen is an exponent of the school of modern architecture. Notable among his many works are the $100-million, 25-building General Motors Technical Center near Detroit, and the auditorium and the cylindrical brick chapel on the campus of the Massachusetts Institute of Technology.

Saarinen, Eliel (**1873-1950**), architect and educator, was born in Finland. Before coming to America, in 1923, he had become well known for his work on the Finnish pavilion at the Paris World's Fair, and for his design of the National Museum at Helsinki. A book, *Munksnas-Haga*, which he wrote while still in Finland, contained advanced ideas on city planning. Some of his ideas found expression in the group of art school buildings at Cranbrook, Mich. In addition to teaching at the Cranbrook School, he designed a number of churches and museums.

Saavedra Lamas (*sä-vä'drä lä'mäs*), **Carlos** (**1880-**), Argentine statesman, was born in the city of Buenos Aires of a wealthy family. After attending a Jesuit School there, he studied in Paris and traveled extensively. He endowed a chair of labor legislation in the University of Buenos Aires and was its first incumbent. In 1932, when General Justo made himself president of Argentina, Saavedra Lamas was chosen foreign minister, a post which he utilized in the furtherance of peace. His efforts resulted in the armistice of 1935 in the Chaco war between Paraguay and Bolivia. The Pan-American Peace Conference of 1936, suggested by President Roosevelt and called by Argentina at Buenos Aires, chose Saavedra Lamas as its chairman shortly after he had received the 1936 Nobel peace prize.

Sabin, Florence Rena (**1871-**), American anatomist, was born at Central City, Colo. She was graduated from Smith College in 1893 and later studied at Johns Hopkins University, from which she received in 1900 the degree of doctor of medicine. She was associate professor of anatomy at Johns Hopkins University from 1902 to 1917, when she became professor of histology. In 1925, she joined the staff of the Rockefeller Institute. Her brilliant researches on the lymphatic system, the origin of blood cells, and also the physiology of blood vessels entitle her to rank among the foremost scientists of the day.

Sacagawa (**1787?-1812**), Shoshone Indian woman who served as guide to the Lewis and Clark expedition, was born probably in what is now eastern Montana near the headwaters of the Missouri River. She was captured as a child by the Minnetaree Indians and was sold as a slave to a Frenchman. Accompanied by her French husband and carrying a papoose on her back, she walked at the head of the Lewis and Clark forces, guiding them over difficult trails and obtaining food for them from friendly Indian tribes with whom she knew how to deal.

Sachs (*zäks*), **Julius von** (**1832-1897**), German botanist, was born at Breslau. In 1868, he became professor of botany at Würzburg. He retained this chair for the remainder of his life, a period of nearly 40 years. He made important experiments in plant physiology, especially in determining the influence of light and heat upon plants and in investigating organic activities of vegetable growth. He wrote extensively on botany, and is considered the founder of experimental plant physiology.

Sackville-West, Victoria May Pepita (**1892-**), English novelist and poet, was born at Knole Castle, Sevenoaks, Kent. She married Harold Nicholson, the novelist, in 1913 and traveled extensively with him in Iran, Morocco, and other countries. Her novels show familiarity with the English aristocracy to which she belonged. Her books include *The Edwardians, All Passion Spent, The Dark Island, Saint Joan of Arc*, and *Solitude*.

Sage, Russell (**1816-1906**), American capitalist, was born at Shenandoah, N. Y. He was educated in the public schools. After several years as errand boy and grocer's clerk he held an interest in a wholesale grocery in Troy, 1839-57. He was a member of Congress, 1853-57. In 1863, he removed to New York, purchased a seat on the stock exchange in 1874, and thereafter was known as a financier, closely associated with Jay Gould in extensive railway operations. His fortune, estimated at more than $50,000,000, was bequeathed unconditionally to his wife.

St. Denis, Ruth (**1880-**), dancer and teacher, was born at Newark, New Jersey. She had rather limited schooling but showed talent and enthusiasm which led her to enter upon a career as a professional dancer. After spending two years in Europe, chiefly in Germany, she went to Los Angeles, where she and her husband "Ted" Shawn founded the Denishawn School of Dancing. Together they toured the Orient and made many tours of the United States, giving exhibitions of dancing. In the 1920's, they moved their school to New York. They built "Denishawn House" in Van Cortlandt Park, a building designed especially for dance exhibitions. Upon retirement from teaching, Miss St. Denis devoted much time to lecturing and writing. Her revealing autobiography entitled *Unfinished Life* contains a review of her long career, with reminiscences of prominent associates and with observations on the artistic significance of the dance.

Sainte-Beuve (*sănt'bûv'*), **Charles Augustin** (**1804-1869**), French literary critic, was born at Boulogne sur Mer. He chose medicine as a profession and for some years studied at Paris. In 1827, he became acquainted with Victor Hugo, whose influence drew him into the romantic movement and determined for him a literary career. In 1828, he published a critical work on French poetry of the 16th century, two volumes of poetry in 1829-30, and a psychological novel, *Volupté*, in 1834. He received an appoint-

ment in the Mazarin Library, Paris, 1840, in which year he began a history of the Jansenists, published as *Port Royal*. From 1849 to 1869 he wrote his famous *Causeries du lundi* and *Portraits contemporains*, which, for variety of human interest, critical insight, and breadth of sympathy, remain unsurpassed.

Saint-Gaudens (*sānt-gô'dĕnz*), **Augustus (1848-1907)**, American sculptor, was born in Dublin, Ireland, and was brought to the United States in infancy. During 1861-66 he was a student at Cooper Institute and at the Academy of Design, New York. He then went to Paris and studied under Jouffroy at the Ecole des Beaux-Arts.

Beginning with the statue of Farragut in Madison Square, New York, 1880, Saint-Gaudens executed many notable works which gave him foremost rank among American sculptors. His "Lincoln" in Lincoln Park, Chicago, is considered by many the finest portrait statue in the United States. The Shaw Memorial on Boston common, regarded by many as Saint-Gaudens's masterpiece, ranks among the best relief sculptures of the 19th century. Other important works are the statue "Deacon Chapin," called also "The Puritan," in Springfield, Mass.: the memorials to Dr. Bellows and Dr. McCosh at Princeton; and the equestrian statues of General Sherman, New York, and of General Logan, Chicago.

The ideal sculptures of Saint-Gaudens, distinguished for refinement of design and poetic feeling, include "Amor Caritas," in the Luxembourg, Paris; "Peace of God," in Rock Creek Cemetery, Washington; and "Diana," formerly on the tower of Madison Square Garden, New York, since removed to Fairmount Park, Philadelphia. In low relief sculpture, Saint-Gaudens stands pre-eminent in America. He was one of the seven original members of the American Academy of Arts and Letters. He was elected to the American Hall of Fame, 1920. See *Sculpture*.

Saint-Pierre (*sĂN'pyâr'*), **Jacques Henri Bernardin de (1737-1814)**, French writer, was born in Havre. He entered the army as an engineer, but was dismissed; and for some years thereafter led an adventurous life in different countries of Europe. In 1768 he went to Mauritius. On returning to France, 1771, he published an account of his voyage and several other works. He is best known for the story *Paul and Virginia*, which has been translated into many languages. See *Paul and Virginia*.

Saint-Saëns (*sĂN'sĂNs'*), **Charles Camille (1835-1921)**, French composer and organist, was born at Paris. At the age of 12 he entered the Paris Conservatory, at 18 was made organist of the church of Saint-Merri, and, from 1858 to 1877, was organist at the Madeleine. After 1870, he devoted himself chiefly to composition. His works include the operas *La princesse jaune*, *Le timbre d'argent*, *Etienne Marcel*, *Henry VIII*, *Les barbares*, *Parysatis*, *Hélène*, and *L'Ancêtre*; the sacred drama *Sampson et Dalila*; the widely known symphonic poems *Le Rouet d'Omphale*, *Phaéton*, *La danse macabre*, and *Jeunesse d'Hercule*; also symphonies, chamber music, and much piano and vocal music. In 1915, he was guest conductor of concerts at the Panama-Pacific Exposition, composing the fantasia *Hail, California*. See *Sampson and Delilah*.

Saint-Simon, Claude Henri de Ruovroy, Comte de (1760-1825), French socialist, was born in Paris. He fought in the American Revolutionary War, was imprisoned during the Terror in Paris, and later amassed a fortune in land speculation, which he dissipated in projects designed for improvement of mankind. He advocated the adoption of a social system which industrialists and scientists should control by ownership of the means of production and should administer to abolish poverty. He founded a sect which continued until 1832 and prepared the way for the socialism of Marx and others.

Saionji (*sī-ôn-jē*), **Kinmochi, Prince (1849-1940)**, Japanese statesman, was born at Kyoto, of a noble family. He was educated at the University of Paris. In 1880, he entered the diplomatic service and became envoy at Vienna, 1885, and at Berlin, 1887. From 1892 to 1896, he served as minister of education and as acting foreign minister. He was made premier in 1906 and again in 1911. In 1919, he represented Japan as chief envoy to the Peace Conference at Versailles. He was made prince in 1920 in recognition of his services in connection with World War I. He was the last surviving member of the group of elder statesmen who guided Japan through the transition period from feudal to national state.

Saladin (*săl'ă-dĭn*), or **Salah-ed-Din (1138-1193)**, sultan of Egypt, was born at Tekrit, of Kurdish parents. He was one of the great conquerors of his time. In 1187, he defeated the Christians at Hittin, afterward storming and capturing Jerusalem. He was, however, defeated by Richard Cœur de Lion in 1191. The valor and magnanimity of Saladin are the subject of praise in Eastern writings and in the Christian chronicles of the Crusades.

Salazar, Antonio de Oliveira (1889-), premier of Portugal. A Jesuit destined for the priesthood, he became professor of economics at Coimba University. At a time of crisis he came into the government as minister of finance, balanced the budget, and set up a rigid system of controls. He has often been referred to as a dictator and a fascist, but he has been commended for skillful handling of delicate problems of neutrality and foreign trade.

Salisbury (*sôlz'bĕr-ĭ*), **Robert Arthur Talbot Gascoyne-Cecil, Marquis of (1830-1903)**, British statesman, was born at Hatfield, England. He was graduated from Christ Church, Oxford, in 1849. He sat in Parliament for Stamford, 1853-68; was secretary for India, 1866-67, and again, 1874-76. In 1878, he was appointed foreign secretary. He was prime minister with two interruptions from 1885 to 1902.

Salk, Jonas E. (1914-), bacteriologist, was born in New York City. He was graduated from the College of the City of New York in 1934 and from the Medical School of New York University in 1939. In 1942 he went to the University of Michigan to study bacteriology and to work on the development of influenza vaccines. In 1947 he was named head of the new University of Pittsburgh virus research laboratory, where he succeeded in producing an improved influenza vaccine.

Following the discovery in 1949 by Dr. John F. Enders of Harvard, the 1954 Nobel prize winner, that poliomyelitis virus is capable of being grown in cultures of different tissues in test tubes, Dr. Salk saw the possibility of producing an anti-poliomyelitis vaccine. Working under a grant received in 1949 from the National Foundation for Infantile Paralysis, he developed a vaccine that was ready for testing on humans in 1952. Mass tests on an increasing scale followed, and on April 12, 1955, scientists at the University of Michigan announced the success of the inoculations. Of a cherry red color, the vaccine, which was administered in injections of one cubic centimeter each, contained a polio virus treated with formaldehyde until it remained only active enough to develop antibodies against polio infection. Since the vaccine was developed under a grant from the National Foundation for Infantile Paralysis, it was not patented and Dr. Salk derives no personal gain from its use.

Sallust (*săl'ŭst*), or **Gaius Sallustius Crispus (86 B.C.-34 B.C.)**, Roman historian, was born at Amiternum. He rose from a plebeian to a senator, but was expelled from the Senate in 50 B. C. probably because of an intrigue with the wife of Milo. Cæsar restored him to his seat and made him successively quæstor, prætor, and governor of Numidia. In the office of governor, he amassed an enormous fortune. On his return to Rome, he built a palace on a site still known as Sallust's Garden and began writing.

With the exception of some fragments, his *History of the Roman Republic* is lost; but his masterly *History of the Jugurthine War* and the *Conspiracy of Catiline* are extant.

Sampson, William Thomas (1840-1902), American naval officer, was born at Palmyra, N. Y. He was graduated from Annapolis in 1861. He served six years as instructor at Annapolis, commanded successively the *Swatara*, *San Francisco*, and *Iowa*, and then became chief of the bureau of ordnance. On the outbreak of the war with Spain in 1898, he was placed in command of the North Atlantic squadron. When the Spanish fleet under Cervera took refuge in the harbor of Santiago de Cuba, Sampson established a close blockade, resulting in the destruction of the Spanish fleet when it attempted to escape from the harbor, July 3, 1898.

Sand, George (1804-1876), is the pen name of Amantine Lucile Aurore, Baroness Dudevant, née Dupin, French author, who was born at Paris. After receiving a conventual education, she married M. Dudevant in 1822, but separated from him in 1831. She then settled in Paris and began a literary career that brought her both fame and fortune. Among her friends were Alfred de Musset, Chopin, Liszt, Balzac, and Lamennais. Of her numerous works the best-known are *Indiana*, *Valentine*, *Rose et Blanche* (written in conjunction with Jules Sandeau), *Lelia*, *La Comtesse de Rudolstadt*, *Consuelo*, *Jacques*, *Mauprat*, *La mare au diable*, *François le Champi*, *La petite Fadette*, and *Jean de la Roche*.

Sandburg, Carl (1878-), American poet and biographer, was born at Galesburg, Ill. He was educated at Lombard College in his native city. Devoting himself to secretarial and editorial work, he was secretary to the mayor of Milwaukee, 1910-12; was assistant editor of the *System* magazine in 1913; and later became an editorial writer for the Chicago *Daily News*. His writings include *Chicago Poems*, *Corn Huskers*, *The Chicago Race Riots*, and *Smoke and Steel*. His poetry is characterized by great vigor. His greatest work, to which he devoted about 30 years, was a biography of Abraham Lincoln in six volumes, completed in 1939. He was elected to the American Academy of Arts and Letters in 1940. His *Collected Poems* was published in 1950, his *New American Songbag* in 1951, and *Always the Young Strangers* in 1953.

Sanger, Margaret (1883-), née Higgins, American reformer, was born at Corning, N. Y. Trained and experienced as a nurse, she came to the conclusion that limitation of families where income was inadequate was a necessary step in social progress. The courts at the time generally interpreted giving of contraceptive information as violations of state or federal laws. After several indictments, Mrs. Sanger obtained a court ruling permitting imparting of such information by physicians for health reasons. She opened the first permanent birth control clinic in New York City in 1923. In succeeding years she founded similar clinics in many foreign countries, and organized also several international conferences on population problems. She coined the term birth control.

Santa Anna (*sän'tä ä'nä*), **Antonio López de (c. 1795-1876)**, Mexican general, was born at Jalapa. In 1810, he entered the Spanish army; in 1821, he joined Iturbide but overthrew him in the following year. Santa Anna was elected governor of the city and province of Vera Cruz in 1822 and in the same year proclaimed a Mexican republic. In 1829, he expelled a Spanish army of invasion.

Santa Anna vigorously opposed the separation of Texas from Mexico. In 1836, he attacked San Antonio, captured the Alamo, and massacred the garrison. A little later, he committed another massacre at Goliad, but soon afterward, at the battle of San Jacinto, he was defeated and made prisoner by General Houston. Promising to acknowledge Texan independence, he returned to Mexico and defended Vera Cruz against the French in 1838. He ruled as dictator till 1841 and president till 1844. In the war against the United States, 1847, Santa Anna took command of the Mexican forces. He was defeated by General Taylor at Buena Vista and by General Scott at Cerro Gordo, and, after the fall of Mexico City, fled to Venezuela. After various periods of exile and recall, he died in Mexico City.

Santayana (*sän'tä-yä'nä*), **George (1863-1952)**, philosopher, was born at Madrid, Spain, and was educated at Harvard University, the University of Berlin, and Cambridge University. He became instructor at Harvard University in 1889, Hyde lecturer at the Sorbonne in 1905-06, and professor of philosophy at Harvard University in 1907. In 1912, he took up his residence in Paris. The by-products of his chief philosophic concern, the relation of reality to experience, resulted in many illuminating studies in literary criticism, esthetics, and morals. His writings are distinguished for their clear, brilliant style and for their broad, human viewpoint. They include *The Life of Reason, Three Philosophical Poets, Character and Opinion in the United States, Scepticism and Animal Faith,* and *The Last Puritan,* a novel.

Santos-Dumont (*sän'tôs'dü'môn'*), **Alberto (1873-1932)**, Brazilian aeronaut and inventor, was born at Sao Paulo, Brazil. He was educated chiefly in France and after the death of his father, a Brazilian coffee planter, resided in Paris. Interested from an early age in the theory of aeronautics, he began experimenting with balloons, making his first ascent in 1897. In 1898, he adapted a gasoline engine and a propeller to an elongated balloon of his own design, the first application of an internal combustion motor to an airship. He made successful flights in 1899, and, in 1901, in his sixth airship, he flew from Saint Cloud to the Eiffel Tower and back in 30 minutes, winning the Deutsch prize of 100,000 francs. When he died he received burial in Rio de Janeiro as a national hero. See *Airship.*

Sappho (*săf'ō*), lyric poetess of Greece, was a native, probably of Mytilene, in Lesbos. She flourished about 600 B. C. and was a contemporary and friend of Alcæus. The ancient writers agree in expressing the most unbounded admiration for her poetry, and the few extant fragments of her work reveal her as a genius of the highest order. Her love poems, mainly addressed to women, are almost unexampled in the intensity of feeling expressed. Her predilection for love poetry probably gave rise to the legend that, upon finding her passionate love for Phaon unrequited, she cast herself into the sea.

Sardou (*sär' dōō'*), **Victorien (1831-1908)**, French dramatist, was born at Paris. He studied medicine, but subsequently turned to literature. He won reputation by *M. Garat* and other pieces produced at the Déjazet Theater, and was admitted to the Academy in 1877. With Augier and the younger Dumas, Sardou dominated the French drama during the Second Empire, and several of his plays are among the most popular on the modern stage. Some, like *La Tosca,* have been made into grand operas; others, such as *Les pattes de mouche,* original of "The Scrap of Paper," *Divorçons,* and *La sorcière,* have become successful on the English and the American stage. Among other well-known plays are *La Taverne, Nos intimes, Candide, Théodora, Cléopâtre, Thermidor, Paméla, Robespierre, Dante, Madame Sans-Gêne, Odette,* and *Fédora.*

Sargent, Charles Sprague (1841-1927), American arboriculturist, was born at Boston. He was graduated from Harvard University in 1862, and, from 1863 to the end of the Civil War, he served in the Federal army. In 1872, he was appointed director of the Arnold Arboretum and, in 1879, was made also professor of arboriculture, Harvard University. He directed the first forest census of the United States, wrote the 14-volume *Silva of North America,* and planned the extensive Jesup collection of woods now in the American Museum of Natural History, New York City. His other writings include *The Forest Flora of Japan* and *Manual of Trees of North America.*

Sargent, John Singer (1856-1925), painter, was born in Florence, Italy, of American parents. He studied painting at the Academy of Fine Arts, Florence, and in Paris under Carolus-Duran. In 1879, he traveled in Spain, studying the work of Velasquez, which greatly influenced his style. He lived in Paris until 1884, when he removed to London.

Sargent ranks as one of the greatest modern portrait painters. His mural "The History of Religion," in the Boston Public Library, is among the most notable works of the kind. Well-known examples of his work are "El Jaleo" in the Boston Museum; "Gitana," "Hermit," "Padre Sebastiano," and portraits of W. M. Chase and Henry Marquand in the Metropolitan Museum, New York; "Carnation Lily, Lily Rose" in the Tate Gallery, London; and "Carmencita" in the Luxembourg. In 1905, he was elected to the American Academy of Arts and Letters.

Sarnoff, David (1891-), American industrial leader, was born at Uzlian, Russia, and was brought to the United States when 9 years of age. In 1906, he entered the employ of the Marconi Wireless Telegraph Co. and became manager of its station at Sea Gate, N. Y. While an operator at John Wanamaker's in New York, in 1911, he came into world-wide notice for continuing at his instrument for 72 hours in order to receive messages from the ill-fated *Titanic,* which had struck an iceberg and was sinking in mid-ocean. He rose rapidly in the radio business and was made commercial manager of the Radio Corporation of America on its formation in 1918, subsequently becoming general manager and, in 1930, president.

Saroyan, William (1908-), American playwright and author of short stories, was born of Armenian immigrant parents at Fresno, Calif. From the publication of his short story, *The Daring Young Man on the Flying Trapeze,* in *Story* magazine, in 1934, he was recognized as a new and different writer, original to the point of eccentricity. Prolific in the production of short stories, he has also been an industrious writer for the stage. His play *The Time of Your Life* received the Pulitzer award and was also chosen by the Critics Circle as best of the 1939-40 season. A by-product of his service in the United States Army in World War II was his satiric novel *The Adventures of Wesley Jackson.*

Sarto (*sär'tō*), **Andrea del (1487-1531)**, Italian painter, was born near Florence. His family name was Vanucchi, but he was named Del Sarto, "the tailor's son," from his father's business. Of numerous frescoes which he painted in Florence the best are "Birth of the Virgin," "Adoration of the Kings," and the "Madonna of the Sack." Among his most celebrated single pictures are the "Assumption," "Madonna of the Harpies," and "Saint John the Baptist." He left many portraits of his wife, Lucrezia, with whom he had fallen in love before the timely death of her former husband. Sarto ranks second only to Michelangelo and Da Vinci in accurate drawings and rivals the great Venetian masters in color. He was called "the faultless painter."

Sartre, Jean-Paul (1905-), French philosopher, novelist, and playwright, was born in Paris. After passing with high honors at the *Ecole Normal Superieure,* he taught for several years at a *lycee* in le Havre. As chief exponent, and in part originator, of the so-called "existentialist" philosophy he has been a storm center in contemporary philosophical and religious circles. Typical of his works are *The Age of Reason, The Chips Are Down, Being and Nonbeing,* and *Existentialism.*

Saud, Abdul Ibn (1880-1953), Arabian military leader and founder of Saudi Arabia, was born at Riyadh, Nejd. Grandson of a deposed sultan of Nejd, Saud recaptured the capital, Riyadh, 1901, in a bold and cunning attack with the aid of 15 followers. As sultan of Nejd and head of the Wauhabi sect, he induced the Arabs in large part to live in settled colonies or villages, stabilized by agriculture, each colony being a division of a standing army. Tribal loyalties were transformed into the closest approach to a national loyalty since the days of Mohammed. With British aid he attacked the Turks during World War I and, in 1924, captured the Hejaz from King Husain, whom British aid in the World War had made powerful. In 1927 he assumed the title of King of Hejaz and Nejd. His rule united all central Arabia in a kingdom which he later named Saudi Arabia.

Saunders, Charles Edward (1867-1937), Canadian botanist and chemist. A graduate of Toronto and Johns Hopkins universities, he spent all his active life working for the Canadian government in connection with experimental farms, becoming chief cerealist for the Dominion

in 1914. He developed many strains of grain which would thrive in the Canadian climate. His greatest discovery was the marquis wheat, which combines excellent quality with early maturity. This wheat soon became the dominant variety in North America. He was knighted in 1934.

Savonarola (*sȧv'ô-nȧ-rō'lȧ*; It., *sä'vô-nä-rō'lä*), **Girolamo (1452-1498)**, Italian preacher and reformer, was born at Ferrara. He became a Dominican monk in 1475, and, in 1482, he removed to Florence, where, in 1491, he was made prior of Saint Mark's. Toward the close of the 15th century, he led the democratic party in Florence and effected important reforms. He held that the mortal enemy of Christ's gospel in all ages of the world has been mammon. Accordingly, he boldly denounced the abuses of the time, the licentiousness of the great, and the corruptions of the Church. He aroused the enmity of the Arrabbiati, the party of the Medici. In 1497, Savonarola was excommunicated by the pope and, in 1498, was arrested and put to death.

Sayers, Dorothy Leigh (1893-), English novelist and translator, was one of the first women to obtain an Oxford degree. Her detective stories, such as *Murder Must Advertise* and *The Nine Tailors*, show great literary skill as well as cleverness of plotting. She has also gained wide recognition for her anthologies, or "omnibuses," of crime, known as *Great Short Stories of Detection, Mystery and Horror*. Recently she has concentrated her attention on the writing of religious dramas and on the translation of Dante's *Divine Comedy*. *The Inferno* (1949) and the *Purgatorio* (1955) have both been published in popular editions.

Scaliger (*skȧl'i-jẽr*), **Joseph Justus (1540-1609)**, French classical scholar, was born in Guienne. He was educated at Bordeaux. In 1593, he was made professor of literature at Leiden. In his treatise, *De Emendatione Temporum*, he laid down for the first time a complete system of chronology formed upon fixed principles. He was master of many languages and was recognized as one of the great scholars of his time.

Schacht, (Horace Greeley) Hjalmar (1877-), German banker, was born at Tingleff, Schleswig. After specializing in economic studies at leading German universities, he secured a position in a bank. The character of his work so impressed his superiors that he was made director of the Darmstader bank in 1916. When currency inflation had rendered Germany's money worthless in 1923, Schacht was given full power to establish a new currency His success led to his selection as president of the Reichsbank and as Germany's chief negotiator in the matter of reparations.

Hitler found his services at first no less indispensable than did the earlier republican regime. He financed the rearmament program, but was removed as finance minister in 1937, and as head of the Reichsbank in 1939. He was tried by the Nuremberg tribunal as a war criminal but was acquitted, October 1946.

Scheele (*shā'lē*), **Karl Wilhelm (1742-1786)**, Swedish chemist, was born at Stralsund, Pomerania. In 1770 he settled in Upsala. He made many important chemical discoveries, among which were tartaric acid, 1770; oxygen (independent of Priestley), chlorin, and baryta, all in 1774; prussic acid, 1782; and glycerin, 1784. He discovered also the arsenite of copper, commonly known as Scheele's green.

Schelling (*shĕl'ĭng*), **Friedrich Wilhelm Joseph von (1775-1854)**, German philosopher, was born in Württemberg. He was educated at Tübingen and at Leipzig. In 1798, he succeeded Fichte as teacher of philosophy at Jena; in 1803 he became professor at Würzburg, later at Erlangen and Munich, and, in 1841, he was called to the University of Berlin. In philosophy he began as a follower of Fichte and of Hegel, but he was later influenced by Spinoza and Böhme and adopted a philosophy recognizing purpose as a guiding principle in the universe. His works include *Inquiry into the Nature of Human Freedom, On the Possibility of Any Form of Philosophy, Philosophy of Nature*, and *The World Soul*.

Schiaparelli, Elsa, coutourière, was born in Italy, the daughter of a professor who was Dean of the University of Rome. Her education was obtained partly at a convent in Switzerland, partly at a school in England. Having established a salon and won success as a designer of clothes in Paris during the 1930's, she became a "style refugee" in the United States following the invasion of France by the Nazis. Her lectures on *Clothes and the Woman* helped to raise money for the relief of unemployed Parisian workers in the clothing industry. In addition to creating original designs, she has written many magazine articles on style. Her autobiography, *Shocking Life*, gets its startling and somewhat misleading title from the name of her most famous perfume.

Schiller, Ferdinand Canning Scott (1864-1937), Anglo-American philosopher. Educated at Oxford University, he taught philosophy at Cornell University, 1893-97, returning then to Oxford, where he taught until 1927. In 1929, he was appointed professor of philosophy in the University of Southern California. He developed a philosophy, which he called humanism, centering in the proposition that man is the measure of all things. In addition to philosophical works, which include *Riddles of the Sphinx, Logic for Use*, and *Must Philosophers Disagree?*, he wrote *Tantalus, or the Future of Man* and *Cassandra, or the Future of the British Empire*.

Schiller, Johann Christoph Friedrich von (1759-1809), German poet and dramatist, was born at Marbach, Württemberg. In his ninth year he was sent to school at Ludwigsburg. He early preferred nature to books. At first he was destined for the clerical profession, but this was abandoned upon his entrance to the academy in Stuttgart in his 14th year. He began the study of law, which he soon changed for that of medicine, but both were uncongenial.

In 1780, he was appointed by the Duke of Württemberg as surgeon in a regiment. The whole bent of his inclinations, however, was toward literature. The next year, he brought out *The Robbers*. This drama was a daring defiance of the artificial restraints of civilization; it was the natural rebound of his mind from what he felt to be the cramping influences of school. Schiller was present without leave at its presentation. Afterward, being arrested and condemned by the duke to write nothing but medical treatises, he escaped from Württemberg and wandered from place to place until the duke's anger subsided.

Being allowed later to reside where he pleased, Schiller went to Mannheim, where, in 1783, he was appointed poet of the theater. Here he produced his dramas *Fiesco* and *Intrigue and Love*. He strove incessantly to improve himself in dramatic art and to render the theater of Mannheim an instrument of national instruction. At this time, he was raised to the rank of councilor to the Duchy of Weimar.

Shortly afterward, he left Mannheim, and then followed another period of wandering. He stopped at Leipzig. Disappointed in love, he gave up his intention of devoting himself to a professional calling. He removed to Dresden, where he completed his historical *Don Carlos* in 1787. After two years, he shifted his residence to Weimar, then the intellectual capital of Germany; and here he met Charlotte von Lengefeld, whom he married in 1790. He was appointed in 1789 to the office of professor of history at Jena, following his publication of *Revolt of the Netherlands*. His *History of the Thirty Years' War* appeared in 1792. Both reveal a marked genius for the effective handling of facts.

From 1791 to 1799, Schiller resided principally at Jena, though incapacitated by ill health for the active duties of his professorship. During these years of pain, he executed his greatest achievements. In 1799, he completed *Wallenstein*, perhaps his greatest work and regarded by many as the finest tragedy in the German language. A period of happy intimacy with Goethe at Weimar followed in 1799-1805, during which he produced *The Maid of Orleans, The Bride of Messina, Mary Stuart*, and some minor poems. In 1804, he wrote *William Tell*, the most popular of his dramas.

Schiller has long been recognized as second only to Goethe in German literature and, in some ways, even surpassing him. As a poet, he is characterized by strong feeling and intense idealism. He stands foremost among German dramatists, and ranks among the greatest of all writers of drama. See *William Tell*.

Schleiermacher (*shlī'ĕr-mä'kĕr*), **Friedrich Ernst Daniel (1768-1834)**, German philosopher and theologian, was born at Breslau. He was educated at the Moravian schools of Niesky and Barby and studied philosophy and theology at Halle. His first important literary work, *Discourses on Religion*, appeared in 1799. He was professor at Halle, 1804-06, and, in 1810, became first dean of the theological faculty at the University of Berlin. In 1811 appeared his *Brief Outline of the Study of Theology*; in 1817, his *Critical Essay on the Writings of Luke*; and, in 1821-22, his greatest work, *Christian Faith*. Schleiermacher exercised a great influence through his theory that science can be reconciled with theology.

Schlesinger, Arthur Meier (1888-), American historian and essayist, was born at Xenia, Ohio, and received his education at Ohio State and Columbia universities. In his writing and research, he has given special attention to the social history of the United States. After teaching for several years at the state universities of Ohio and Iowa, he was appointed Professor of History at Harvard University. Examples of his popular essays on history are his books, *Paths to the Present* and *The American as Reformer*. Earlier works more in the nature of textbooks are *The Colonial Merchants and the American Revolution* and *Political and Social History of the United States*.

Schley (*slī*), **Winfield Scott (1839-1911)**, American naval officer, was born near Frederick, Md. He was graduated from the United States Naval Academy in 1860, served in West Gulf blockading squadron in 1862-63, and was in the engagements leading to the capture of Port Hudson,

La., in 1863. In 1884, he took command of the relief expedition which rescued Lieutenant Greely and six survivors of an ill-fated attempt to reach the North Pole. In the war with Spain he was in immediate command at the destruction of Cervera's fleet off Santiago, July 3, 1898. Despite the victory, a court of inquiry later found him guilty of negligence but no action was taken as a result. He wrote *Rescue of Greely* and *Forty-five Years under the Flag.*

Schnitzler (*shnĭts'lĕr*), **Arthur (1862-1931),** Austrian dramatist, was born in Vienna. He was graduated from the university of his native city in 1885 and devoted himself to the practice of medicine and to literature. He possessed high technical skill, treated his themes with grace and charm, and excelled in the one-act play and sketch. Of his numerous plays, some of the best-known are *Anatol, The Legacy, The Green Cockatoo, Paracelsus, The Companion, Living Hours, The Woman with the Dagger, Professor Bernhardi, Playing with Love,* and *Countess Mizzi.*

Schopenhauer (*shō'pĕn-hou'ĕr*), **Arthur (1788-1860),** German philosopher, was born at Danzig. He studied at Göttingen, Berlin, and Jena. He spent the winter of 1813 at Weimar, where he enjoyed the society of Goethe. In 1819, he published his greatest work, *The World as Will and Idea.* Having lived in Berlin lecturing intermittently from 1820 to 1831, he removed to Frankfort on the Main and thereafter devoted himself uninterruptedly to the elaboration of his philosophical system. Schopenhauer developed the view that reality is a blind force expressing itself through individuals as the will to live, pain is the only positive feeling, and the sole relief from unhappiness is absence of desire. He became known as the philosopher of pessimism.

Schubert (*shōō'bĕrt*), **Franz Peter (1797-1828),** Austrian composer, the son of a poor schoolmaster, was born at Vienna. At 11 he became a singer in the court choir and later leading violinist in the school band. At 14 he began writing songs and at 18 his supreme gift of lyric melody was revealed in "The Erlking," one of the world's most dramatic songs, written by him in a single day. His brief life, spent chiefly in the drudgery of teaching, was harassed by pecuniary embarrassment and embittered by the slow recognition accorded to his work. Schubert's fame rests upon his songs, some 600 in number, which constitute an imperishable monument to his genius. He originated the modern artistic song (*Kunstlied*) of which he still remains the unsurpassed master. He wrote also 8 symphonies, several of which, notably the so-called "Unfinished symphony," are among the world's greatest.

Schuman, Robert (1886-), French politician, was born and spent his early life in Lorraine. He practiced law in Metz, and was elected to the Chamber of Deputies in 1919. During the German occupation he was deported, but escaped and took part in the resistance movement. Re-elected to the Chamber of Deputies as a member of the popular republican movement, he was appointed minister of finance, and became premier in November 1947. His policy of drastic financial reform finally resulted in his defeat in July 1948. He was minister of foreign affairs from 1948 to 1953.

Schumann, Robert (1810-1856), German composer, was born in Zwickau. He was educated at Heidelberg and studied music under Wieck at Leipzig. In 1834, he founded the *Neue Zeitschrift für Musik,* which under his editorship greatly influenced musical progress. In 1840, he married the pianist Clara Wieck, whose brilliant interpretations did much to establish his fame throughout Europe. While Schumann's early compositions were chiefly for the piano, he produced between 1840 and 1854 nearly 250 songs. During this time he wrote also his celebrated piano quintet; the choral work *Paradise and the Peri;* the opera *Genoveva;* symphonies; and various other works.

Schumann-Heink (*shōō'măn-hĭngk'*), **Ernestine (1861-1936),** nee Roessler, dramatic contralto, was born at Lieben, Bohemia. She studied at Graz and made her debut at Dresden, 1878, as Azucena in *Il Trovatore;* sang in Dresden four years and, in 1883, went to Hamburg. In 1896, she sang at Bayreuth in *Der Ring des Nibelungen.* In 1926, at 64, she appeared in *Das Rheingold* with the Metropolitan Opera Company.

Schurz (*shōōrts*), **Carl (1829-1906),** American political leader and soldier, was born near Cologne, Germany. He was educated at the University of Bonn and began the publication of a Liberal newspaper. He took part in the revolutionary movement of 1848 and joined the revolutionary army, but was finally forced to flee to Switzerland.

Schurz came to the United States in 1852, settled at Watertown, Wis., in 1856, and, at the outbreak of the Civil War in 1861, he joined the Union army. He commanded a division at Chancellorsville and a corps at Gettysburg. After the war he engaged in journalistic work and in 1867 became editor of the Saint Louis *Westliche Post.* From 1869 to 1875, he was United States senator from Missouri.

An orator and writer of marked ability and an indefatigable advocate of political reform, Schurz for a quarter of a century was a prominent figure in American public life. His writings include *Life of Henry Clay, Abraham Lincoln,* and *Reminiscences.* In 1905, he was elected a member of the American Academy of Arts and Letters.

Schwab (*shwäb*), **Charles Michael (1862-1939),** American capitalist, was born in Williamsburg, Pa. He was educated in the village school and at Saint Francis College. He entered the service of the Carnegie Company as stake driver in the engineering corps and rose steadily. He was superintendent of the Homestead works, 1892-97; president of the Carnegie Steel Company, limited, 1897-1901, and president of the United States Steel Corporation, 1901-03. He then became president and manager of the Bethlehem Steel Corporation. Early in 1918, Schwab was made director general of the shipbuilding board of the emergency fleet corporation and devoted his efforts to speeding up shipbuilding until the end of the war. He then returned to the Bethlehem Steel Corporation.

Schweitzer, Albert (1875-), theologian, philosopher, musician, missionary, and physician, was born in Alsace. A musical prodigy, his studies under Widor paved the way for his authoritative writings on Bach and the organ. He delved deeply into theology and wrote several religious works, best-known of which is *The Quest of the Historical Jesus.* He also became an authority on Kant's philosophy. After he had mastered these fields he took up the study of medicine to prepare himself for work as a medical missionary. In the midst of a busy life caring for native patients in his hospital at Lambaréné, in French Equatorial Africa, he has written such notable works as *On the Edge of the Primeval Forest, The Decay and Restoration of Civilization,* and *Civilization and Ethics.* On occasional visits to Europe he has given organ concerts to raise money for his hospital. He was awarded the Nobel peace prize for 1952.

Scipio (*sĭp'ĭ-ō*), **Publius Cornelius (c. 237 B.C. -c. 183 B. C.),** surnamed Africanus Major, Roman general. In 212, he was elected ædile and, in 211, became proconsul with command of the Roman forces in Spain.

Scipio found, on arriving, that the Carthaginians, under Hannibal, had eluded him and had invaded Italy, where they continued to win signal victories for many years. In 205, he returned to Rome and, having been elected consul, persuaded the Senate to permit him to invade the African territory of Carthage. "Carrying the war into Africa," he compelled Hannibal to return from Italy, and the two met at Zama in 202 B. C. Scipio won a complete victory, and peace was concluded in the following year. He accompanied his brother Lucius in the campaign against Antiochus in 190. Scipio is considered the greatest Roman general before Julius Cæsar.

Scipio, Publius Cornelius Scipio Æmilianus (c. 185 B. C.-129 B. C.), surnamed Africanus Minor. After distinguishing himself in Spain, he took part in the third Punic war, laid siege to Carthage, took it by storm, and leveled it to the ground in 146. He was later sent to Spain, where he captured Numantia after a stubborn resistance. After his return to Rome, he became leader of the aristocratic party. Upright and magnanimous, he was neither an uncompromising oligarch nor a servile flatterer of the people. He gathered about himself a brilliant group of intellectual and literary men, who formed what has been called the Scipionic circle. He was assassinated.

Scott, Duncan Campbell (1862-1948), Canadian poet, was born in Ottawa, Ont. He was educated at Stanstead Wesleyan College. In 1893 he became an accountant in the Canadian civil service. In the same year he published his first volume of verse entitled *The Magic House,* which was followed by *Labour and the Angel, New World Lyrics and Ballads, Via Borealis, Lundy's Lane, Beauty and Life,* and *The Green Cloister.* His writings include also a collection of short stories entitled *In the Village of Viger* and *John Graves Simcoe,* a biography.

Scott, Robert Falcon (1868-1912), English antarctic explorer, was born at Outlands. He entered the navy at 14 and, in 1889, was promoted lieutenant. In 1901, he was placed in command of an antarctic expedition, during which he discovered King Edward VII land and reached latitude 82° 17′ S., then a new "farthest south." In recognition of his valuable scientific work, he was promoted captain and awarded many honors. In 1910, he set out in command of a new expedition for antarctic discovery. By a continuous sledge journey of 1842 miles, the longest made in polar regions, he reached the south pole, January 18, 1912, only five weeks later than Amundsen, but perished with his entire party some two months later while making the return journey. His writings include *Voyage of the Discovery* and the posthumous *Scott's Last Expedition.*

Scott, Sir Walter (1771-1832), Scottish poet and novelist, was born in Edinburgh. He was descended from an old family of border freebooters; and the stories of his

marauding ancestors, to which he listened, produced a deep and indelible impression upon his mind.

Education. He entered the high school at Edinburgh in 1779. There he became distinguished for his courage, his extraordinary memory, his vast store of miscellaneous information, and his skill in story telling. In the winter of 1783, he entered Edinburgh University, but he attended only one session. When 15 years of age, he was in his father's office studying law, and devouring romances, novels, histories, and old plays.

Early Career. In 1792, he was admitted a member of the Scottish faculty of advocates. In 1797, he married Charlotte Margaret Carpenter, daughter of a French emigrant, whose small fortune, together with his own income from the shrievalty of Selkirkshire, made Scott sufficiently independent to devote himself to literature. He gradually made authorship the main business of his life. To this earlier period belong several of his original ballads.

Literary Success. The most brilliant period of Scott's literary career extends from 1802 to 1825. In the first of those years, he published his *Minstrelsy of the Scottish Border*, which gave him a distinguished reputation for his annotations upon the old ballads and for the promise of his own ballads inserted in the collection. *The Lay of the Last Minstrel*, which appeared in 1805, is a romance of border chivalry. Its success was phenomenal. *Marmion* came in 1808 and *The Lady of the Lake* in 1810. During this time Scott contributed for a time to the Edinburgh *Review*, and assisted in establishing the *Quarterly*.

Publishing Enterprise. Having quarreled with his publisher, Constable, Scott became a third partner in a new publishing house with the two brothers Ballantyne. This arrangement, kept secret, was to exercise a disastrous effect upon his later fortunes.

Scott wished for fame; therefore, seeing the waning popularity of his poetry, he set to work to win laurels in a new field. He wished for gain, that he might gratify his ambition to possess an estate in land. He accepted an appointment as one of the principal clerks of the court of sessions in 1812 in order to add to his income and to enable him to buy lands. His success enabled him shortly to create a country estate at Abbotsford. For these ends at first, and, later, to avert the ruin that threatened his publishing interests, Scott turned to the writing of historical novels.

The first of the historical novels was *Waverly*, which gave its name to the series. *Guy Mannering* appeared in 1815; *The Antiquary* and *Old Mortality*, in 1816; *Rob Roy* and *The Heart of Midlothian*, in 1818; *The Bride of Lammermoor*, in 1819; *Ivanhoe*, in 1820; *Kenilworth*, in 1821; *The Pirate*, in 1822; *St. Ronan's Well*, in 1824. Few writers have been so prolific as Scott. He was created a baronet in 1820 for his distinguished work.

In 1826, the Ballantyne's firm failed; Scott's concealed partnership was revealed, and he pledged himself to devote the labor of his subsequent life to the payment of the liabilities. Breaking up his establishment at Abbotsford, he hired a lodging in Edinburgh, and, for some years, he toiled at his prodigious work. His *Life of Napoleon* and *The Fair Maid of Perth* belong to this period. He made amazingly large payments to his creditors; but the limits of endurance were reached, and, in 1830, he was smitten with paralysis. A brief trip to Italy failed to restore his health, and he returned to Abbotsford.

Place in Literature. It is one of the most melancholy thoughts in the history of English literature that Scott was prematurely sacrificed. No writer ever exercised a greater influence over the public mind or led to so much imitation. His writings never foster a base feeling nor throw ridicule on good and generous impulses. His unfailing wholesomeness and freshness, the variety and richness of his range, his Homeric simplicity and charm, place him second only to Shakespeare in English imaginative literature. The greatness of Scott's heart, the loyal and sympathetic affection of his nature, are as remarkable as his astonishing genius. In an important sense, he was the greatest of peaceful conquerors in the world of letters. See *Literary Plots, Characters, and Allusions* under titles of chief works.

Scott, Winfield (1786-1866), American general, was born near Petersburg, Va. He studied at William and Mary College and became a lawyer; but in 1808 he entered the army as captain. In the War of 1812 he fought at Queenston, Chippewa, and Lundy's Lane, and, in recognition of his services, he was made major general. As commander in chief of the United States army, 1841-47, he led the expedition invading Mexico. He captured Vera Cruz and defeated Santa Anna at Cerro Gordo, taking Jalapa and Puebla. After capturing the Castle of Chapultepec by storm, he led his army, on September 14, 1847, into the city of Mexico, where he commanded until the treaty of peace was signed in February 1848. In 1852, he was a candidate for the presidency, but was defeated.

Scribe (*skrēb*), **Augustin Eugène (1791-1861),** French dramatist, was born in Paris. He was educated for the law, but early turned his attention to the stage. Beginning with his first successes in 1816, he produced, alone or in collaboration, about 400 plays, remarkable for their mastery of stagecraft. He tried every form of dramatic composition—tragedies, comedies, vaudevilles, and opera librettos—often doing little more than editing the ideas of others. Dumas the Younger, Augier, and especially Sardou gained from Scribe that mastery of theatrical technique which gave France undisputed leadership in 19th-century drama. He was elected to the French Academy in 1834. Among his best plays are *Valérie*, *Le mariage d'argent*, *Le verre d'eau*, *Bataille de dames*, and *Les doigts de fée*. His librettos include *Robert le Diable*, *La Juive*, and *L'Africaine*.

Scripps, Robert Paine (1895-1938), American journalist and editor, was born at San Diego, Cal., a son of Edward Wyllis Scripps, the founder of the Scripps newspapers and also of Science Service, Washington, D. C. He was educated privately and at Pomona College. At the age of 16, he became a reporter and newspaper correspondent for the newspapers which his father controlled. He also traveled and studied, fitting himself for the management of these properties, the controlling interest in which he inherited on the death of his father in 1926. He took charge of the editorial policy of the chain, known as the Scripps-Howard newspapers.

Scudder, Janet (1873-1940) American sculptor, was born at Terre Haute, Ind. She studied art at Cincinnati, Chicago, and Paris. She became known for her fountain and garden figures, usually featuring joyous children or small animals. Among her best known are "Frog Fountain" at the New York Metropolitan Museum, "Tortoise Fountain" at the Peabody Museum, Philadelphia, and "Fighting Boys Fountain" at the Chicago Art Institute. She was the first American woman to have an example of her work purchased by the Luxembourg Gallery in Paris.

Seaborg, Glenn Theodore (1912-), American chemist and physicist, was born at Ishpeming, Mich. He was educated at the University of California, with which institution he has been connected since he earned his doctorate there in 1937. Known for his research in nuclear chemistry and physics, Seaborg was codiscoverer in 1940 of plutonium (element 94); in 1944 of americium (element 95) and curium (element 96); in 1949 of berkelium (element 97), and in 1950 of californium (element 98). Professor of chemistry at the University of California since 1945, Seaborg during World War II worked for four years on the atomic energy project at the University of Chicago. In 1951 he and Edwin M. McMillan shared the Nobel prize in chemistry for their discoveries. Seaborg has been a contributor to *The Lincoln Library of Essential Information*.

Seaton, Frederick Andrew (1909-), newspaper publisher and government official, was born at Manhattan, Kansas, and was educated at Kansas State College. Beginning as reporter, sports publicity director, and radio sports announcer, he advanced to become publisher successively of several newspapers in Kansas and Nebraska. He was appointed interim senator from Nebraska following the death of Senator Wherry and became a member of General Eisenhower's personal staff of advisers in 1952, during the presidential campaign. In 1956 he was appointed Secretary of the Interior in President Eisenhower's cabinet.

Sedgwick, Henry Dwight (1861-1957), American biographer and historian, was born at Stockbridge, Mass. Admitted to the bar in 1884, he practiced in New York for 13 years. The rest of his life was spent chiefly in writing, his works including *Samuel Champlain*, *Dante*. *Short History of France*, *The Art of Happiness*, and *Vienna*. He was elected to the American Academy of Arts and Letters in 1933.

Seeger, Alan (1888-1916), American poet, was born in New York City, of New England parentage. In 1906, he entered Harvard University, where he displayed much interest in literary studies and contributed verse to the *Harvard Monthly*. Following graduation, he spent two years in New York, and, in 1912, he went to Paris, where he wrote most of the poems entitled *Juvenilia*. In August 1914, he enlisted in the foreign legion of France. While in service at the front he produced some excellent verse, including the famous poem "I Have a Rendezvous with Death." He was killed in battle near Belloy en Santerre.

Segni, Antonio (1891-), Italian political leader, lawyer, university professor. Early interest in problems of land reform affecting his native Sardinia led him to specialize in agrarian law while studying at the University of Rome. He became a professor of law at the universities of Perugia, Cagliari, Pavia, Sassari, and Rome and was active as a leader of the Christian Democracy Party. Particularly while holding the cabinet post of Minister of Agriculture and Forestry from 1946 to 1951, he exerted a profound influence on Italy's postwar policies relating to the distribution and use of land. Author of several land reform bills, he has shown that redistribution of land held in large estates need not depend upon confiscation by Communists, but can be brought about equitably by orderly

legal procedure. Named Premier of Italy in 1955, he has gained support for an anti-Communist, anti-Fascist policy dedicated to stability and prosperity.

Selden, George Baldwin (1845-1922), American inventor, was graduated from Yale University in 1869, studied law for a time, and then turned his attention to experimenting with engines for propelling light vehicles. For many years he was president of the Selden Motor Company of Rochester, N. Y.

In 1879, he filed the first patent for a gasoline motor-propelled vehicle. This later resulted in protracted litigation, which is said to have cost Selden nearly all of the financial returns realized from the invention. In 1900, he sued Ford and Winton for infringement of his basic patent. He was successful in the lower courts, but appeals were taken to higher courts.

In 1911, the higher court rendered a decision upholding Selden's patent but ruling that the Ford engine was of the Otto type and therefore not covered by the Selden patent. As the other makers of cars were then using engines similar in type to that used by Ford, all the royalties that were being paid to Selden ceased. See *Automobile.*

Seltzer, Louis Benson (1897-), American journalist, was born at Cleveland, Ohio, where he began his newspaper career as an office boy in 1911. In 1916 he became a reporter on the staff of the Cleveland *Press,* the newspaper with which he has since been associated. His advancement was rapid and in 1928 he was made editor. Since 1937, he has also been editor in chief of the Scripps-Howard newspapers in Ohio—the Cincinnati *Post,* the Columbus *Citizen,* and the Cleveland *Press.* Outstanding among American newspapermen, Seltzer's book of reminiscences, *The Years Were Good,* was published in 1956.

Selznick, David O. (1902-), motion picture producer, was born in Pittsburgh, Pa., the son of Lewis Selznick, who was himself a motion picture producer. David's education at Hamilton Institute and Columbia University was effectively supplemented by the training he received in his father's studio. After working as reader, story editor, and associate producer for Paramount, RKO, and MGM, he formed his own company. Of his many pictures, some of which have brought him highest honors, perhaps the best remembered are *Gone With the Wind, Rebecca, Anna Karenina, Intermezzo, The Prisoner of Zenda, Jane Eyre, Duel in the Sun,* and *Portrait of Jennie.*

Seneca, Lucius Annæus (c. 4 B.C.-65 A.D.), Roman Stoic philosopher, was born at Cordoba, Spain. He was educated at Rome and became a successful advocate in the courts of justice. Accused of intrigue, he was exiled to Corsica, but, on the marriage of the emperor Claudius to Agrippina, Seneca was recalled and made instructor to Agrippina's son Nero, who ascended the throne five years later.

Seneca became one of Nero's chief advisers, attaining great power and immense wealth. Seneca's influence, however, failed to restrain the vicious propensities of Nero. On the latter's murder of his own mother, Seneca offered to return all his rich gifts, craving only permission to retire. Nero refused but soon afterward attempted to poison Seneca.

His extant writings are chiefly moral and philosophical. Ten tragedies ascribed to Seneca by Quintilian have also come down to us. While not intended for the stage, these plays are important on account of their influence upon the classical French drama. Following the conspiracy of Piso in 65 A. D., Seneca received an order from Nero to put himself to death, which he promptly acted upon with the traditional Stoic contempt for life.

Senefelder (*zā'nĕ-fĕl'dĕr*), **Aloys (1771-1834),** Bohemian inventor, the son of an actor, was born at Prague. After studying the art of printing, he determined to invent a process of his own and, in 1798, made his discovery of lithography. Constructing a suitable press and obtaining a patent, he soon was successfully established as a lithographic printer in Munich, which became the center of the lithographic art.

Serra (*sĕr'rä*), **Junipero** (*Hōō-nĕ'pä-rō*), **(1713-1784),** Franciscan missionary, founder of early Indian missions in California, was born at Petra, Island of Majorca. He was graduated from the Lullian University at Palma, where he became professor of philosophy. In 1749, he joined the missionary college of San Fernando, Mexico. For nine years he served in Indian missions north of Queretaro and meanwhile translated the catechism into the Pame language. Returning to Mexico City, he became a zealous and effective preacher of missions.

In 1767, Serra was made superior of a band of 15 Franciscans for the missions of Lower California, and, in 1769, he accompanied Portola's overland expedition to Upper California. En route he established at San Diego, July 16, 1769, the first of the 21 California missions extending along the coast as far north as Sonoma. During the last three years of his life he visited all the missions from San Diego to San Francisco and confirmed over 5000 Indians who had been converted during his 14 years of service. He died at San Carlos mission, near Monterey, where a monument was erected to his memory by Mrs. Leland Stanford. See *California Missions.*

Service, Robert William (1874-), Canadian poet and novelist, was born at Preston, England. He was educated in Glasgow, where he served an apprenticeship in a bank. He then went to Canada, first settling on Vancouver Island, B. C. Later, he spent eight years in the Yukon region, during which he traveled extensively. Following the success of his *Songs of Sourdough,* 1907, he devoted himself to writing poems and novels. On account of his vigorous, descriptive style, he has been called the "Kipling of Canada." For two years during World War I, he drove an ambulance in France, and, as war correspondent, he wrote a series of letters entitled *Rhymes of a Red Cross Man.* His writings include *Ballads of a Cheechako, The Trail of '98, Rhymes of a Rolling Stone, The Pretender,* and *Why Not Grow Young?*

Sesostris. See *Rameses I.*

Seton (*sē'tŭn*), **Ernest Thompson (1860-1946),** artist, author, and lecturer, was born at South Shields, England. In childhood he lived in the forests of Canada and, later, on the western plains. He was educated at Toronto Collegiate Institute and at the Royal Academy, London. From 1890 to 1896 he studied art in Paris. As official naturalist to the government of Manitoba, he published *Mammals of Manitoba* and *Birds of Manitoba.* He became widely known as a writer and illustrator of animal stories and as a lecturer. He was one of the originators of the Boy Scout movement in America and started the outdoor life organization known as the Woodcraft League. Among works written and illustrated by him are *Wild Animals I Have Known, Trail of the Sandhill Stag, The Biography of a Grizzly, Lives of the Hunted, Two Little Savages, Mainly about Wolves,* and *Trail of an Artist-Naturalist.*

Seversky, Alexander P. de (1894-), test pilot and consulting engineer, was born in Russia and fought in his country's air force in World War I. He was shot down and lost his right leg in a bombing expedition but resumed flying and was credited with shooting down 13 enemy planes in 1917. He came to America during the Russian revolution, using a French passport which accounts for the "de" in his name. As consulting engineer and test pilot for the U. S. Air Force, and later as a member of the Air Corps Reserve, he has been closely identified with the progress of military aviation in the United States. A tireless experimenter, he has worked on such inventions as retractable landing gears, pontoons for amphibian planes, automatic bombsights, and mechanisms for refueling planes in the air.

Sévigné (*sā'vēn'yā'*) **Marquise de (1626-1696),** née Marie du Rabutin-Chantal, was born at Paris. At 18 she married the Marquis de Sévigné, who left her a widow at 25. To her children, especially to her daughter, Madame Sévigné devoted the rest of her life. Her beauty, vivacity, and social tact attracted many distinguished friends, among them Turenne and Prince de Conti. Her fame rests upon her *Letters,* written chiefly to her daughter. Unrivaled for freshness, vividness, and wit, these letters form an intimate chronicle of the court and the high society of the time, 1669-95.

Seward (*sū'ĕrd*), **William Henry (1801-1872),** American statesman, was born in Florida, N. Y. He was graduated from Union college in 1820, was admitted to the bar in 1822, and settled in Auburn, N. Y., 1823. He was elected state senator as an Antimason, in 1830, and governor of New York as a Whig, in 1838. In 1849, he was elected to the United States Senate, where he became the acknowledged leader of his party. A strong candidate for the Republican nomination in 1860, Seward became secretary of state in Lincoln's cabinet and rendered services of great value. At the time of Lincoln's assassination, an unsuccessful attempt was made upon Seward's life also. He continued as secretary of state throughout the administration of President Johnson. He negotiated the purchase of Alaska from Russia. He published *Speeches and Orations* and *Life of John Quincy Adams.* See *Alaska Purchase, Seward Whigs, Trent Affair.*

Sforza (*sfōr'tsä*), **Carlo (1872-1952),** Italian statesman was born at Lucca. A cousin of the king of Italy, he entered the diplomatic service, was sent to China, Turkey, and France. He became a member of the Senate in 1919. In 1920-21, he was foreign minister and negotiated the Treaty of Rapallo. He led the opposition to Fascism in the Senate. When Mussolini came into power he resigned and came to the United States. On Mussolini's fall in 1943 he returned to Italy, took part in the reorganization, and later became foreign minister. He wrote *The Chinese Enigma, Fifty Years of War and Diplomacy,* and *The Real Italians.*

Shackleton, Sir Ernest Henry (1874-1922), British naval officer and antarctic explorer, was born at Kilkee, Ireland. He entered the navy and was lieutenant in the ant-

arctic expedition of Captain R. F. Scott in 1901-04. During 1907-09, he commanded an expedition which ascended Mt. Erebus and reached for the first time the south magnetic pole. After an unsuccessful attempt to cross the antarctic continent in 1914-16, he perished on a third expedition, near South Georgia Island. He published *The Heart of the Antarctic, The Diary of a Troopship,* and *South.*

Shaftesbury (*shâfts'bĕr-ĭ*), **Anthony Ashley Cooper, Earl of (1801-1885),** English statesman and philanthropist, was born in London. He was graduated from Oxford in 1822. In 1826, he entered Parliament as a Conservative, serving until 1851, when he succeeded his father in the peerage. His fame lives by reason of his lifelong philanthropy, which took shape in numerous acts of Parliament, such as the Mines and Collieries Act, excluding women and boys under 13 from working in the mines; the Factory Acts, and the Workshop Regulation Act. Outside of Parliament he worked in behalf of benevolent and religious movements, notably the ragged school movement and for the better housing of the London poor.

Shah Jehan (*shä jĕ-hän'*), **(c. 1592-1666),** fifth of the Mogul emperors of Delhi, succeeded his father in 1627. He was a man of great administrative ability and a skilled warrior; he conquered Bijapur and Golconda, and raised the Mogul empire to its zenith. He founded the city of Delhi, where he constructed the famous peacock throne, valued at 30 million dollars, and built the Taj Mahal and other magnificent edifices at Agra. A victim of the perfidy of his usurping son, Aurangzeb, he died in prison.

Shakespeare, William (c. 1564-1616), English dramatist and poet, was born at Stratford-on-Avon, Warwickshire, England, where his baptism was registered April 26, 1564. His mother's name was Mary Arden. "Born at Stratford-on-Avon, married and had children there; went to London, where he commenced as an actor, and wrote poems and plays; returned to Stratford, made his will and died—this," says Steevens, "is all that is known, with any degree of certainty, about Shakespeare." His real biography lies in a critical estimate of his writings.

There was a free grammar school at Stratford, and the probabilities are that here Shakespeare received his education,—English, besides "small Latin and less Greek." We have no trace of his employment in the interval between his school days and manhood. Some hold that he was an attorney's clerk. The tradition is that he was a wild young fellow, stealing deer. The certainty is that he was treasuring up that store of knowledge and cultivating that range of genius which made him what he became.

Private Life. Shakespeare married Ann Hathaway in 1582, and to them were born three children—Susanna, Hamnet, and Judith. In 1586, Shakespeare became connected with the Blackfriars Theater in London. In 1589, he was a joint proprietor of that theater. The players of the Blackfriars were the lord chamberlain's company, who acted under royal patronage. We know nothing of the date of the production of his first play. Shakespeare became rich in connection with the theaters. In 1597, he purchased the principal house in Stratford and also some lands in that parish.

It is supposed that he ceased to be connected with the theaters in 1609. His father died in 1601, and it is more than probable that Shakespeare succeeded him as a practical farmer in his native place. At any rate, he is known to have brought action in the bailiff's court there to collect money for corn sold and delivered.

Dramas and Poems. In the 20 years between 1590 and 1610, Shakespeare wrote and produced most of his plays. To the first decade belong chiefly the histories and comedies; to the second, the tragedies. Some or all of them were performed before the royal court as well as elsewhere. In 1623, his stage companions, Heminge and Condell, having affectionately preserved his plays, gave them to the world in what is known as the *First Folio.* Prefixed to this edition was a half-length portrait, engraved by Droeshout and regarded as an authentic likeness of the poet.

The evidence by which the chronology of Shakespeare's works is inferred is of various kinds: entries of publication in the stationers' registers; statements about the plays and poems; allusions to them; quotations from them by contemporary writers; facts connected with the history of dramatic companies that presented plays of Shakespeare; allusions in the plays to historical events; and quotations made by Shakespeare from publications of the day. There are not many instances of the mention of Shakespeare's name during his lifetime.

In 1593 appeared Shakespeare's first work, the narrative poem "Venus and Adonis," dedicated to the earl of Southampton, the poet's friend and patron. "Lucrece" followed in 1594, and this also became very popular. Of his many comedies, tragedies, historical dramas, and farces, the following are perhaps the most widely known: *Merchant of Venice,* 1596; *Romeo and Juliet,* 1598; *Twelfth Night* and *Julius Cæsar,* both 1601; *Hamlet,* 1602; *Othello,* 1604; *King Lear,* 1605; *The Tempest,* 1610.

Character and Genius. His dramas and his poems furnish a full record of Shakespeare's mental endowments. The peculiar quality of his mind has been expressed in three words, *a complete imagination.* His favorite books were those of Plutarch and Montaigne; his hero was Julius Cæsar; his aversion was the Puritan spirit; his greatest creation was Hamlet. In reality, that which we think of first and last in connection with Shakespeare is his *creation* of characters.

Place in Literature. A full appreciation of Shakespeare's extraordinary genius was not reached until the 19th century, and his place in the intellectual development of mankind was even less appreciated. He belonged to what has been called the modern transition,—that general movement which issued out of the decaying feudal society and led confusedly toward a new era of literary art. For centuries before his time, particularly during the middle ages, whatever there was of art belonged to the feudal world, and its dominant notes were the Church and chivalry. The ideals created by these two forces were sacramental ceremonies, gracious manners, and worship of women.

At the beginning of the 14th century, the system gave signs of decay. The artistic mind gradually receded from religious themes and sought secular objects. Shakespeare was the luminous chief of a band of poets of the secular drama, whose subject was mankind. He took the human soul to be his province, and he made it both web and woof of art and worship, without rival and without disguise.

By the whole civilized world, Shakespeare is now recognized as a creative genius unique in all literature. In imagination, fancy, knowledge of man, wisdom, humor, pathos, strength, and versatility, in the music of his verse and the felicity of his language, and also in that mysterious power which fuses all these separate gifts into one, he stands unapproached and apparently unapproachable. Died, April 23, 1616, and was buried in the chancel of the parish church at Stratford. See *Literary Plots, Characters, and Allusions* under titles of plays and names of characters.

Shapley, Harlow (1885-), American astronomer, was born at Nashville, Mo. Educated at the University of Missouri and Princeton University, he went to the Mount Wilson Observatory as astronomer in 1914 and was chosen director of the Harvard Observatory in 1921. From 1940 he was also professor of practical astronomy at Harvard. His analysis of stellar data in the light of the most recent findings of physics led him to formulate the theory of "island universes," of which the milky way is the one to which the solar system is held to belong.

Shaughnessy (*shô'nĕ-sĭ*), **Thomas George Shaughnessy, Baron (1853-1923),** Canadian railway executive, was born at Milwaukee, Wis. He received his training in railway administration in the service of the Chicago, Milwaukee, and Saint Paul Railroad, 1869-82. He then became identified with the Canadian Pacific Railway, serving successively as purchasing agent, assistant general manager, assistant to the president, vice president, director, and, beginning with 1898, president. In 1901, he was knighted and, in 1916, was created baron. Under his direction the company became one of the greatest transportation enterprises in the world, its transcontinental line being supplemented by ocean liners circling the globe, numerous hotels, and vast colonizing projects.

Shaver, Dorothy (1897-), American business executive, was born in Howard County, Ark., and was educated at the University of Arkansas and the University of Chicago. She has been a director of Lord and Taylor, New York City, since 1927. In 1931, she was made vice president, and then served from 1937 to 1945 as executive vice president. She has been president since 1946. Active in the work of many institutions and organizations, she has been the recipient of a number of honorary degrees.

Shaw, George Bernard (1856-1950), English dramatist and critic, was born in Dublin, Ireland. Self-educated after his 15th year, he went to London at 20 to devote himself to a literary career. He did unremunerative hack work, wrote unsuccessful novels, and became an ardent socialist. Finally, he won recognition as a critic on art, musical, and dramatic subjects for London newspapers. As a critic, he championed Whistler, the impressionists, Wagner, Ibsen, the drama of ideas, and other at first unpopular but later victorious causes.

In 1892, Shaw produced *Widowers' Houses,* his first play, which was followed almost yearly by other little-noticed plays until 1904, when he scored a notable triumph with *John Bull's Other Island.* By the increasing popularity of his earlier plays and by the success of many new productions, he attained eminent rank among British dramatists. His plays are clever, witty, and pregnant with ideas. Among his best plays are *Candida, Man and Superman,* and *Arms and the Man.* He was awarded the Nobel prize in literature for 1925, but refused to accept the money payment.

His dramas include also *The Philanderer, Mrs. Warren's Profession, The Man of Destiny, The Devil's Disciple,*

Cæsar and Cleopatra, The Doctor's Dilemma, Androcles and the Lion, Pygmalion, Back to Methuselah, The Apple Cart, In Good King Charles's Golden Days, and *Saint Joan.*

He wrote also many remarkably effective prefaces and essays, such as *The Quintessence of Ibsenism, The Perfect Wagnerite, The Sanity of Art,* and *Fabian Essays.* See *Man and Superman.*

Shaw, Henry Wheeler (1818-1885), American humorist, was born in Lanesborough, Mass. He entered Hamilton College but soon after went West, where for more than 20 years he worked on farms and steamboats, finally becoming an auctioneer. In 1859, he began writing and, in 1860, sent to a New York paper "An Essay on the Mule, by Josh Billings," which was extensively copied. His most successful literary venture, however, was his *Farmers' Alliminax,* a travesty on the *Old Farmers' Almanac.* His best writings are collected in *Josh Billings's Complete Works.*

Shawn, (Ted) Edwin M. (1891-), American dancer, teacher, and writer, was born at Kansas City, Mo. At Los Angeles, Calif., he joined Ruth St. Denis in organizing a school for the training of professional dancers. Later the school was moved to New York City. In tours through America, Europe, and the Orient, he has conducted exhibitions of dancing. In addition to teaching, he has written extensively on the art of dancing. His books include: *Ruth St. Denis, Pioneer and Prophet; The American Ballet; Fundamentals of a Dance Education;* and *Every Little Movement: A Treatise on Francois Delsarte.*

Sheean, James Vincent (1899-), American writer, was born at Pana, Ill. After being graduated from the University of Chicago, he became a foreign correspondent, contributing articles to various newspapers and magazines and gathering material which appears in such books as *An American Among the Riffi, The New Persia,* and *Personal History.* Other books written by him are *A Day of Battle, Not Peace but a Sword,* and *Bird of the Wilderness.* During World War II, he served for two years with the United States Air Force.

Sheeler, Charles (1883-), American artist, was born in Philadelphia, Pa. He studied at the local School of Industrial Art and at the Pennsylvania Academy of Fine Arts, where he was a pupil of William M. Chase. In addition to still-life studies of flowers and city "scapes," the latter being done in his "reversed perspective" style, he has painted many industrial scenes, including six illustrations for *Fortune* magazine. Examples of subjects used for his interpretation of industrial America are *River Rouge Plant, Rolling Power,* and *Amoskeag Mills No. 2.*

Sheen, Fulton John (1895-), writer and educator, was born in El Paso, Illinois. Educated in this country and abroad, he was ordained a priest in the Roman Catholic Church in 1919. Since 1926 he has been a member of the faculty of the Catholic University of America. From 1930 to 1945 he was preacher on the Catholic Hour of the National Broadcasting Company, and during the same period preached at St. Patrick's Cathedral, New York. His numerous books have achieved wide circulation, his *Peace of Soul* being a best seller of 1949-50. In 1951 he became an auxiliary bishop of New York.

Sheldon, Edward Brewster (1886-1946), American dramatist, was born in Chicago. He was graduated from Harvard in 1907, and devoted himself to play writing. With the production of his first play, *Salvation Nell,* by Minnie Maddern Fiske, in 1908, his reputation as a dramatist was established. His plays include also *The Nigger, The Boss, The High Road, Princess Zim-Zim, The Song of Songs, Romance, The Garden of Paradise,* and *Dishonored Lady.*

Shelley, Mary Wollstonecraft Godwin (1797-1851) English author, was born in London. She married Percy Bysshe Shelley in 1816. In 1818, she produced the novel *Frankenstein,* which captured the imagination of the English-speaking world. Among her other novels are *Valperga, The Last Man, Lodore,* and *The Fortunes of Perkin Warbeck.* She wrote also *Rambles in Germany and Italy* and edited her husband's poems. See *Frankenstein.*

Shelley, Percy Bysshe (1792-1822), English poet, was born near Horsham. In 1810, he entered Oxford, but, in 1811, a pamphlet entitled *The Necessity of Atheism,* which he had published and circulated, caused his expulsion. A few months later he married Harriet Westbrook, from whom he separated in 1814, and, after her suicide, he married Mary Godwin in 1816. His poem, *Queen Mab,* appeared in 1813. In 1816, he wrote his *Alastor,* one of the most finished and characteristic of his works, which are chiefly passionate lyrics of ethereal beauty. This was followed by *The Revolt of Islam,* a poem dedicated to the cause of political freedom.

In 1818, Shelley left England and spent the remainder of his life in Italy. While a resident at Rome he produced two of his finest poems—the lyrical drama, *Prometheus Unbound,* and the tragedy, *The Cenci.* At Venice, in 1820, he wrote *Julian and Maddalo.* Other important works are *Rosalind and Helen, The Witch of Atlas, Epipsychidion, Adonais,* and *Hellas.* He was drowned while sailing in a small boat.

Shepard, Helen Miller Gould (1868-1938), American philanthropist, was born in New York, eldest daughter of Jay Gould. She was identified with philanthropic work for many years. Her gifts included the library building with the widely known Hall of Fame to New York University and numerous donations for educational and charitable purposes. She also established a home for children. During the Spanish-American War, she was an active member of the Women's National War Relief Association, and, at Camp Wikoff, gave her personal care to sick and convalescent soldiers. In 1913, she married Finley J. Shepard.

Shepilov, Dmitri Trofimovich (1905-), Soviet editor and diplomat, was born in Krasnodar Territory in Southern European Soviet Russia, a son of a Don River town metal worker. After he was graduated from Moscow University in 1926, he joined the Communist party, with which he has been associated ever since, chiefly as a political propagandist. It was in this capacity that he served in the Soviet forces during World War II, from which he emerged a major general and Deputy Chief of Agitation and Propaganda of the Armed Services. He was then assigned to the party newspaper, *Pravda,* the most influential mouthpiece of the Kremlin, as propaganda editor, and in 1952 became editor in chief. In 1956 he was named Molotov's successor as foreign minister, and was, in turn, replaced by Andrei Gromyko in 1957.

Sheraton, Thomas (1751-1806), English cabinetmaker and furniture designer, was born at Stockton-on-Tees and spent his working years in London. Because he was known chiefly as a draftsman and writer rather than a cabinetmaker, it has been difficult to find authentic examples of his work. However, his books on furniture are illustrated by designs representing a style with which his name has been identified. At their best, examples of his style are distinguished for slenderness and grace, but in his later period his name is associated with some eccentric experiments in form and decoration. His drawings and recommendations are found in *The Drawing Book, The Cabinet Dictionary,* and *The Cabinet Maker, Upholsterer and General Artists' Encyclopedia.*

Sheridan, Philip Henry (1831-1888), American general, was born at Albany, N. Y. He was graduated from West Point in 1853. At the beginning of the Civil War he was a captain, and rapidly rose to major general of volunteers. He performed brilliant service in the battles of Perryville, Murfreesboro, Chickamauga, Chattanooga, Winchester, Cedar Creek, Five Forks, Appomattox Courthouse.

Sheridan's dashing ride of 20 miles from Winchester to Cedar Creek to rally his army and rout the enemy was a notable exploit. For this victory he was promoted to major general in the regular army and received the thanks of Congress. Rejoining the army of the Potomac in 1865, he was conspicuous under Grant in the operations before Petersburg. His masterly handling of his forces at Five Forks resulted in a decisive victory. Lee was thereby compelled to give up Petersburg and soon afterward began his disastrous retreat ending in surrender at Appomattox.

When Sherman was made general, following the election of Grant to the presidency, Sheridan was raised to the rank of lieutenant general and, when Sherman retired in 1883, Congress conferred the further rank of general upon Sheridan. See *Sheridan's Ride.*

Sheridan, Richard Brinsley (1751-1816), British dramatist and statesman, was born in Dublin, Ireland. He was educated at Harrow and studied law, although he was never called to the bar. In 1773, he married and for a time devoted himself to literature. In 1775, he produced *The Rivals* at Covent Garden, and, in 1776, he became part proprietor of Drury Lane theater, for which he wrote *The School for Scandal* and also *The Critic,* one of the wittiest farces in the language.

In 1780, through the influence of Fox, Sheridan was elected to Parliament and soon became distinguished as a speaker on the side of the opposition. During the entire period of Pitt's ascendancy, the talents of Sheridan were displayed in combating that great statesman. His most notable speeches were against Warren Hastings.

For his powerful speeches against the American war the Continental Congress desired to present him with £20,000, but he declined to accept. Sheridan's *Rivals* and *The School for Scandal* rank among the best prose comedies in English. See *Rivals, The.*

Sherman, John (1823-1900), American statesman, brother of William Tecumseh Sherman, was born at Lancaster, Ohio. He was admitted to the bar in 1844; was elected to Congress in 1855; and soon rose to prominence. He entered heartily into the movement for the formation of the Republican party, and ardently supported Frémont in 1865. As the recognized leader of the Republicans, he served in the House until 1861. He was United States senator continuously from 1861 until 1897, except during

1877-81, when he was secretary of the treasury. During 1897-98 he was secretary of state.

In the Senate, Sherman was prominently identified with all measures for the prosecution of the Civil War. He supported the reconstruction measures, defended the protective tariff, and took a leading part in the legislation for the restoration of specie payments and for the refunding of the national debt. He was author of the famous Sherman Antitrust Law.

Sherman, William Tecumseh (1820-1891), American general, was born in Lancaster, Ohio. He was graduated from West Point in 1840. During the war with Mexico he obtained the rank of captain, resigning in 1853. In 1861, he offered his services to the Federal government and was appointed colonel of infantry. Raised to the rank of brigadier general, he succeeded Anderson in the department of Ohio, from which he was removed for declaring that it would require 200,000 men to end the war in the West.

In 1862, he distinguished himself at the battle of Shiloh and, in 1863, as major general in the siege of Vicksburg. He took an active part under Grant in the successful operations around Chattanooga, 1863, and forced Longstreet to abandon the siege of Knoxville. Placed in command of the army of Georgia, 1864, he fought Johnston at Dalton, Resaca, and Kenesaw Mountain, and forced Hood to evacuate Atlanta. He then began a march to the sea and captured Savannah and Charleston. The surrender of the army of General Johnston to Sherman in North Carolina, 1865, shortly after the surrender of Lee and that of General Kirby Smith, west of the Mississippi, closed the war.

Sherman was appointed lieutenant general in 1866 and in 1869 became general and head of the army. In point of daring, originality of design, fertility of resource, brilliant strategy, and untiring energy, Grant pronounced him the best field officer that the Civil War produced. In 1875, he published his *Memoirs*. Elected to the American Hall of Fame, 1905. See *Sherman's March*.

Sherwood, Robert Emmett (1896-1955), American dramatist, was born at New Rochelle, N. Y. Interrupting his course at Harvard University, he served in the Canadian army in France 1917-19. He then served as dramatic editor of *Vanity Fair* and, in 1924-28, was editor of *Life*. Sherwood's first successful play was *The Road to Rome* in 1927. His *Idiot's Delight* and *Abe Lincoln in Illinois* received Pulitzer prize awards in 1936 and 1939. His plays are inspired by democratic and humanitarian ideals. They include, in addition to the above, *Reunion in Vienna, Acropolis, Revelation,* and *There Shall Be No Night*. His book *Roosevelt and Hopkins*, a biography, was published in 1948. He was a member of the American Academy of Arts and Letters.

Sholes, Christopher Latham (1819-1890), American inventor, was born in Columbia County, Pa. At 18 years of age, he went to Wisconsin, where he became an editor, and, in 1848, was elected to the state legislature. He removed to Milwaukee in 1860 and was engaged in various departments of government service. In 1866, he began to devote his leisure hours to the devising of a machine that became, after six years' work, the first practical typewriter. In 1868, he won the financial aid of James Densmore, who was instrumental in selling the manufacturing rights to the firm of E. Remington and Sons. Sholes parted with his patent rights for $12,000. See *Typewriter*.

Shostakovich, Dmitri (1906-), composer, was born in Leningrad. He received his training at the Conservatory there and composed several pieces, including his First Symphony, while still in his teens. In 1925 he became a member of the Union of Soviet Composers, and was soon hailed as a musical laureate of the U.S.S.R. Among many honors he received was the Soviet Union's 100,000-ruble award for highest achievement in arts and sciences. Although his symphonies and some of his operas have found admirers in the United States and other non-Russian countries, both his political overtones and his musical innovations have made his works the subject of lively controversy. He has been a life-long resident of Leningrad, having remained there even during the siege of World War II.

Sibelius, Jean Julius Christian (1865-), Finnish composer, was born at Tavastehus. Having studied at Helsinki, Berlin, and Vienna, he returned to Helsinki and taught at the Conservatory there, later becoming principal. Through his compositions and teaching, he created a Finnish national type of music, leading examples of which were his symphonic poems *Finlandia, Oceanides,* and others based on Finnish myths. His other works include the well-known *Valse Triste* and incidental music to *As You Like It, The Tempest,* and *Scaramouche*.

Siddons, Sarah (1755-1831), English tragic actress, was born at Brecon, Wales. In 1773, she married William Siddons, an actor, and, in 1775, made her first appearance in London as Portia, but was unsuccessful. She reappeared at Drury Lane in 1782 in the character of Isabella in *The Fatal Marriage*. In 1785, she appeared as Lady Macbeth, her greatest role, and in 1788 as Queen Catherine. Thenceforth, until her retirement in 1812, her course was a continual triumph. In 1783 Sir Joshua Reynolds painted her as "The Tragic Muse."

Sidney, Sir Philip (1554-1586), English writer and soldier, was born in Kent. He was educated at Oxford; traveled throughout Europe; and, upon his return, became a favorite at the court of Elizabeth, who called him "the jewel of her dominions." For the entertainment of his sister, he wrote his celebrated *Arcadia* and several minor poems. Among his works are also *Apologie for Poetrie* and *Defense of Poesie*. He was mortally wounded at the battle of Zutphen. The singular beauty of his character is evidenced by an incident which occurred when he was being carried from this field of battle. Seeing a common soldier lying wounded near by, Sidney handed him his bottle of water, saying, "Thy necessity is greater than mine."

Sienkiewicz (*shĕn-kyā'vich*), **Henryk (1846-1916),** Polish novelist, was born at Wola Okrzejska, Lithuania, and was educated at the University of Warsaw. He wrote *The Deluge, Pan Michael, Without Dogma,* and *Children of the Soil*, which are remarkable for vigorous characterization, historical truth, and psychological analysis. In 1896 appeared his masterpiece, *Quo Vadis?*, which gave him world-wide fame. In 1905, he was awarded the Nobel prize for literature. See *Quo Vadis?*.

Sigsbee, Charles Dwight (1845-1923), American naval officer, was born in Albany, N. Y., and was graduated from the United States Naval Academy in 1863. He was present at the battle of Mobile Bay and at both attacks on Fort Fisher. In 1865-69, he was attached to the Asiatic squadron, and, during 1874-78, sounded and explored the Gulf of Mexico.

Sigsbee introduced numerous inventions and new methods in deep-sea exploration. In 1897, he took command of the battleship *Maine*, which was blown up and sunk in Havana Harbor, February 15, 1898. He commanded the battleship *Texas*, 1898-1900, and was made rear admiral in 1903. He wrote *Deep Sea Sounding and Dredging* and *Personal Narrative of the Battleship Maine*.

Sikorsky, Igor (1889-), airplane designer, was born in Kiev, Russia. After being graduated from the Naval College at Leningrad he decided to take up engineering and studied at the Polytechnic in Kiev. From the age of 12, when he built a rubber-powered helicopter that did not fly, he continued to experiment with airplanes. By 1911 he was able to stay in the air half an hour at 1000 feet altitude with his S-5. From a four-motor plane which he developed came the bombers he built for the Russian government during World War I. After the revolution he came to America, where, with the help of friends, he was able to organize the Sikorsky Manufacturing Corporation. His amphibian planes proved particularly successful. His company was purchased by United Aircraft and Transport, and he became engineering manager for the company's Vought-Sikorsky Aircraft Division. He gave much attention to the design and manufacture of helicopters. He produced a practical plane of this type in 1939, and his helicopters were used extensively by the U. S. government and private organizations during World War II.

Simms, William Gilmore (1806-1870), American poet and novelist, was born at Charleston, S. C. He studied law, which he soon abandoned for literature. His chief poetical production, *Atalantis*, a story of the sea, published in 1832, established his reputation. He became a very prolific writer, producing numerous volumes of verse and short stories, novels, historical and biographical books, and dramas. For many years he was the leader of a Southern literary coterie, of which Timrod and Hayne were prominent members.

Simonson, Lee (1888-), American scenic designer, was born in New York City. After he was graduated from Harvard University, Simonson studied painting in Paris and specialized in scene painting for the stage. He was designer for the Washington Square Players, 1912-16, and was a director of the Theatre Guild from 1919. Among the plays for which he designed the setting are *Peer Gynt, Back to Methuselah, Dynamo, The Apple Cart, Idiot's Delight,* and *Jane Eyre*.

Simpson, Sir James Young (1811-1870), Scottish physician, was born at Gathgate. He was graduated in medicine from the University of Edinburgh, 1832, and was appointed to the chair of obstetrics, 1840. In 1846, he introduced into England the use of ether as an anesthetic and, in 1847, first employed chloroform for the same purpose. In 1856, he was awarded the Montyon prize for his discovery of chloroform as an anesthetic and for introducing its use into obstetrics.

Sims, William Sowden (1858-1936), American naval officer, was born at Port Hope, Ont. In childhood, he was brought to Pennsylvania, and, in 1880, was graduated from the United States Naval Academy. After some years spent in naval service on the sea and in the American embassy at Leningrad, he came into notice through recommending, in a personal letter to President Roosevelt, that

improved methods of gunnery should be introduced into the navy. He rose rapidly in rank and, when the United States entered World War I in 1917, he was made rear admiral with command of the American fleet in European waters. His management of the fleet throughout the remainder of the war won high praise both in America and abroad. As a result of outspoken criticism which he directed against the secretary of the navy, he was retired in 1919 from his command, and he resumed duties in which he had previously been engaged as president of the Naval War College at Newport.

Sinclair, Upton Beall (1878-), American author and socialist, was born in Baltimore, and was graduated from the College of the City of New York, 1897. He assisted the government in the stockyard investigation in Chicago in 1906 and took a leading part in socialist movements. His published works include *Springtime and Harvest, Manassas, The Jungle, The Industrial Republic, The Overman, The Profits of Religion, Expect No Peace, World's End, Between Two Worlds,* and *Dragon's Teeth,* which received the Pulitzer prize for 1942.

Sinding (*sĭn'dĭng*), **Christian (1856-1941)**, Norwegian composer, was born at Königsberg. He studied under Reinecke at Leipzig, 1874-77, and, after further preparation at Dresden, Munich, and Berlin, settled in Oslo as organist and teacher. In 1921, he joined the faculty of the Eastman School of Music at Rochester, N. Y. His piano compositions are notable for their brilliancy and for their reflection of Norwegian characteristics. He wrote the opera *Der Heilige Berg.*

Sitting Bull (c. 1837-1890), a "medicine man" of the Sioux Indians. He exercised great influence over various chiefs and was an obdurate foe of the whites. He was conspicuous in the Sioux massacre of 1862; was constantly on the warpath for 14 years; was a leader in the Indian outbreaks of 1876; and directed operations leading to the battle of the Little Big Horn, in which General Custer and his entire force were killed. With his band, he escaped into Canada, but continued even there to incite rebellion among the Sioux Indians. In 1880, receiving the promise of pardon, he returned to Dakota and surrendered to General Miles. He again incited the Indians to renewed outbreaks. His arrest was ordered and, in attempting to resist, he was killed.

Sitwell, Sir Osbert (1892-), poet and critic, was born in London, England. He is perhaps the leading member of a famous British family of writers, the other members being his sister Edith and his brother Sacheverell. All three show marked originality, with more than a trace of literary snobbishness. Sir Osbert says in *Who's Who* that he advocates "compulsory Freedom everywhere, the suppression of Public Opinion in the interest of Free Speech." His family memoirs contained in *Left Hand, Right Hand!* and *Noble Essences* are stimulating reading, as are also his poems, *Four Songs of the Italian Earth*; *Demos the Emperor*: *A Secular Oratorio*; and *England Reclaimed: A Book of Balearics.*

Sixtus V (1521-1590) (Felice Peretti), pope, was born in Ancona, Italy. He was professor of theology at Rimini and Siena; became known as an eloquent preacher; was made vicar-general and cardinal; and, in 1585, succeeded Gregory XIII in the pontifical office. His pontificate was notable for a vigorous administration. He built the Library of the Vatican; authorized a new edition of the Septuagint and the Vulgate; and carried out a general policy of aggrandisement for the Church.

Skinner, Otis (1858-1942), American actor, was born at Cambridge, Mass. He was an amateur reader and actor at Hartford, Conn., prior to 1877, when he made his professional debut as Jim in *Woodleigh.* He appeared at different times with Edwin Booth, Lawrence Barrett, and Mme. Modjeska. Under the management of the producer Augustin Daly, he played in New York, London, Paris, Berlin, and other cities. The later plays in which he was seen include *Sire, Kismet, Uncle Tom's Cabin, Merry Wives of Windsor,* and *Merchant of Venice.* He wrote *Mad Folks of the Theatre* and *One Man in His Time.*

Slater, Samuel (1768-1835), American manufacturer, was born in Derbyshire, England. Having acquired a thorough knowledge of cotton spinning under a partner of Richard Arkwright, he emigrated secretly to the United States in 1789 and, in the following year, founded a spinning factory at Pawtucket, R. I., the first in America. With his brother John, he built extensive cotton mills on the site of the present town of Slatersville, R. I., in 1806 and others at Oxford, Mass., in 1812. In 1815-16 he erected woolen mills. To these activities of Slater, the present textile industry of New England owes its origin.

Smiles, Samuel (1812-1904), British biographer, was born at Haddington, Scotland. At 20, he was graduated in medicine from Edinburgh and began practice in his native town. Subsequently he became editor of the Leeds *Times* and was, for some years, secretary of the Leeds and Thrisk Railway and of the South-Eastern Railway, retiring in 1866.

Smiles became the biographer of self-made men and a glorifier of industry. His book of practical talks to young men, *Self-Help,* met with extraordinary success. Among his other books are *Life of George Stephenson, Character, Thrift, Duty, Life and Labor, Industrial Biography,* and *Josiah Wedgwood.*

Smith, Adam (1723-1790), Scottish political economist, was born at Kirkcaldy. He was educated at Glasgow University and at Oxford. In 1751, he was elected professor of logic in Glasgow, and, in the following year, he became professor of moral philosophy. In 1759, he published his *Theory of Moral Sentiments,* still well known in the history of ethics. After a period of travel and study, he produced, in 1776, his *Wealth of Nations,* on the basis of which he is frequently called the father of economics. This work is the standard source for arguments in favor of free enterprise. Its conclusions are based on developments antedating the industrial revolution and the corporate form of business enterprises.

Smith, Alfred Emanuel (1873-1944), American statesman, was born in New York City of humble parentage. Elected to the state assembly in 1903 as a Democrat, he served continuously until 1915, being Democratic floor leader during the later years. He took a prominent part in the insurance and factory investigations ordered by the legislature and in amending the constitution to permit the passage of a Workmen's Compensation Law. He was elected governor of New York State for terms extending over 1919-20 and 1923-28. At the Democratic National Convention in 1924, Smith was a prominent candidate for the presidential nomination, receiving a maximum of 364 votes. In 1928, he was chosen on the first ballot as Democratic candidate, but was defeated by his Republican opponent, Herbert Hoover, in the ensuing election. In 1936, he opposed the election of the Democratic candidate, Franklin D. Roosevelt, from whom he had become estranged. He headed the company which built the Empire State Building, tallest in the world.

Smith, Francis Hopkinson (1838-1915), American author, artist and engineer, was born at Baltimore and was educated as a mechanical engineer. He built the government sea walls at Governors Island and at Tompkinsville, Staten Island, the Race Rock Lighthouse off New London, Conn., and the foundation for the Bartholdi Statue of Liberty.

He became known also for his water-color paintings, charcoal sketches, and illustrations. His work is represented in the public art collections of Baltimore, Washington, and Buffalo.

Smith traveled extensively and wrote many novels, of which *Colonel Carter of Cartersville* and *Caleb West, Master Diver* rank among the most successful. As a writer, he excelled in depicting Southern life and manners. He was made a member of the American Academy of Arts and Letters in 1908.

Smith, Goldwin (1823-1910), publicist, historian, and educator, was born in Reading, England. He was graduated from Magdalen College, Oxford, 1845, and was called to the English bar, 1847. He was professor of modern history at Oxford, 1858-66; was a champion of the North during the American Civil War; visited the United States, 1864; and was lecturer, 1868-71, at Cornell University.

After 1871, he lived in Toronto. A skeptic in religion and humanitarian in politics, he favored Anglo-American friendship and predicted Canada's destiny to be union with the United States. Among his numerous writings are *Rational Religion, The Civil War in America, The Political Destiny of Canada, Commonwealth or Empire,* and *No Refuge But in Truth.* He left most of his fortune to Cornell University and bequeathed his Toronto estate to be used by the city as an art gallery and art school.

Smith, John (1580-1631), English adventurer and colonist, was born at Willoughby, England. In 1606, he sailed with an expedition of three vessels and 105 men to found a colony in Virginia. On the voyage he was accused of conspiracy to make himself king and was kept a prisoner. The expedition founded Jamestown in May 1607.

After being tried and acquitted, Smith was made a member of the council and for a time was the head of the colony, to which he rendered valuable service by reason of his familiarity with Indian characteristics. On one of his journeys into the country for corn, he was captured by Indians under chief Powhatan, but his life was saved through the intercession of the chief's daughter Pocahontas.

Having been superseded as governor of the colony by Lord Delaware in 1609, Smith returned to England. In 1614, he explored the coast of New England and, in 1615, undertook the founding of a colony in New England, but his vessel was captured by a French warship. He wrote, among other works, *True Relation*; *Generall Historie of Virginia, New England, and the Summer Isles.*

Smith, Joseph (1805-1844), founder of Mormonism, was the son of a farmer in Vermont state. He claimed to

have been divinely directed in 1823 to a place in Wayne County, N. Y., where he should find golden plates on which were engraved "the fullness of the everlasting gospel." Their text was orally translated by Smith, according to his own account, and the alleged translation was called the "Book of Mormon." Seven years later, the Mormon religion was founded under Smith's leadership. Persecution induced the sect to migrate to Illinois, where Smith was instrumental in founding Nauvoo. His last "revelation," dated in 1843, sanctioned polygamy, although this was publicly denied and its publication was withheld until 1852, eight years after Smith's death at the hands of a mob.

Smith, Margaret Chase (1897-), congresswoman, was born in Skowhegan, Maine, where, after attending public schools, she became a teacher. Later she began a successful business career in Skowhegan and entered politics. She was a member of Congress from 1940 to 1949. In 1948 she was elected United States senator from Maine, and was re-elected in 1954.

Smith, Sydney (1771-1845), English humorist, essayist, and clergyman, was born at Woodford. He was graduated from Oxford and was ordained to the Anglican Church. In 1802, he resided in Edinburgh. There he assisted in establishing the *Edinburgh Review*, of which he edited the first three issues. In 1803, he removed to London, where, 1804-06, he delivered *Lectures on Moral Philosophy*. In 1807-08, he published *Letters on the Subject of the Catholics*, advocating Catholic emancipation, which had an immense success, and later wrote a number of political speeches and pamphlets, all characterized by brilliant wit and forceful argument. Many of his epigrams have had frequent repetition, and his denunciation of all things American has been called the most famous sneer in history. He was a canon of Saint Paul's, London, 1831-1845.

Smollett (*smŏl'ĕt*), **Tobias George (1721-1771),** British novelist, was born near Dumbarton, Scotland. After a meager schooling at Dumbarton, he was apprenticed to a physician in Glasgow, where he attended lectures at the university and acquired some knowledge of languages. At 18, he went to London. Failing to find a publisher for his play *The Regicide*, he became a surgeon's mate in the navy and served in the Carthagena Expedition, 1740-41. Quitting the navy, he set himself up as a surgeon in London, but lived chiefly by his pen. An autobiographical novel *Roderick Random*, published in 1748 and containing realistic pictures of life in the navy, was a notable success. Of his subsequent novels, the best known are *Peregrine Pickle* and *Humphrey Clinker*. Smollett is regarded as the founder of the satirical novel. See *Peregrine Pickle, Roderick Random*.

Smoot, Reed (1862-1941), American legislator, was born at Salt Lake City. He was graduated from Brigham Young Academy, Provo, Utah, 1879. In 1900, he was made an apostle of the Mormon Church. He became president of numerous banks and other corporations and accumulated a large fortune. He was elected to the United States Senate in 1903, the first Mormon to be a senator, and was re-elected for terms extending to 1933. He was a conservative, and opposed the League of Nations.

Smuts (*smŏōts*), **Jan Christiaan (1870-1950),** South African statesman and general, was born at Cape Town. He was educated at Victoria College and at Cape and Cambridge universities. Having been admitted to the bar, he practiced in Cape Town and later at Johannesburg, where he was appointed attorney of the Transvaal Republic at 28 years of age. During the South African War of 1899-1902 he rose by sheer military genius to be one of the outstanding Boer leaders and aided in negotiating the peace treaty.

The formation of the Union of South Africa as a British dominion is due more to him than to any other man, and, after its establishment, he held various cabinet offices in the Union. On the outbreak of World War I in 1914, he organized the South African forces and, with Botha, crushed a rebellion at home and conquered South West Africa. In 1916, he was made commander of the British forces in German East Africa. He represented South Africa in the Imperial War Cabinet and at the Paris Peace Conference, where he took the leading part in securing the recognition of the autonomy of the British dominions. Smuts was premier of South Africa 1919-24 and 1939-48. Defeated in 1948, he became leader of the opposition.

Smyth, Henry Dewolf (1898-), physicist and educator, was born at Clinton, N. Y. Following graduation from Princeton and studies at Cambridge University, he joined the faculty of Princeton as instructor in physics. In 1941 he became director of the Office of Scientific Research and Development and had charge of research in isotopes and chain reaction. At the close of World War II he was asked by the War Department to write a report, which was entitled *Atomic Energy for Military Purposes*. Because of its completeness it has been referred to as "a textbook on nuclear physics."

Snowden, Philip Snowden, Viscount (1864-1937), English socialist writer and politician, was born at Cowling, Yorks. In 1886, he entered the civil service from which, in 1893, he retired. He then devoted himself to journalism and politics, becoming well known for his advocacy of socialistic views. From 1906 to 1918, he sat in Parliament as a Socialist, and was again elected to Parliament in 1922. He was chancellor of the exchequer in 1924 and again in 1929-31; minister of finance in 1929. He was made a peer in 1931. His writings include *Socialism and Syndicalism, Socialism and the Drink Question*, and *The Living Wage*.

Sobieski (*sō-byĕs'kē*). See *John III, Sobieski*.

Sockman, Ralph Washington (1889-), clergyman and writer, was born at Mt. Vernon, Ohio. He was educated at Ohio Wesleyan and Columbia universities and at the Union Theological Seminary. He is minister of Christ Church in New York City and for several years has been a radio preacher for the National Council of Churches of Christ in America. He is the author of numerous books, including *Suburbs of Christianity and Other Sermons, Paradoxes of Jesus, Date with Destiny, The Higher Happiness, How to Believe*, and *The Whole Armor of God*.

Socrates (c. 470 B.C.-399 B.C.), Greek philosopher, was born at or near Athens, Greece. He was the son of Sophroniscus, a sculptor, and he himself followed this profession in the early part of his life. Socrates saw Athens at its zenith, and he lived to witness its fall.

Character and Public Life. He received the usual education of the Athenian citizen, which included the study of the Greek poets and the elements of the sciences then known. He had an ungainly figure, a bald head, prominent eyes, and a snub nose. His wife, Xanthippe, possibly nursing a grievance against her husband for his indifference to wealth, has passed into history as the typical scold. Socrates distinguished himself for his courage at the battles of Potidæa, Delium, and Amphipolis. He was remarkable for his endurance in hardships and his self-control in pleasures. On two occasions he risked his life rather than consent to an unworthy deed—once when, having been selected by lot as president of the assembly of citizens, he refused to yield to their angry clamor and permit an illegal execution of the city's military leaders; and once when, commanded by the so-called 30 tyrants, he refused to slay one of their enemies.

Socrates found no satisfaction in the vast and vague speculations of the physical philosophers. He turned his attention exclusively to the study of man and of morals. He believed that it was his divinely appointed mission to test the reputed wisdom of the great and the accepted opinions of the average man and, by means of skillful questioning, to force upon all a consciousness of ignorance as the first step toward self-improvement. In his questioning, he sought to arrive at definitions of the different virtues. He is credited with having originated the scientific definition and formal inductive reasoning as aids in thought and investigation. The basis of his ethics is the principle or paradox that all vice is ignorance and that no one is willingly bad.

It is not clear what was the exact position of Socrates as to the religion of the state, but it is probable that he believed in the traditional dieties. That he believed in one supreme God, the ruler of the universe, is clear. He constantly asserted that he was guided by an inner voice, which warned and restrained him when he contemplated any action that might have an undesirable issue.

Condemnation. Socrates' habit of questioning together with his own avowal of ignorance, known as Socratic irony, made him many enemies. As early as 423 B. C., the satirist Aristophanes voiced in *The Clouds* the hostile feeling already existing. Some feared Socrates for his seemingly ambiguous position in religion; others bore grievance because he questioned the traditional morality and proposed to substitute reason for custom in the conduct of life. Association with Alcibiades and Critias, who were justly hated by the Democratic party, helped also to bring him into disfavor with the dominant faction at Athens. In 399 B. C., he was formally charged with impiety and the corruption of the youth. He defended himself in a simple speech in which he maintained that, so far from meriting any penalty, he deserved to be supported at the state's expense. He was condemned to death by a jury of Athenian citizens.

Influence. Socrates left no writings. Few men, however, have so powerfully influenced the world's thought. Through the works of Plato, Socrates may be said to have been the originator of idealistic philosophy. His words were made the basis both for the Stoic and for the Epicurean system of philosophy. In the decay of the old beliefs, he became the chief religious type of the ancient world. He was executed in the manner customary at Athens, being compelled to drink a cup of poison hemlock. See *Educational Reformers*.

Soddy, Frederick (1877-1956), English chemist, was born at Eastbourne. After he was graduated from Oxford University, Soddy taught at McGill University from 1900

to 1902 and, having worked in the laboratory with Rutherford and Ramsay, he became, in 1904, lecturer in radioactivity at Glasgow University. In 1914 he was made professor of chemistry at Aberdeen University, from which he went in 1919 to Oxford University as professor of inorganic and physical chemistry. For his work on radioactivity, he was awarded the Nobel prize in chemistry for 1921. This work led to his formulation of the theory of isotopes. His scientific publications include *Radioactivity, The Interpretation of Radium,* and *Matter and Energy.* He advocated modifications in the economic system in his *Cartesian Economics, Money versus Man,* and *Wealth, Virtual Wealth and Debt.* See *Isotopes.*

Solon (*sō'lŭn*) **(c. 639 B.C.-c. 559 B.C.),** Athenian legislator and one of the seven sages of Greece, was born of an ancient family at Salamis. After acquiring a fortune by commerce and gaining much knowledge by travel, he turned his attention to writing and to public affairs, making a practice of expressing his political opinions in elegaic verse.

Solon first came into notice as a leader in the war by which Athens wrested Salamis from Megara. In an economic crisis, he was chosen to devise remedial measures, and his statesmanlike measures led to his being clothed with full powers to remodel the constitution. He framed a new code of laws containing great advances directed toward individual liberty and democracy.

According to tradition, Solon bound the citizens by oath to observe these laws for ten years, during which he withdrew from Athens, but, upon his return, he found the tyranny of Pisistratus established.

Solvay (*sōl'vā*), **Ernest (1838-1922),** Belgian manufacturing chemist, by some styled the Carnegie of Belgium, was born at Rabeck, near Brussels. He was educated at Liège and early in life began the manufacture of chemicals. His greatest achievement was the development of the ammonia process, commonly called the Solvay process, for the manufacture of soda. In 1863, at Couillet, Belgium, he built a plant for utilizing this process. The enterprise was eminently successful and was extended throughout Europe and America. In 1880, he manufactured about one-half, and in 1913 nearly all, of the world's supply of soda. He amassed a large fortune, founded the Solvay institute in Brussels, and was active in philanthropic enterprises. Much of his wealth was taken from him during the German occupation of his country in World War I. See *Soda, Solvay Process.*

Solyman II (*sŏl'ĭ-măn*) **(1496-1566),** surnamed "The Magnificent," sultan of Turkey, was the greatest of the Turkish sultans, and was scarcely less remarkable for the wisdom and justice of his internal administration than for the extent of his conquests. He encouraged literature and was himself a poet of no mean rank. He died of fever while besieging the town of Szigeth, in Hungary.

Sophocles (495 B.C.-406 B.C.), Greek dramatist, was born at Colonus near Athens. From his father, Sophilus, he received a liberal education in all the literary and personal accomplishments of his age. He was proficient in poetry and music and was handsome in person. At 15, he was chosen to play on the lyre an accompaniment to the pæan that celebrated the battle of Salamis. At 27, in the festival of the Dionysia, he was awarded the first prize in tragedy over Æschylus. In the following 32 years, he won the first prize about 20 times and never fell below second place. His first recorded contest with Euripides was in 438 B. C., when the latter came off second best.

As a result of the success of *Antigone,* presented in 440 B. C., Sophocles won an appointment as colleague of Pericles and Thucydides in the Samian war. His greatest laurels, however, were won in literary rather than in political and military fields.

Sophocles' tragedies mark the transition from the drama as a religious institution to the drama as a work of pure art. He added the third speaker to the second already introduced into tragedy by Æschylus. The dramas of Sophocles hold an even balance between the titanic symbolism of Æschylus and the sentimental realism of Euripides. A slight plot sufficed him for a masterpiece because his subtle dramatic art and his exhaustive psychological analysis could elicit from a simple situation a complete revelation of character and destiny. Fate is, with him, not a capricious power, but an inevitable outcome of given characters and situations. His dramas are written in a concise, elegant style and are rich in deep poetic sentiment.

His *Œdipus the King* is regarded as the most perfect Greek tragedy. Of about 120 plays composed by him, only 7 are extant in their entirety; namely, *Œdipus the King, Œdipus at Colonus, Antigone, Philoctetes, Ajax, Maidens of Trachis,* and *Electra.* He was remembered as a man of sweet temper, consummate grace, and rare balance of mind. See *Œdipus Tyrannus.*

Sorolla y Bastida, (*sō-rōl'yȧ ē bȧ-stē'dȧ*), **Joaquin (1863-1923),** Spanish painter, was born in Valencia and studied art in the Academy there and later in Paris. His first successes were "Another Marguerite," 1892, now in the Saint Louis Museum, and "The Fishing Boats' Return," in the Luxembourg, Paris.

Producing landscapes, figure paintings, and portraits with great rapidity, he soon became one of the foremost modern impressionistic painters. His subjects are chiefly out-of-door scenes in brilliant sunlight, rendered with remarkable vigor and sure technique. The Metropolitan Museum, New York, contains his "Swimmers." "The Bath," "After the Bath," "Beaching the Boat," and the portrait "Señora de Sorolla in Black." For practically the whole of the decade 1910-20, he was engaged on work for the Hispanic Society of America, for which he produced portraits of Spanish writers and a "Panorama of the Forty-nine Provinces of Spain."

Sothern (*sŭTH'ĕrn*), **Edward Hugh (1859-1933),** American actor, was born in New Orleans, La. He received an academic education in England; first appeared on the stage in New York, 1879; and won his first real success in *One of Our Girls,* 1885. During the ensuing ten years, his most popular plays were *If I Were King, The Highest Bidder, The Three Musketeers,* and *The Adventure of Lady Ursula.* In 1904, with Julia Marlowe, whom he married in 1911, he began presenting Shakespearean plays and attained first rank among Shakespearean actors of his time in America. His roles included Hamlet, Macbeth, Jacques, Petruchio, Malvolio, Shylock, and Romeo.

Soto, Hernando de (c. 1500-1542), Spanish explorer, was born in Estremadura. He joined the expedition of Pizarro, under whom he served in Peru. About 1536, he was made governor of Cuba. In 1539, he explored and took possession of Florida, and, in the same year, he conducted an expedition from there and discovered the Mississippi River, on the banks of which he died.

Soult (*sōōlt*), **Nicolas Jean de Dieu (1769-1851),** marshal of France, was born at Saint Amans la Bastide. In 1785, he entered the army; was appointed general of a division in 1799 by Masséna; became an ardent Napoleonist; and was made marshal of France in 1804.

He achieved brilliant success at the battle of Austerlitz, which he decided by piercing the Russian center. He took part in the Russian campaign of 1806-07, after which he was created duke of Dalmatia. In 1809, he became commander in chief in Spain; gained a brilliant victory at Ocana; subdued Andalusia; but was defeated at Talavera and Albuera. He was sent to hold Wellington in check, but suffered further reverses at Salamanca and Toulouse in 1814.

He became a Royalist after the abdication of Napoleon; but, on the return of the latter from Elba, he abandoned Louis XVIII and became major general of the Imperial army. After Waterloo, he was banished from France, 1816-19, but later served as minister in various cabinets and was made marshal-general of France in 1847.

Sousa (*sōō'zȧ*), **John Philip (1854-1932),** American bandmaster and composer, was born at Washington, D. C. He studied music and became first violin in Jacques Offenbach's Orchestra. He was bandmaster of the United States Marine Corps, 1880-92, and, after 1892, was director of Sousa's Band. His ability as a composer of marches won him the title of "The March King." His most famous ones include "Washington Post" (1889), "El Capitan" (1896), and "Stars and Stripes Forever" (1897). His compositions include also the operas *The Smugglers, The Queen of Hearts,* and *The Free Lance.* His publications include *The Fifth String, Dwellers in the Western World,* and *Transit of Venus.*

Southey (*souTH'ĭ*; *sŭTH'ĭ*), **Robert (1774-1843),** English author, was born at Bristol. He was educated at Oxford, but he left without a degree in 1794 and traveled in Spain and Portugal. In 1893, he settled at Greta Hall, Cumberland, where he devoted the remainder of his life to literature.

In addition to his formal works, he wrote extensively for periodicals, notably the *Quarterly Review.* On the death of Pye, 1813, Southey was made poet laureate. His chief poetical works are *Madoc, Thalaba, The Curse of Kehama,* and *Roderick.* As a prose writer, Southey is well represented by his *Letters from England by Don Manuel Alvarez Espriella, The Doctor,* and *The Life of Nelson.* His prose style is easy, lucid, and agreeable.

Spalding, Albert (1888-1953), American composer and violinist, was born in Chicago. Educated in New York, Florence, and Paris, he toured the principal cities of Europe. His debut in America took place in 1908 at Carnegie Hall, New York, with the Damrosch Orchestra. He was elected in 1937 to the American Academy of Arts and Letters.

Sparks, Jared (1789-1866), American historian, was born at Willington, Conn. He was graduated from Harvard, 1815; was a Unitarian minister at Baltimore; and finally became editor of the *North American Review.* For ten years, he was professor of history at Harvard and, for four years, was its president. His writings include *Life of John Ledyard,*

Life of Gouverneur Morris, and *Library of American Biography*. He edited *The Works of Benjamin Franklin*, *Writings of George Washington*, and *Correspondence of the American Revolution*.

Spartacus (?-71 B.C.), Thracian revolutionary leader, who, having been captured by the Romans and placed in a Roman gladiatorial "school," escaped in 73 B. C. and headed a revolt of the slaves. He defeated army after army of the Romans and threatened the city itself, but was finally defeated by Crassus and, being trapped, died fighting bravely. His 6000 captured followers were crucified.

Speke (*spēk*), **John Manning (1827-1864)**, English explorer, was born at Jordans, Somersetshire. At the age of 17, he entered the Indian army, made several trips to the Himalayas, and reached Tibet. In 1854, he accompanied Captain Burton to Somaliland, and, in 1857-59, from Zanzibar into the interior of Africa. They discovered Lake Tanganyika in 1858 and, in the same year, Speke reached Lake Victoria. He then believed this lake to be one of the sources of the Nile, and in 1862 verified his belief. He wrote *Journal of Discovery of the Source of the Nile*.

Spellman, Francis Joseph (1889-), American prelate, was born at Whitman, Mass. He studied at Fordham College, and at the University of the Propaganda at Rome and was ordained priest there in 1916. He held several pastorates, was attached to the office of the papal secretary of state, 1925-32, and was auxiliary bishop of Boston, 1932-39. He was made archbishop of New York in 1939. In February 1946, Pope Pius XII made him cardinal.

Spencer, Herbert (1820-1903), English philosopher, was born at Derby, England. Ill health in childhood necessitated a home education.

Taking up civil engineering in 1837, he still found time for much miscellaneous reading. From 1845 to 1853 he was employed on the London *Economist*. This position gave time for his studies, and made him acquainted with such brilliant thinkers as George Henry Lewes, "George Eliot," and John Stuart Mill.

Spencer published in 1850 his *Social Statics*. This work was of a decidedly *a priori* character and did not show the inductive spirit of his later writings. It reveals, however, his tendency to reconcile opposing influences and to discover closeness of relations where others did not suspect them. In 1855, he published a work on psychology, which he afterward revised and expanded into a part of his *Synthetic Philosophy*. Over-application brought on a serious attack of nervous prostration, in consequence of which he was obliged, for the rest of his life, to abridge his hours of study.

Meanwhile, Spencer had conceived a system of philosophy that should embrace the general principles of all existing knowledge. He brought out a prospectus indicating his intention to give 20 years to its development. He published the *First Principles* in 1862. Then, fearing that he would not live to complete the system, he wrote *The Data of Ethics*, which had been the object of the whole system and in which it was intended to culminate. Fortunately, he was able to complete the undertaking and to revise an important part of it. It consists of two volumes on biology, two on psychology, three on sociology, and two on ethics. His later years were devoted to his *Autobiography*.

Spencer's philosophy is a philosophy of evolution. Beginning with the first principles of all we know, he proposed to trace how the law of evolution was realized in life, mind, society, and morality. Few men have ever dominated contemporary thought more completely or have succeeded to such a degree in popularizing a scientific point of view. See *Educational Reformers*.

Spender, Stephen (1909-), English poet and critic, was educated at Oxford. Widely known as a writer of poems, some of them rather leftist in point of view, he has served also as co-editor of *Horizons* and as editor of *Encounter*. In 1953 he was Elliston Lecturer and poet in residence at the University of Cincinnati and he has been called upon to lecture at several other American colleges and universities. Collections of his poems, published at intervals, include: *20 Poems*, *Poems of Dedication*, and *Collected Poems*. His autobiography is contained in *World Within World*.

Spengler, Oswald (1880-1936), German philosopher, was born at Blankenburg. He studied mathematics, history, and art, from which fields he drew extensively for material in support of the thesis set forth in his best known work, *The Downfall of Western Civilization*. He maintained that civilizations rise and fall according to definite laws, and that the present Western civilization is now in the declining stage of its cycle. This work was translated into many languages and attracted a great deal of attention.

Spengler was engaged as a teacher in Hamburg and later in Munich. He wrote also *Prussianism and Socialism*, *Pessimism*, and *The Rebuilding of Germany*.

Spenser, Edmund (c. 1552-1599), English poet, was born of humble parentage in London. He studied at Pembroke College, Cambridge, and was brought under the notice of Queen Elizabeth by the Earl of Leicester. In 1579, he published *The Shepherd's Calendar*, which marks an epoch in the development of English poetry. Through the influence of Leicester, he was appointed chief secretary to the lord lieutenant of Ireland. Queen Elizabeth conferred on him an estate at Kilcolman, where he wrote *The Faery Queen*, his greatest work. His other works include *Tears of The Muses*, *Epithalamion*, *Astrophel*, *Hymns*, and *Visions*.

In 1598, a rebellion broke out; Spenser's Castle at Kilcolman was burned, and an infant child of the poet perished in the flames. Spenser returned to London, impoverished and broken-hearted. He was buried near Chaucer in Westminster Abbey. See *Faery Queen*, *Shepherd's Calendar*.

Sperry, Elmer Ambrose (1860-1930), American electrical engineer and inventor, was born at Cortland, N. Y., and was educated there and at Cornell University. He founded the Sperry Electric Company in Chicago in 1880, engaging in the manufacture of arc lamps, dynamos, and other electrical appliances. He invented the gyrocompass and instruments for stabilizing airplanes, ships, and aerial torpedoes. He became president of the Sperry Gyroscope Company in 1910. See *Compass*.

Spinoza, Baruch (1632-1677), Dutch philosopher, was born of Jewish parentage at Amsterdam, the Netherlands. From childhood, Spinoza was physically delicate and was inclined to retired and studious habits. He received his early education from the rabbis. His extraordinary talents coupled with his penetrating studies of the physical sciences and of the writings of Descartes resulted in his excommunication from the synagogue in 1656.

He was later exiled from Amsterdam. In 1661, he settled at Rhynsburg near Leiden, where he became a master craftsman in lens polishing and devoted his spare time to abstruse studies. In 1663, Spinoza brought out an abridgment of the *Meditations* of Descartes under the general title *Descartes's Principles of Philosophy*. He attached an appendix, which was the first draft of his own *Ethics*.

In 1664, Spinoza removed to Voorburg, a few miles from The Hague. About 1668, he received a small pension from the statesman Jan de Witt and settled in The Hague. There, in 1670, he completed his great work, the *Tractatus Theologico-Politicus*. His *Ethics* was written about 1674, but was published posthumously because of his dislike of controversy. In this period, the elector of the Palatinate offered Spinoza the vacant chair of philosophy at the University of Heidelberg. This he refused, as well as all other honors and offers which he considered would endanger his independence and integrity of thought.

The attainment of truth was the one object of Spinoza's life. For this he sacrificed all natural ties of affection and endured want and persecution. He was stigmatized as an atheist and Epicurian in his day, but his abstemious life and the profoundly religious nature of his writings indicate how erroneous was this opinion.

Spinoza endeavored to found a system that should deduce the fundamental principles of moral life by strictly mathematical demonstrations founded on the knowledge of God. He held that existence consisted of extension, or the material world, and thought. Each of these realms was independent of the other: thought did not influence matter, and matter did not influence thought. Nevertheless the movements of one were parallel or analogous to the movements of the other, and the movements of each depended on an all-pervading essence, which was equivalent to God. The system is thus a thoroughgoing pantheism. Spinoza, though not a voluminous writer, has had an extensive and enduring influence on modern thought.

Sproul, Robert Gordon (1891-), American educational administrator, was born at San Francisco, Cal. After he was graduated from the University of California, he engaged in real estate and banking. He was made comptroller of his alma mater in 1920, vice president in 1925, and president in 1930. He lent his support to a large number of public and humanitarian causes.

Spurgeon, Charles Haddon (1834-1892), English preacher, was born at Kelvedon, Essex. In 1850, his sympathies drew him toward the Baptists, and, removing to Cambridge in 1851, he began to deliver cottage sermons. In 1854, he entered upon the pastorate of the New Park Street chapel, London, where his preaching proved so popular that finally his followers built for him the Metropolitan Tabernacle, opened in 1861.

Until 1891, Spurgeon continued to preach in the Tabernacle every Sunday to thousands of hearers. His sermons were published weekly, and yearly volumes were issued. He also wrote *John Ploughman's Talk*, *The Treasury of David*, and *The Saint and His Saviour*.

Staël (*stä'ĕl;* F., *stäl*), **Madame de** (Anne Louise Germaine de Staël-Holstein), **(1766-1817)**, French writer, was born at Paris. She was the daughter of Jacques Necker, minister of finance under Louis XVI. In 1786, she married Baron de Staël-Holstein, Swedish minister to Paris. In 1788, she

published *Letters on the Works and Character of Rousseau*, which attracted attention. Compelled by the Revolution to leave France and later exiled by Napoleon, she traveled in Germany and Italy, making the acquaintance of Goethe, Schiller, and other eminent men and gathering the material for her novel *Corinne* and for her widely known work *De l'Allemagne*. She also visited England, where she wrote *Ten Years of Exile*. After the fall of the Empire, she returned to Paris. Besides the foregoing, her works include *Thoughts on the French Revolution* and *Delphine*, a novel. Madame de Staël notably influenced the romantic movement in France.

Stalin, Joseph Vissarionovitch (1879-1953), Russian revolutionary and dictator, was born at Gori, Georgia, son of a peasant shoemaker named Dzhugashvili in the Caucasus. The name Stalin, "Steel," was given him as a sobriquet by Lenin. Expelled from a religious seminary in 1898 for "unreliability," he joined a revolutionary group. After the unsuccessful uprising of 1905, he robbed a government money transport to secure funds for his party. He was banished to Siberia four times, escaping three times and finally returning to Europe in February 1917 after the Revolution. Lenin made him a member of the all-powerful Politbureau.

With no advantages of appearance or oratory, Stalin consolidated his power by winning the support everywhere of the most ruthless foes of capitalistic social ideals. He shrank from neither hardship, danger, nor cruelty necessary for his purposes. Although merely secretary of the Bolshevik party, he broke with Lenin shortly before the latter's death, and overthrew Trotzky and secured his banishment. He was now strong enough to force through the so-called five-year plans for industrial development and collective agriculture. In World War II, by agreement with Germany, he seized the opportunity to consolidate Russian power on the Baltic and to obtain part of Poland.

When Germany attacked Russia in 1941, Stalin surprised the world by the quality of his resistance. He traded space for time, held Leningrad and Moscow, turned back the German invasion at Stalingrad, and, in 1945, after liberating Russia and Poland, overran all eastern Germany and occupied Berlin. At Yalta and Potsdam he obtained advantageous concessions from his allies. After the surrender of Germany his policies toward them became less co-operative and even unfriendly.

Standish, Miles (c. 1584-1656), New England colonist, was born in Lancashire, England. He served in the army in the Netherlands and sailed with the Pilgrims in the *Mayflower* in 1620. On reaching Massachusetts, he was chosen captain and led expeditions against the Indians. He settled finally at Duxbury, Mass., where he died. The story of his unsuccessful effort to secure a wife is told by Longfellow in his *Courtship of Miles Standish*.

Stanford, Leland (1824-1893), American capitalist and philanthropist, was born in Watervliet, N. Y. Early in life, he studied law and was admitted to the New York bar. Attracted to California by the gold discoveries, he engaged in mercantile business in San Francisco, 1856. He was one of the organizers and became president of the Central Pacific Railroad Company. Entering political life, he was Republican governor of California, 1861-83, and United States senator from California, 1885-93. He gave property to the value of $20,000,000 to found at Palo Alto, in memory of his deceased son, a university to be known as Leland Stanford Junior university.

Stanley, Sir Henry Morton (1841-1904), African explorer, was born near Denbigh, Wales, of obscure parentage. He went to Louisiana at an early age, served first in the Confederate army, then in the Federal navy during the Civil War, and subsequently went to Turkey as a newspaper correspondent. In 1867, he made a reputation as war correspondent in Ethiopia.

Sent by James Gordon Bennett to find Livingstone, he reached Zanzibar early in 1871; organized a large expedition; and found Livingstone, November 10, 1871, at Ujiji, on Lake Tanganyika.

In 1874, he set out on a second African expedition for the New York *Herald* and the London *Daily Telegraph*. He reached Lake Victoria in 1875; proceeded to Lake Tanganyika; pushed westward to the Lualaba, which he descended; and finally reached the Atlantic coast in 1877, proving the identity of the Lualaba and the Congo. During this notable journey, Stanley crossed equatorial Africa from east to west and traveled more than 7000 miles.

Stanley's next expedition to Africa was made under the auspices of the African International Association and it led to the foundation of the Congo Free State, now Belgian Congo. In 1886, Stanley undertook an expedition for the relief of Emin Pasha, who had been cut off in the interior of Africa by the Mahdi rebellion. Stanley left England in 1887 and returned in 1890 after escorting Emin and a large troop of followers from the interior to the coast. This was his last journey in Africa; it occupied 1012 days, replete with peril and tragic incident. Stanley wrote, among other works, *Congo and the Founding of Its Free State* and *In Darkest Africa*. He was a member of Parliament, 1895-1900, and was knighted in 1899.

Stanton, Edwin McMasters (1814-1869), American statesman, was born in Steubenville, Ohio. He practiced law in his native town until 1847, when he settled in Pittsburgh, Pa., and there became a leader of the bar. In 1860, he was made attorney general of the United States and, in 1862, secretary of war. The latter post he filled throughout the Civil War with ability, energy, and industry. He retained office until 1867, when he was suspended by President Johnson. Stanton was reinstated by the Senate in January 1868. In December 1869, he was appointed associate justice of the U. S. Supreme Court and died the same month.

Stanton, Elizabeth Cady (1815-1902), American reformer and suffragist, was born in Johnstown, N. Y. She married Henry B. Stanton, Antislavery reformer. She signed the call for the first Woman's Rights Convention at Seneca Falls, N. Y., 1848, and became president of the National Woman's Suffrage Association formed there, retaining the office until 1893. After 1848, she devoted much time to traveling and lecturing in behalf of woman's rights. She wrote *A History of Woman Suffrage* and an autobiography.

Stanton, Frank Lebby (1857-1927), American poet and journalist, was born at Charleston, S. C. From 1889 he was editor and column writer for the Atlanta *Constitution*. His poetry is largely lyrical and in Southern Negro dialect. Many of his poems have been put to music and have become very popular. These include "Just A-Wearyin' for You." "Li'l Feller," and "Mighty Lak a Rose." He was proclaimed poet laureate of Georgia in 1925.

Stark, Harold Raynsford (1880-), American naval officer, was born at Wilkes-Barre, Pa. After he was graduated from the United States Naval Academy in 1903, he entered the navy and rose through the grades to rear admiral in 1934. During World War I he was aide on the staff of Admiral Sims. He was advanced to chief of naval operations in 1939, when the fleet was being expanded to a "two-ocean navy." In 1942 he was placed in command of the American naval forces in Europe. He retired in 1946.

Stark, John (1728-1822), American soldier, was born at Londonderry, N. H. He served in the French and Indian War; at Bunker Hill, was colonel of a regiment raised by himself in one day; and was in the attack on Trenton and in the battle of Princeton. He raised a regiment in 1777 and took command of the New Hampshire troops sent against the British forces from Canada. On August 16, 1777, he won the battle of Bennington, which brought him the thanks of Congress and the rank of brigadier general. With a force recruited by him in New Hampshire, he cut off Burgoyne's retreat from Saratoga.

Stassen, Harold Edward (1907-), American politician, was born in West St. Paul, Minnesota, and was educated at the state university. He engaged in law practice, and was elected governor of Minnesota in 1939, resigning in 1943 to join the navy. He saw service in the Pacific. In 1944 he was a delegate to the San Francisco conference, holding advanced internationalist views. In 1948 he was a candidate for the Republican nomination for president, representing the liberal wing of the party. He was president of the University of Pennsylvania from 1948 until 1953, when he was appointed U. S. mutual security director. He was later made administrator of the Foreign Operations Administration, and in 1955 was given a special cabinet post dealing with disarmament.

Steele, Sir Richard (1672-1729), British essayist and playwright, was born in Dublin, Ireland. He was educated at Oxford. Leaving college without a degree, he entered the army and rose to the rank of captain. In 1702, he wrote the comedy *The Funeral, or Grief á la mode*, followed by *The Tender Husband* and *The Lying Lover*.

In 1709, Steele founded the *Tatler*, a tri-weekly periodical containing short essays on life and manners, which was succeeded by the *Spectator*, a daily literary journal of a higher tone and character. To both of these Addison, whom Steele had met at Charterhouse, contributed extensively and became the more important figure. Preceding the more finished work of Addison, Steele originated the essay describing contemporary manners which was later developed into the novel. In 1722, he produced his successful comedy *The Conscious Lovers*.

Stefánsson (*stā'fāns-sŏn*), **Vilhjálmur (1879-),** arctic explorer, of Icelandic descent, was born at Arnes, Manitoba. He was graduated from the University of Iowa, 1903, and studied anthropology at Harvard, where he became an instructor. In 1904-05, he made archeological researches in Iceland. He spent the winter of 1906-07 with the Eskimo of the Mackenzie delta and returned alone by way of the Porcupine and Yukon rivers.

Between 1908 and 1912, Stefánsson was engaged in the ethnological survey of the central North American Arctic

Coasts, exploring Coronation Gulf and discovering the so-called blond Eskimo. During 1913-16, he conducted explorations for the Canadian government. In 1921, he was instrumental in having Wrangell Island claimed for Canada, although the claim was later relinquished. From 1932, he was adviser to Pan-American Airways for northern routes. His writings include *My Life with the Eskimo*, *The Friendly Arctic*, and *Ultima Thule*.

Steffens, Joseph Lincoln (1866-1936), American journalist and author, was born at San Francisco, Cal. Educated at the University of California and at Heidelberg, Leipzig, and Paris universities, he worked as reporter and later as city editor for the New York *Evening Post*, beginning in 1892. While on the editorial staffs of the *American Magazine* and other periodicals he wrote a series of articles depicting the corruption of American city governments, later published more fully in *The Shame of the Cities* and *The Struggle for Self-Government*. His *Autobiography* is a valuable documentation of a period when municipal corruption frequently ran riot.

Steichen, Edward (1879-), photographer and painter, was born at Hancock, Mich. His first art work was the designing of advertising posters for a lithographing firm in Milwaukee. Later he became interested in the possibilities of photography as a fine art, and examples of his work were shown at salon exhibitions in Philadelphia, New York, London, and Paris. He specialized in portrait studies and had many prominent people as subjects, among them Shaw, Rodin, Maeterlinck, Theodore Roosevelt, and William Howard Taft. In collaboration with his brother-in-law, Carl Sandburg, he prepared the "Road to Victory" exhibit, which was shown in 1942 by the Museum of Modern Art in New York. As lieutenant commander in the U. S. Naval Reserve he directed many photographic projects during World War II.

Stein, Gertrude (1874-1946), American author, was born at Allegheny, Pa. After studying medicine at Johns Hopkins University, she took up her residence in Paris in 1903, where she became a friend of the leading artists and writers of the time, particularly those who were experimenting in new forms or opening up new fields of artistic expression. She developed and used in some of her writings a style in which words were used to evoke feelings quite apart from ideas which they might or might not express. Besides a long novel, *The Making of Americans*, her works include *Useful Knowledge*, *Before the Flowers of Friendship Faded*, *Poems*, *The Autobiography of Alice B. Toklas*, *The World Is Round*, and *Wars I Have Seen*.

Steinbeck, John Ernst (1902-), American novelist, was born at Salinas, Cal. After studying at Stanford University, he spent ten years at various jobs before the publication of his first novel *Cup of Gold*. This was followed by *Tortilla Flat*, *In Dubious Battle*, *Of Mice and Men*, and *Grapes of Wrath*, in which were depicted in swift realistic narrative moving dramas of characters, both weak and strong, embattled against the impersonal force of an economic system of which they were victims. *Grapes of Wrath* was honored by an award of the Pulitzer prize in 1939. Several of his works were no less successful as motion picture dramas than as novels. Works since then include *The Moon Is Down* (1942), *Cannery Row* (1944), *The Wayward Bus* (1947), *East of Eden* (1952), and *Sweet Thursday* (1954). He is a member of the American Academy of Arts and Letters.

Steinmetz (*stīn'mĕts*), **Charles Proteus (1865-1923)**, electrical engineer, was born in Breslau, Germany and was educated at Breslau, Berlin, and Zurich. He came to America and, in 1893, became consulting engineer for the General Electric Company. In 1902, he began also to serve as professor of electrical engineering in Union University. He became widely known as an authority on electric currents and particularly on problems of electrical measurements, in which he was reputed to be a genius. His publications include *Theory and Calculations of Alternating-Current Phenomena*, *Theoretical Elements of Electrical Engineering*, and *Engineering Mathematics*. He was a socialist and refused to accept more for his services than a very modest salary.

Steinway, Henry (1797-1871), piano manufacturer, was born at Wolfshagen, Germany. He was known as Heinrich Steinweg until 1850, when he emigrated to America and adopted the English equivalent of his name. As a maker of musical instruments in Brunswick, he produced many guitars and zithers and some "claviers," preparatory to his principal work for the future. In 1853, together with four sons, he established the firm of Steinway and Sons, manufacturers of pianofortes in New York City. Careful workmanship and some improvements in design, such as the "double-overstrung scale," gave this firm a reputation which has made the name a trade-mark of excellence for more than a century.

Stephen, Sir Leslie (1832-1904), English biographer and critic, was born at Kensington. He was educated at Eton, King's College, and Trinity Hall, Cambridge, where he was fellow and tutor. He was editor of the *Cornhill Magazine*, 1871-82, and of the first 26 volumes of the *Dictionary of National Biography*. His works include *The Playground of Europe*, *Hours in a Library*, *The English Utilitarians*, *An Agnostic's Apology*, and *Studies of a Biographer*.

Stephens, Alexander Hamilton (1812-1883), American statesman, was born in Georgia. He was graduated from the University of Georgia in 1832 and was admitted to the bar in 1834. In 1843, he was elected to Congress by the Whig party, and he retained his seat until 1859, during which period he supported the annexation of Texas, promoted the passage of the Kansas-Nebraska Act of 1854, and joined the Democratic party in upholding the measures of President Buchanan.

In 1860, he opposed the secession of his state, but, in the following year, expressed his adherence to sectional views and was elected vice president of the Confederate States of America. In 1866, he was elected United States senator, but was not allowed to take his seat. He was, however, a member of the House of Representatives 1873-82, and governor of Georgia, 1882-83. In 1869, he published *A History of the War of Secession* and, in 1870, *A Constitutional View of the War Between the States*.

Stephenson, George (1781-1848), English engineer and inventor, was born near Wylam, Northumberland. He was poor in early life, worked on a farm and at a colliery, and at 17 became engineman at Throckley Bridge. Although a grown man he went to night school to learn the elements of English and mathematics.

In 1806, Stephenson had charge of an engine in a large spinning mill near Montrose, Scotland, and, in 1812, he became enginewright at Killingworth. There he began his own experiments with the engine. Watt had shown the practicality of fixed steam engines. Trevathick had invented, in 1804, the first self-acting steam carriage. Blackett, in 1811, on the Wylam Railway, proved that engines running with smooth wheels on smooth rails could draw heavy loads up a moderate incline. The means for imparting speed, however, had not yet been devised.

Stephenson had the happy thought of using the escaping steam to blow his fire. This increased the ascending current of air so much that the speed of the engine was more than doubled. In 1815, he took out a patent, with Dodds, for this improved engine. In the same year he invented a colliery safety lamp, the "Geordie."

In 1821, Stephenson became constructing engineer for the Stockton and Darlington Railway. In 1826, he accepted a similar position with the Liverpool and Manchester Railway, and, upon the completion of the line in 1829, he astonished every one, even himself, by the success of his "Rocket" in a celebrated competitive trial of locomotives over the Liverpool and Manchester Railway. The "Rocket" attained a speed of 44 miles a hour.

The subsequent career of Stephenson was rapid and smooth. He was principal engineer on the North Midland, York and North Midland, Manchester and Leeds, Birmingham and Derby, and Sheffield and Rotherham Railways. In 1845, he visited Belgium and Spain for professional purposes. He was created a Knight of Leopold of Belgium and was made a fellow of the Royal Society in England. He was the founder and first president of the Society of Civil Engineers. Stephenson was offered knighthood by the sovereign of England, but declined the offer.

Stern, Otto (1888-), American physicist, was born at Sohrau, Germany. A former professor in the University of Hamburg, he came to the United States in 1933 and continued his researches at the Carnegie Institute of Technology, Pittsburgh. In 1944, he received the 1943 Nobel prize in physics for his contributions to atomic ray method and his discovery of the magnetic moment of the proton.

Sterne, Laurence (1713-1768), British novelist, was born at Clonmel, Ireland. He studied at Cambridge and became a clergyman. In 1759, he wrote two volumes of *Life and Opinions of Tristram Shandy*, to which additional volumes were added later. The work brought him lasting fame for its whimsical humor and memorable characters of "Corporal Trim," "Yorick," and "My Uncle Toby." He wrote also *Sentimental Journey*.

Steuben (*stū'bĕn*), **Friedrich Wilhelm von, Baron (1730-1794)**, general in the American Revolutionary army, was born at Magdeburg, Prussia. When only 14, he was a volunteer at the siege of Prague, and he steadily rose until, in 1752, he was on the staff of Frederick the Great.

Steuben came to America in 1778 and served with Washington during the dark days of Valley Forge. He was appointed inspector general, remodeled the army, and took part in the siege of Yorktown. In 1790, Congress voted him $2400 yearly and a township of land near Utica, N. Y., where he died. A monument to his memory was unveiled at Utica in 1914.

Stevens, John (1749-1838), American inventor, was born in New York. He was graduated from King's College, 1768, and was admitted to the bar in 1771. He secured the

establishment of the American patent system in 1790 and obtained patents for his own inventions in connection with steam engines.

In 1807, he constructed the *Phœnix*, a paddle-wheeled steamer, which he operated successfully on the Delaware River for several years. The *Phœnix* was completed but a short time after Fulton finished the famous *Clermont*. In 1811, Stevens established between Hoboken and New York the first steam ferry in the world. In 1815, he secured a charter for the first American railroad and, in 1824, obtained a charter for the first part of what is now the Pennsylvania system.

Stevens, Risë (1913-), American soprano, was born in New York. She made her debut at the Metropolitan Opera in 1938, appearing in *Mignon*. In 1941 she appeared with Nelson Eddy in the film *The Chocolate Soldier* and later in *Going My Way* with Bing Crosby. One of her most successful operatic roles has been as Carmen. She has sung with leading opera companies in this country and abroad and is one of America's most popular singers, whether in opera, at concerts, or on radio or television.

Stevens, Thaddeus (1792-1868), American statesman, was born at Danville, Vt. He was graduated from Dartmouth College, 1814; studied law; practiced at Gettysburg, Pa.; and served in the Pennsylvania legislature. He was a member of Congress, 1849-53 and 1859-68, and rose to prominence at the bar. In 1850, he opposed the Clay Compromise Measure and the Fugitive Slave Law. He was regarded as the most radical Antislavery advocate in Congress and was the most powerful opponent of President Johnson's plan of reconstruction.

Stevens, Wallace (1879-1955), American poet, was born in Reading, Pa. Educated at Harvard and New York Law School, he was in the general practice of law in New York City from 1904 to 1916, when he joined the legal staff of an insurance company in Hartford, Connecticut, of which he later became an executive officer. His published poems, sought after by collectors of modern first editions, include *Harmonium*, originally published in 1924. This was followed by *Ideas of Order*, *Owl's Clover*, *Man with the Blue Guitar*, *Parts of a World*, and *Notes Towards a Supreme Fiction*. In 1955 he was awarded the Pulitzer prize for his *Collected Poems*.

Stevenson, Adlai Ewing (1900-), statesman, was born in Los Angeles. His grandfather, Adlai Ewing Stevenson (1835-1914), was a congressman from Illinois and vice president of the United States during Grover Cleveland's second term, 1893-1897. Following his graduation from Princeton University in 1922, Stevenson studied law at Northwestern University and was admitted to the Illinois bar in 1926. He worked briefly on the family newspaper, the Bloomington, Illinois, *Daily Pantagraph*, and then practiced law in Chicago. During and after World War II he fulfilled a number of important government missions in the field of international relations. In 1948 he was elected governor of Illinois, and in 1952 became the Democratic nominee for president of the United States, but lost the election to Dwight D. Eisenhower. Again in 1956 he ran for the presidency against Eisenhower.

Stevenson, Robert Louis Balfour (1850-1894), British novelist and essayist, was born at Edinburgh. Educated at Edinburgh University, he was admitted to the bar in 1875, but soon abandoned law for literature.

In 1878 appeared his first book, *An Inland Voyage*, which was quickly followed by *Travels with a Donkey*, *Virginibus Puerisque*, and *Familiar Studies*. As a writer of adventure and romance, he won permanent fame with *Treasure Island*, *Kidnapped*, *The Master of Ballantrae*, and *Dr. Jekyll and Mr. Hyde*. His versatility was further revealed in *A Child's Garden of Verses*, *Ballads*, *Memories and Portraits*, and *A Footnote to History*.

Stevenson's fiction and essays, written in an exquisite and finished style, reveal the charming personality which made him one of the best-loved writers of his time. Failing health led him to settle in the island of Upolu, Western Samoa, where he died. A fine monument has been erected to his memory on the estate which he had owned there.

Stevenson, William Edward (1900-), American lawyer and educator, was born at Chicago, Ill. After he was graduated from Princeton (1922), he was a Rhodes Scholar at Oxford University. He was admitted as a barrister-at-law at the Inner Temple, London, in 1925. On his return to America, he was assistant U. S. attorney for the Southern District of New York (1925-27). He then engaged in the practice of law in New York City until 1946, when he was made president of Oberlin College, Ohio.

Still, Andrew Taylor (1828-1917), founder of osteopathy, was born near Jonesboro, Va. He farmed in Missouri, studied medicine at Kansas City, fought along with John Brown in the border warfare, and saw considerable service in the Civil War. In 1864, when three of his children died with spinal meningitis, he devised the treatment known as osteopathy and practiced as an itinerant physician for some years. In 1875, he settled in Kirksville, Mo., and developed a large practice. In 1892, he opened the American School of Osteopathy at Kirksville.

Stillwell, Joseph W. (1883-1946), American army officer, was born at Palatka, Fla., and was graduated from West Point in 1904. After serving in World War I, he began a special study of China and its languages, spending most of the next 20 years in Peiping and Tientsin. In 1942, as lieutenant general he commanded the fifth and sixth Chinese armies in Burma. After the fall of Burma, he was placed in command of the American forces in China. Recalled in 1944 because of differences with Chiang Kai-shek, he was made general and, in 1945, was placed in command of the 10th Army, Pacific theater.

Stimson, Henry Lewis (1867-1950), American statesman, was born in New York City. After he was graduated from Yale and from the Harvard Law School, he was admitted to the bar and began practicing law in 1893. He was Republican candidate for governor of New York in 1910 and secretary of war in Taft's cabinet, 1911-13. President Coolidge sent him in 1927 as his representative to Nicaragua, then torn by civil war, where he induced both warring parties to permit a peaceful election. On his return he was made governor general of the Philippines, from which post President Hoover called him in 1929 to accept the portfolio of secretary of state. He was called again to public life in 1940, when he accepted the secretaryship of war in the Democratic administration of Roosevelt. He headed the War department through World War II, retiring in 1945.

Stokowski, Leopold Anton Stanislaw Boleslaw (1882-), musical conductor, was born in London, Eng., of Polish and Irish parentage. He was graduated from Oxford University and studied also in France and Germany. He was organist at St. James's Church, London, and, 1905-08, at St. Bartholomew's Church in New York. Returning to England, he conducted orchestral concerts and was invited in 1909 to conduct the Cincinnati Orchestra. From 1912 to 1934 he conducted the Philadelphia Symphony Orchestra with great success. Later he conducted orchestras in San Francisco and Los Angeles, the orchestra of the National Broadcasting Company in New York, and the New York City Symphony in New York.

Stone, Lucy Blackwell (1818-1893), pioneer American woman suffragist, was born at West Brookfield, Mass. She was graduated from Oberlin College, 1847; devoted herself to the advocacy of woman suffrage and to the Antislavery cause; lectured widely; and became editor of the *Woman's Journal*. In 1850, she assisted in organizing, at Worcester, Mass., the first National Woman's Rights Convention. In 1855, she married Henry B. Blackwell, although retaining her maiden name.

Stone, Melville Elijah (1848-1929), American journalist, was born at Hudson, Ill., and received a high school education. He was editor of several Chicago dailies, 1871-74, and, in 1875, established the Chicago *Daily News*. In 1881, in partnership with Victor F. Lawson, he started the Chicago *Morning News*, which became the Chicago *Record*. Withdrawing in 1888, he organized the Globe National bank, of which he was president, 1891-98. In 1893, he removed to New York and acted until 1921 as general manager of the Associated Press. While he managed it, the service grew to become the chief supply of news for the American press.

Story, Joseph (1779-1845), American jurist and legal writer, was born at Marblehead, Mass. He was graduated from Harvard College in 1798; rapidly rose to eminence at the bar; and, in 1808, was elected to Congress. In 1811, he was appointed associate justice of the United States Supreme Court and, after 1829, was professor of law at Harvard. His decisions practically created patent law, and he shares with John Marshall the credit for an extension of federal authority over states through constitutional interpretations. He was elected to the American Hall of Fame in 1900.

Stowe, Harriet Elizabeth Beecher (1811-1896), American novelist, sister of Henry Ward Beecher, was born at Litchfield, Conn. She married Professor Calvin Ellis Stowe in 1836. She became a frequent contributor to periodicals; published a volume of stories; and, in 1851, commenced, in *The National Era*, an Antislavery paper at Washington, D. C., a serial entitled *Uncle Tom's Cabin*. When issued in book form, 1852, this unnoticed serial immediately became one of the most successful and influential novels in American literature.

By its emotional appeal, dramatic force, and intense human interest, *Uncle Tom's Cabin* aroused the conscience of the nation and made the slavery question an imperative moral issue. It has been translated into 40 languages and, in dramatized form, has been widely presented on the stage in America and in other countries.

A prolific writer for a half century, Mrs. Stowe produced many other novels, the best of which are *Oldtown Folks*,

The Minister's Wooing, and *The Pearl of Orr's Island*. She was elected to the American Hall of Fame in 1910. See *Topsy*, *Uncle Tom*.

Strabo (*strā'bō*), **(c. 64 B.C.-c. 21 A.D.)**, Greek geographer, was born at Amasia, in Pontus. He spent much of his life in travel and study, settling about 20 B. C. in Rome, whence he is believed to have made extensive journeys over most of the world as then known.

His *Geography*, in 17 books, describing Europe, Asia, Egypt, and Libya, is a work of great value, based partly on his own observations and partly on the geographical writings of Eratosthenes and other earlier authorities. He wrote also a history of Rome to 27 B. C., but this work has not survived.

Strachey (*strā'chĭ*), **Giles Lytton (1880-1932)**, English author, was educated at Trinity College, Cambridge. His first published work was *Landmarks in French Literature*. His realistic methods of biographical treatment, as exemplified first in *Eminent Victorians* and *Queen Victoria* may be said to have set a new fashion. He wrote later *Books and Characters*, *Pope*, and *Elizabeth and Essex*.

Stradivari (*strä'dē-vä'rē*), or **Stradivarius, Antonio (1644-1737)**, Italian violin maker, was born at Cremona. His instruments are known for their finish and fine tone. The great care with which he selected and cut his wood, the study he gave to the shape and the proportions, and the quality of the varnish used combined to make an unrivaled instrument. Of 2000 violins made by him, only a few now exist, and they are valued at fabulous prices.

Strathcona (*străth-kō'nä*), **Donald Alexander Smith, Baron (1820-1914)**, Canadian railway builder and statesman, was born at Forres, Scotland. He went to Canada in 1838; entered the Hudson's Bay Company's service; and rose to the position of resident governor and chief commissioner. He was a special commissioner during the first Riel rebellion in the Red River settlements, 1869-70; represented Winnipeg and Saint Johns in the Manitoba legislature, 1871-74; and was, for many years, a member of the Dominion House of Commons.

Lord Strathcona was the chief promoter and builder of the Canadian Pacific Railroad, of which he became a director. In 1889, he was elected chancellor of McGill University and, in 1899, lord rector of Aberdeen University. He made large donations to McGill University and other Canadian educational institutions, and, with Lord Mount-Stephen, gave an endowment to the Royal Victoria Hospital at Montreal, to which he also bequeathed $1,000,000. He was raised to the peerage in 1897.

Straus (*strous*), **Nathan (1848-1931)**, merchant and philanthropist, was born in Bavaria, Germany. He was brought to the United States in 1854 and resided at Talbotton, Ga. He afterward went to New York, where, in 1866, he joined his father's firm, L. Straus and Sons, which was engaged in the importation of pottery and glassware. From 1888 to 1914, he was a partner in the firm of R. H. Macy and Company, conducting a department store. He retired in the latter year in order to devote himself to philanthropy.

Straus originated and maintained a laboratory and system of distribution for pasteurized milk to the poor of New York City. He was one of the most active exponents of pasteurizing milk and contributed equipment for the process to various cities. He established a welfare center in Jerusalem for use by people of all races; also a smaller one in Tel Aviv.

Strauss (*shtrous*), **Johann (1825-1899)**, Austrian composer and conductor, was born at Vienna, of an eminently musical family. He became an orchestra conductor, toured in many European countries, and composed dance music and operettas. Of nearly 500 pieces of dance music, many of which became immensely popular and led to his being called the Waltz King, the best-known is *The Beautiful Blue Danube Waltz*. His operettas, several of which are classics in their field, include *Indigo, Cagliostro, Die Fledermaus, Der lustige Krieg, Simplicius, Eine Nacht in Venedig, Ninetta, Waldmeister*, and *Der Zigeunerbaron*.

Strauss, Joseph Baermann (1870-1938), American bridge builder, was born at Cincinnati and was educated at the University of Cincinnati. He designed and built over 225 bascule bridges in America and other parts of the world. These include the Canadian Pacific Railway bridge at Sault Sainte Marie, one of the longest two-lead bascule bridges in the world; a bridge at Copenhagen, the design of which was chosen in an international competition; a bridge at Tientsin, China, built in the Chinese style of architecture. He was chief Engineer for the Golden Gate bridge at San Francisco Bay.

Strauss, Lewis Lichtenstein (1896-), director of nuclear research, was born at Charleston, W. Va. His education included training in medicine, in addition to study at Dickinson College, Columbia University, and the Case Institute of Technology. Associated for more than twenty years with the New York firm of Kuhn, Loeb & Co., he also has been financial adviser to the Messrs. Rockefeller. He was a member of the United States Atomic Energy Commission from 1946 to 1950, and in 1953 was made Chairman of the Commission. He holds the rank of Rear Admiral in the United States Navy.

Strauss, Richard Georg (1864-1949), German composer, was born at Munich. He studied music at Munich and, in 1885, became conductor at Meiningen. From 1889 to 1894, he was chapelmaster at Weimar; was later conductor at the Munich opera house; and, in 1898, became conductor of the Royal Opera, Berlin.

By compositions which display great power of invention and originality, Strauss became a commanding figure in modern music. His works include the tone poems *Don Juan*, *Tod und Verklärung*, *Macbeth*, *Till Eulenspiegel*, *Also Sprach Zarathustra*, *Don Quixote*, and *Ein Heldenleben* and the operas *Guntram*, *Feuersnot*, *Salome*, and *Daphne*.

Stravinsky, Igor (1882-), composer and conductor, was born at Oranienbaum, Russia, and studied under Rimski-Korsakov. His early compositions came to the attention of Serge Diaghilev, who commissioned him to write the music for *The Fire Bird*, a ballet performed by Nijinsky in 1910. One composition of this period, *Le Sacre du Printemps*, has been revived recently as the basis for Walt Disney's *Fantasia*. Stravinsky's musical creations, at first novel and audacious and later more restrained, have aroused much discussion because of their originality. As holder of the Norton chair at Harvard University and as guest conductor of the New York Philharmonic and Boston Symphony Orchestras, he has gained an influential position in American musical circles. Many of his musical and personal memories are found in his *Autobiography*.

Streit, Clarence (1896-), journalist and author, has become identified with the widespread movement for an organization of all the democracies of the world into a union similar to the United States of America. Born at California, Mo., and educated chiefly in Montana, he has had a career that was bound to give him a world point of view. Soldier in World War I, Rhodes scholar, student at the Sorbonne, foreign correspondent, first for the Philadelphia *Public Ledger* and then for the *New York Times*, he has had assignments in Paris, Rome, Geneva, Istanbul, Bucharest, Vienna, and other points in Europe. His conviction that the democracies must unite has found expression in several books, including *Union Now* and *Union Now with Britain*.

Strindberg (*strĭnd'bĕr-y'*), **Johan August (1849-1912)**, Swedish dramatist was born at Stockholm. He studied at the University of Upsala. He became successively schoolmaster, journalist, and author of scientific and political treatises. In 1883, he began a period of travel, during which he wrote many stories, novels, and plays. The production of *The Father* in 1887 won wide recognition. In 1897, he returned to Stockholm and published a large number of plays, which established his position as Sweden's most eminent dramatist and one of the most influential in modern Europe. Of his plays, the following were among the first to be translated into English: *The Father*, *The Dance of Death*, and *The Spook Sonata*.

Stritch, Samuel Alphonsus (1887-), American prelate, was born at Nashville, Tennessee. He was educated at St. Gregory's College, and at the American College at Rome, where he was ordained priest in 1910. After pastorates in Memphis and Nashville he was appointed bishop of Toledo in 1921. He became archbishop of Milwaukee in 1930; and of Chicago in 1939. In 1946 Pope Pius XII named him cardinal.

Stuart, Gilbert (1755-1828), American portrait painter, was born in Rhode Island. In 1775, he went to London, where his talent was recognized by Benjamin West. In 1781, he opened a studio in London and painted the portraits of George III, Mrs. Siddons, Sir Joshua Reynolds, and many other celebrated characters. At the height of his fame, he returned to America, 1792. His later portraits included those of the first five presidents of the United States.

Among the most celebrated of Stuart's portraits are those of Washington. The best of these include the "Gibbs-Channing" portrait, in the Metropolitan Museum, New York; the "Athenæum" portrait, in the Boston Museum; and the full-length portrait painted for the Marquis of Lansdowne. He was elected to the American Hall of Fame in 1900. See *Painting*.

Stuart, James Ewell Brown, "Jeb" (1833-1864), American cavalry officer, was born in Patrick County, Va. After he was graduated from the United States Military Academy in 1854, he served in the United States army and was made captain in 1861, but he resigned in order to join the Confederate forces. Bravery displayed as a cavalry commander in the first battle of Bull Run won him the rank of brigadier general, and, in July 1862, he became major general of cavalry. Among his exploits was the capture of part of General Pope's staff with the staff documents. He distin-

guished himself at Antietam, Fredericksburg, and other well-known battles. At Chancellorsville, Stuart took over "Stonewall" Jackson's command temporarily after the latter had been killed. When Sheridan advanced on Richmond, Stuart met him at Yellow Tavern but was defeated and mortally wounded.

Stuart, Jesse Hilton (1907-), American writer and educator, was born near Riverton, Ky. He was educated at Lincoln Memorial and Vanderbilt universities, but much of the preparation for his writing was gained from his life in rural sections of his native state. He has lectured on literature at several universities and has taught in the public schools, having been Superintendent of Schools for a time at Greenup, Ky. Folklore and homespun philosophy treated with literary skill give his works wide appeal and lasting influence. Examples of his writings are *The Man with a Bull-tongue Plow* (poetry), *Beyond Dark Hills* (autobiography), and *Taps for Private Tussie* (novel).

Stubbs, William (1825-1901), English historian and prelate, was born at Knaresborough. He was graduated from Oxford, 1848, and was ordained to the Church the same year. In 1866, he was appointed professor of modern history at Oxford; in 1884, was made bishop of Chester; and, in 1889, became bishop of Oxford.

By his profound learning and rare impartiality, Stubbs exercised a great influence upon the study of history. His *Constitutional History of England*, published in 1874-78, immediately took rank as an authoritative work. His other historical works include *The Early Plantagenets* and *Germany in the Middle Ages*.

Stuyvesant (*stī'vĕ-sănt*), **Peter (1592-1672)**, director general of the New Netherlands, 1647-64, and last Dutch governor of New York, was born in the Netherlands. He served first in the West Indies and arrived at New Amsterdam, 1647. He made peace with the Indians; settled the English and Dutch boundary question; recaptured, 1655, the fort on the Delaware River, taking possession of the Swedish colony at the same time; but was forced to surrender the city of New York to the English, 1664. He then retired to his farm, the "Bouwerij," which gave the name to the modern Bowery.

Sudermann (*zōō'dĕr-män*), **Hermann (1857-1928)**, German dramatist and novelist, was born in Matzicken, East Prussia. He studied in the universities of Königsberg and Berlin, and was a teacher and journalist, 1881-89. In 1888, he won European fame by a play entitled *Die Ehre*, and a novel, *Frau Sorge*, which reached its 125th edition in 1912. Among Sudermann's other dramatic works are *Sodoms Ende*, *Die Schmetterlingsschlacht*, *Morituri*, *Johannes*, *Johannisfeuer*, and *Es Lebe das Leben*, which was translated as *The Joy of Living*. His novels include *Katzensteg*, *Iolanthes*, *Hochzeit*, and *Es War*.

Sue (*sū*), **Marie Joseph**, known as **Eugène (1804-1857)**, French novelist, was born in Paris. He studied medicine and served as surgeon in the army and afterward in the navy. Having inherited wealth, he resigned in 1829 and devoted himself to literature. His reputation as a writer rests mainly on *The Wandering Jew* and *The Mysteries of Paris*, both of which attained a world-wide reputation. See *Jew, The Wandering*.

Sulla, Lucius Cornelius (138 B.C.-78 B.C.), Roman general and dictator, was born at Rome. He acquired military fame in the armies of Marius and Catulus. His great popularity among the soldiers incited him to aspire to the sovereign power of dictator; and, though opposed by Marius, he gained his end, proscribing and putting to death all who opposed him. He used his power to establish a constitution of a thoroughly oligarchic type. After holding the dictatorship for about two years, he resigned his office in 79, and retired to his estate at Puteoli, where he died.

Sullivan, Edward Vincent (1902-), television master of ceremonies and newspaper columnist, was born in New York City. His career as a news writer began early in the 1920's, when he wrote short stories for the *New York Evening Mail*, *The World*, and *The Morning Telegraph*. While he was working as sports editor on *The Evening Graphic*, he was asked to write a "Broadway" column. This was the beginning of a series that was soon afterward syndicated and has appeared in newspapers all over the country. Varied experience in conducting radio programs was followed, in 1948, by the introduction of the television show, *Toast of the Town*, which has brought him nationwide acclaim. Mr. Sullivan has been commended especially for his ability to recognize promising new talent.

Sullivan, Sir Arthur Seymour (1842-1900), British composer, was born in London, of Irish parents. He studied in London and at Leipzig, and, in 1861, composed incidental music for *The Tempest*. He wrote a grand opera entitled *Ivanhoe*, cantatas, overtures, oratorios, church music, and ballads, but is best known for his comic operas written in collaboration with W. S. Gilbert, who contributed inimitable librettos. The most famous of these operas are *H.M.S. Pinafore*, *Pirates of Penzance*, *Patience*, *Iolanthe*, *The Mikado*, and *The Yeomen of the Guard*. Essentially lyric in quality, Sullivan's music abounds in melody and dainty orchestration. See *Mikado, The*; *Pinafore*.

Sully, Thomas (1783-1872), portrait painter, was born in Horncastle, England. While a boy, he emigrated to America and studied at Charleston, S. C., afterward residing in Richmond, New York, and Philadelphia. He enjoyed a great reputation as a portrait painter, executing portraits of Jefferson, Lafayette, Madison, Jackson, and other prominent personages.

Sully-Prudhomme (*sü'lē' prü'dôm'*), **René François Armand (1839-1907)**, French poet, was born in Paris. He was educated for the law and studied also science and philosophy.

Encouraged by the success of his *Stances et poèmes*, 1865, he devoted his efforts entirely to poetry. Soon afterward he published *Les épreuves* and *Les solitudes*, worthy forerunners of his great philosophical poems, *La justice* and *Le bonheur*, which rank among the most notable efforts in French poetry since Hugo. *Impressions de la guerre* gave some aspects of the Franco-Prussian War and was followed by *Les destins*, *Vaines tendresses*, and *Le prisme*. In 1905, he produced *La vraie religion selon Pascal*. He was elected to the French Academy in 1881 and, in 1901, he was awarded the Nobel prize for literature.

Sulzberger, Arthur Hays (1891-), American newspaper publisher, was born in New York City, and was educated at Columbia University. Both a family connection and a natural inclination toward newspaper work have kept him active on the staff of *The New York Times*, of which he has been publisher since 1935. His many active interests include The Interstate Broadcasting Company, The Times Facsimile Corporation, and The Spruce Falls Power and Paper Company, Ltd., of Toronto, Canada.

Summerfield, Arthur Ellsworth (1899-), American political leader, was born near Bay City, Mich. and began work as a lad in an automobile factory. While still a young man, he engaged in several lines of business, including real estate and automobile sales and oil distribution. At the same time he took an interest in politics and took a leading part in the affairs of the Republican party in Michigan. He was active in the campaign of Wendell Willkie for the presidency and was leader of a movement to draft Senator Arthur S. Vandenberg as the Republican pres dential candidate in 1948. Following the nomination of General Dwight D. Eisenhower in 1952, Mr. Summerfield was elected Chairman of the Republican National Committee, a position which he resigned in 1953 in order to accept appointment as Postmaster General in President Eisenhower's cabinet.

Sumner, Charles (1811-1874), American statesman, was born at Boston; was graduated from Harvard, 1830; studied law; and was admitted to the bar, 1834. He became a writer and lecturer on law, taking no part in politics until 1840, when he identified himself actively with the Anti-slavery movement.

In 1845, he delivered a notable Fourth of July oration on "The True Grandeur of Nations," which offended the Whig leaders and led to Sumner's withdrawal from their party. He then became a leader of the Free-Soil party and, in 1850, was elected successor to Daniel Webster in the United States Senate.

Sumner's first important speech in the Senate was in opposition to the Fugitive Slave law. His speech delivered in 1856 under the title "The Crime against Kansas," greatly incensed the members of Congress from South Carolina, one of whom, Preston S. Brooks, assaulted Sumner at his desk in the Senate chamber. Sumner supported the election of Lincoln, urged upon him the proclamation of emancipation, and became the leader of the Senate as chairman of the committee on foreign relations.

Sumner, William Graham (1840-1910), American sociologist and economist, was born at Paterson, N. J. Following his graduation from Yale University, he was ordained as a Protestant Episcopal minister, but, after preaching until 1872, he was made professor of political and social science at Yale University. By his trenchant lectures and writings he exercised an extensive influence in support of the view that individual initiative free of all governmental action in economic life conduces to the best social order. As a sociologist, he did much to clear the way for the study of the social order as a complex of customs. His *Folkways* became a standard text. His other publications include *Earth Hunger*, *Forgotten Man*, and *Challenge of Facts*.

Sunday, William Ashley (1863-1935), American evangelist, popularly known as "Billy" Sunday, was born at Ames, Iowa, and was educated in the public schools. In 1883, he became a professional baseball player, and, for seven years, made a notable record with the Chicago, Pittsburgh, and Philadelphia teams. From 1891 to 1895, he was assistant secretary of the Y. M. C. A. in Chicago.

In 1896, Sunday began evangelistic work and, in 1903, was ordained to the Presbyterian ministry. His unconventional methods aroused great diversity of opinion, from the severest criticism to enthusiastic admiration.

Sun Yat Sen (**1867-1925**), Chinese revolutionary leader, was born of native Christian parentage in Kwangtung Province. He was educated in Hongkong as a physician. Shortly after 1892, he devoted himself to secret activities aiming at the overthrow of the Chinese monarchy. Following the Chinese revolution in 1911, he was chosen provisional president of the Chinese Republic, but resigned the following year. In 1921, he was elected president by the Southern Parliament and led a military campaign against the Northern government at Peiping.

The Nationalist government took its inspiration from Sun Yat Sen and erected a magnificent monument to him near its capital, Nanking.

Suttner (*zōōt'nĕr*), **Bertha, Baroness von** (**1843-1914**), Austrian writer and peace advocate, was born at Prague. She was the daughter of Count Franz Kinsky, Austrian field marshal. In 1876, she married the novelist Baron Arthur von Suttner and resided with him at Tiflis until 1885, after which she lived in Austria. At one time, she was secretary to Alfred Nobel, whom she greatly influenced by her championship of the brotherhood of nations.

She was a prolific writer of stories, novels, and books on social science. Her novel entitled *Die Waffen nieder*, "*Lay Down Your Arms*," ran through many editions. In 1905, she was awarded the Nobel prize for peace.

Swarthout, Gladys (**1904-**), American mezzo-soprano, was born at Deepwater, Mo. and received her musical education at the Bush Music Conservatory, Chicago. She began as a church singer. After an audition with the Chicago Civic Opera, she became at the age of twenty the youngest member of that company, and five years later appeared with the Metropolitan Opera in New York. She is particularly known for her interpretation of the role of Carmen. Gladys Swarthout is married to Frank M. Chapman.

Swedenborg (*swē'dĕn-bôrg*), **Emanuel** (**1688-1772**), Swedish scientist and theologian, was born at Stockholm. He studied at Upsala and traveled abroad for four years. In 1716, Charles XII appointed him assessor of mines. He was ennobled in 1719; took a prominent part in the House of Peers; and wrote on many scientific subjects, publishing *Opera Philosophica et Mineralia* and *The Animal Kingdom*.

In 1743, Swedenborg claimed a divine commission to disclose the internal or spiritual sense of Scripture by the correspondence existing between natural and spiritual things. He taught that all angels were formerly human beings and that, in heaven, they live together in societies and marry, although only in a spiritual sense.

Among his chief theological works are *Arcana Cœlestia*, his most extensive and valuable treatise; *Heaven and Hell; Divine Love and Wisdom;* and *The True Christian Religion*. He died in London. The New Church, which accepts Swedenborg's mission and general views, held its first public services in 1778.

Swift, Jonathan (**1667-1745**), British satirist, was born in Dublin, of English parents. After he was graduated from Trinity College, he removed to London and, in 1689, became secretary to Sir William Temple. At this time, he first met Esther Johnson, then eight years old, whom he subsequently immortalized as "Stella."

Entering the Church, he became established in a parsonage at Laracor, near Dublin, 1700, but spent much time in London. In 1704 appeared *The Battle of the Books* and *The Tale of a Tub*, which brought him into notice as the most powerful satirist of his time. In politics, he became an important figure by his effective attacks upon the Whigs. Retiring to Ireland upon the fall of the Tory ministry, he became dean of Saint Patrick's Cathedral, Dublin, 1713. In 1726, he wrote *Gulliver's Travels*, the most famous of all his works. His later life was embittered by failure to realize his ambitions and by the death of Esther Johnson, to whom he wrote the *Journal to Stella*. He had previously lost by death a second sweetheart, whom he called Vanessa.

The most original writer of his time, Swift was one of the great masters of English prose, and, in vigor, directness, and convincing power, he has never been surpassed. His *Gulliver's Travels* has the unique distinction of being, at the same time, a charming tale for children and, for the discerning reader, perhaps the most savage satire on mankind that has ever been written. See *Gulliver, Lilliput*.

Swinburne, Algernon Charles (**1837-1909**), English poet, was born in London. He was educated at Eton and at Oxford, and afterward traveled on the continent, visiting Landor at Florence in 1864. Upon returning to England, he became intimately associated with William Morris and Dante Gabriel Rossetti. In 1865, he published a lyric tragedy *Atalanta in Calydon*, which is regarded as his masterpiece. This was followed by *Poems and Ballads, Songs before Sunrise*, and other works which revealed great originality, passionate intensity, and an unusual power of melodious versification.

At the death of Tennyson, Swinburne was the greatest living English poet, but his radical views prevented his appointment as poet laureate. His works include also *Bothwell, Songs of Two Nations, Songs of the Springtides, Mary Stuart, A Study of Victor Hugo, Astrophel and Other Poems*, and *Rosamund*.

Symington, William Stuart (**1901-**), U. S. government official, was born at Amherst, Mass. After serving briefly in the U. S. Army in World War I he studied at Yale University, then entered a railroad equipment plant owned by his family. Eventually he became president of the Emerson Electric Company. At the close of World War II he was appointed chairman of the Surplus Property Board. In 1947 he was named secretary of the U. S. Air Force which position he held until April, 1950, when he resigned to become chairman of the National Security Resources Board. He has been U. S. senator from Missouri, since 1953.

Symonds (*sĭm'ŭnz*), **John Addington** (**1840-1893**), English literary historian and critic, was born at Bristol. He was graduated from Oxford and began the study of law, which ill health compelled him to abandon. For several years, he lived chiefly in Switzerland, where he wrote extensively on Italian history and literature.

Symond's chief writings are *Introduction to the Study of Dante, Studies of the Greek Poets, The Renaissance in Italy, Italian Byways, Shakespeare's Predecessors*, and lives of Shelley, Ben Jonson, Sir Philip Sidney, Boccaccio, Benvenuto Cellini, and Michelangelo. His work is marked by accurate learning and much critical insight.

Synge (*sĭng*), **John Millington** (**1871-1909**), Irish dramatist and poet, was born at Newton Little, near Dublin. He was educated at Trinity College from which he was graduated in 1892. Always an ardent nature lover, with a passion for languages and music, he went to Germany to study music and later to Paris to do literary criticism.

In 1898, William Butler Yeats induced Synge to return to Ireland and join the movement for the revival of the ancient Irish language and drama. His first plays, *Riders to the Sea* and *The Shadow of the Glen*, immediately established his reputation as a dramatist of a high order. He wrote also *The Well of the Saints*, which was followed by *The Playboy of the Western World*, his most remarkable drama. Among his other productions are *The Aran Islands, The Tinker's Wedding*, and *Deirdre of the Sorrows*. Synge possessed unusual imagination, perfect mastery of words, and rare delicacy of style.

Szent-Györgyi, (*sĕnt-dyûr' dyĭ*) **Albert** (**1893-**), biochemist, was born at Budapest, Hungary, and was educated in his native city. He later carried on laboratory research at several universities, including those in Berlin, Prague, Hamburg, and Liége. He also studied in England at Cambridge, and in the United States at the Mayo Clinic at Rochester, Minn. He won the Nobel prize for medicine in 1937. His research has dealt with various aspects of the physiology of muscles. Having experienced difficulty in continuing his work in Communist-controlled Hungary, he came to America in 1947 and established the Institute for Muscle Research at the Marine Biological Laboratory at Woods Hole, Mass. The possibility that his pioneer research may help in combating muscular dystrophy has attracted much attention to his work. In addition to articles he has written three books, titled as follows: *On Oxidation, Fermentation, Vitamins, Health and Disease; Chemistry of Muscular Contraction;* and *Chemical Physiology of Contraction in Body and Heart Muscle*.

Tacitus (*tăs'ĭ-tŭs*), **Publius Cornelius** (**c. 55 A.D. -c. 120 A. D.**), Roman historian and orator. In 78, he married the daughter of the general Agricola; was quæstor, 79; became prætor in 88; and was elected consul in 97. He attained distinction as an orator and, in 99, was appointed, with the younger Pliny, to conduct the prosecution of Marius, then proconsul of Africa.

After his consulship, Tacitus devoted himself chiefly to literature. His works include *Dialogue on Orators; Agricola*, a biography; *Germania*, describing the German peoples; *Annals*, covering the period from 14 to 68; and *Histories*, which narrates events from 68 to 96. He possessed a remarkably forceful style and many of his maxims have become proverbial.

Tadema, Alma. See *Alma-Tadema, Sir Laurence*.

Taft, Lorado (**1860-1936**), American sculptor, was born at Elmwood, Ill. After being graduated from the University of Illinois in 1879, he studied sculpture at the Ecole des Beaux-Arts, Paris, 1880-83. Returning to America, he settled in Chicago, and, in 1886, became an instructor at the Art Institute. In this capacity and as a lecturer, he exercised a marked influence upon the development and appreciation of sculpture.

Taft also undertook to carry out an extensive plan of sculptural decoration for Chicago which had been made possible by the Ferguson bequest of 1905. "The Spirit of the Great Lakes" was completed in 1912 and the colossal "Fountain of Time" was finished in 1920. He published *The History of American Sculpture* and *Recent Tendencies in Sculpture*. In 1920, he was elected member of the American Academy of Arts and Letters.

Taft, Robert Alphonso (1889-1953), American politician, was born at Cincinnati, Ohio, the son of President Taft. A graduate of Yale University, he practiced law in Cincinnati from 1913. Entering politics as a Republican, he served in the Ohio legislature, 1921-26 and 1931-32. In 1939, he was elected to the United States Senate and was a prominent contender for the presidential nomination on the Republican ticket in 1940, 1948, 1952. In the Republican controlled Congress elected in 1946 he was the Republican leader in the Senate, and sponsored the Taft-Hartley Labor Bill. He was re-elected to the Senate, 1950.

Taft, William Howard (1857-1930), 27th president of the United States, was born in Cincinnati, Ohio. He was graduated from Yale in 1878 and from the Law School of Cincinnati College in 1880. He practiced law from 1883 to 1887; was judge of the superior court of Ohio, 1887-90; and solicitor general of the United States, 1890-92. He was dean and professor in the Law Department, University of Cincinnati, 1896-1900; United States circuit judge, 1892-1900; president of the United States Philippine commission, 1900-01; first civil governor of the Philippine Islands, 1901-04; secretary of war, United States, 1904-08; and President of the United States, 1909-13.

As member of Roosevelt's cabinet, Taft ably represented the administration on important missions to Cuba, Japan, China, and Russia. Although elected president by an overwhelming majority, he lost popularity by reason of his attitude in the Ballinger-Pinchot controversy and by his defense of the Payne-Aldrich Tariff Act of 1909. His final alignment with the reactionary group as against the progressive element divided his party. While renominated by the Republicans in 1912, he received only eight electoral votes at the ensuing election.

In 1913, Taft was made professor of law at Yale. In 1918, he was made a member of the National War Labor Board. In 1921, he was appointed Chief Justice of the United States Supreme Court, from which he resigned early in 1930 because of ill health. His writings include *The Anti-Trust Act and the Supreme Court* and *The Presidency: Its Duties, Opportunities, and Limitations.*

Tagore (*tä-gōr'*), **Rabindranath (1861-1941),** Hindu poet, was born at Calcutta. He spent his childhood in his native city but at 17 was taken to Europe for further education. Returning to India, he became a successful journalist and well-known also as an educator, philosopher, and religious teacher, having founded a school in Bolpur, Bengal, known as the Visva-Bharati. His early productions were romantic and sensuous, but his later work reveals a change to idealism and spirituality.

Tagore's poetry exerted a remarkable power over the masses in Bengal. He acquired a fine English style so that his influence extended readily to the Western world. In 1913, he was awarded the Nobel prize for literature. He wrote and set to music over 3000 songs. At the age of 68 he took up painting and exhibited in leading cities.

Among Tagore's works available in English are *The Crescent Moon* (child poems), *The Gardener, The King of the Dark Chamber, Nationalism, Mashi, Lover's Gift, The Home and the World,* and *The Religion of Man.*

Taine (*tān*), **Hippolyte Adolphe (1828-1893),** French literary historian and critic, was born at Vouziers. He went to Paris in 1841, studied at the Collège Bourbon, and, in 1848, entered the Ecole Normale. In 1851, he was appointed professor of philosophy at Toulon. He immediately resigned, however, and devoted himself to the study of medicine and the sciences in order to bring himself in touch with the growing scientific spirit of the time. In 1864, he was made professor of the history of art and of æsthetics in the Ecole des Beaux-Arts.

Among his important works is *History of English Literature,* a valuable criticism brilliantly written. His monumental achievement, *Origins of Contemporary France,* engaged his efforts for more than 20 years. His other writings include *Voyage in Italy, The Ancient Régime, Notes on England,* and *The Ideal in Art.* In 1878, Taine was elected to the French Academy.

Tallchief, Maria (1925-), ballerina, was born at Fairfax, Okla. Her family having moved west, she received her early education at Beverly Hills, Calif., where she studied piano music and obtained training in ballet dancing from some famous professional teachers, one of whom was a sister of the great Nijinsky. Her versatility and remarkable genius for interpretive dancing may be aided in part by her study of the piano, possibly even by a tribal dancing inheritance which could have come through her Osage Indian father. Among her classic interpretations are *Chopin Concerto, Sheherazade Etude,* and *Firebird.* She has appeared as a member of the Ballet Russe de Monte Carlo and the New York City Ballet, and as guest star with the Paris Opera.

Talleyrand-Périgord (*tăl'ĭ-rănd*; Fr., *tà'lĕ'răN' pā'rē'-gôr'*), **Charles Maurice de, Prince de Benevento (1754-1838),** French statesman and diplomat, was born at Paris. He was educated for the Church, becoming in 1775 abbot of Saint Denis and, in 1788, bishop of Autun. He was a member of the States-General in 1789 and took a leading part in the proceedings of that assembly and also of the National Assembly. He was soon afterwards excommunicated by the pope, and then devoted himself entirely to politics.

The excesses of the Revolution led to his withdrawal to England and afterward to America. After the fall of Robespierre, he returned to Paris, and, through Madame de Staël's influence with Barras, he was appointed foreign minister, an office which he retained until 1807. In return for notable services, Napoleon made Talleyrand grand chamberlain and prince. After the fall of Napoleon, he was for a time prime minister under Louis XVIII, whose restoration he had brought about, and secured favorable terms for France at the Congress of Vienna. He was then sent as ambassador to London.

Talleyrand possessed unrivaled skill and finesse in diplomacy by virtue of which he wielded power under four régimes.

Tamerlane. See *Timur.*

Taney (*tô'nĭ*), **Roger Brooke (1777-1864),** American jurist, was born in Calvert County, Md. He was graduated from Dickinson College, studied law, and entered politics as a Federalist. He afterward became a Democrat and was made attorney general in President Jackson's cabinet, 1831. Two years later he was appointed secretary of the treasury, and, in 1836, succeeded John Marshall as Chief Justice of the United States Supreme Court. His famous decision in the Dred Scott case, 1857, denying the right of citizenship to Negroes, and also the authority of Congress to keep slavery out of the territories, may be said to have brought on the Civil War.

Tarbell, Ida Minerva (1857-1944), American author and editor, was born in Erie County, Pa. She was graduated from Allegheny College in 1880 and, from 1883 to 1891, she was associate editor of the *Chautauquan.* From 1891 to 1894, she was a student at the Sorbonne and at the Collège de France, Paris. Returning to America, she was associate editor of *McClure's Magazine* from 1894 to 1906 and of the *American Magazine* from 1906 to 1915.

In addition to many contributions to magazines, her writings include *Short Life of Napoleon Bonaparte, Life of Abraham Lincoln, History of the Standard Oil Company, The Business of Being a Woman, New Ideals in Business, Life of Judge Gary,* and *All in the Day's Work.*

Tarkington, (Newton) Booth (1869-1946), American novelist and playwright, was born at Indianapolis, Ind. He was educated at Phillips Academy, Purdue University, and at Princeton, where he was graduated in 1893. At first he planned to pursue a business career, but, after a few years, turned his attention wholly to writing. His first story, *The Gentleman from Indiana,* was published in 1899. This was followed in 1900 by *Monsieur Beaucaire,* which established his reputation. In 1919 he was awarded the Pulitzer prize for his novel *The Magnificent Ambersons.*

Among his other stories are *Cherry, The Conquest of Canaan, Penrod, Women, Image of Josephine,* and *Alice Adams.* His plays include *Clarence, Poldekin, The Wren,* and *Colonel Satan.* In 1920, he was elected member of the American Academy of Arts and Letters.

Tasso (*tăs'ō*; Ital., *tās'sō*), **Torquato (1544-1595),** Italian poet, was born at Sorrento, the son of a nobleman of Bergamo. He studied law at Padua and philosophy at Bologna. In 1562, he published his earliest poem, *Rinaldo.* In 1565, he entered the service of Cardinal Luigi d' Este and, in 1570, accompanied him to Paris. In 1572, Tasso was invited to the court of Alfonso II, Duke of Ferrara. While there he produced his most important works. His *Aminta,* a pastoral drama of exquisite lyrical charm, was published in 1573. In the following year, he completed *Jerusalem Delivered,* one of the great epic poems of modern times.

For some years Tasso lived on intimate terms with the Duke of Ferrara and his sisters, the Princesses Lucrezia and Leonora. About 1577, Tasso's mind began to fail and, in 1579, he was confined as insane in a hospital of Ferrara. A theory that he was imprisoned because of his aspirations for the hand of the Princess Leonora gained wide acceptance. While now generally discredited, this legend formed the basis for Goethe's *Tasso* and Byron's *Lament of Tasso.*

Following his release in 1586, Tasso led a broken and wandering life, residing for brief periods in various Italian cities. In these last years he wrote the tragedy *Torrismondo* and several poems as well as a revised version of his *Jerusalem Delivered,* which he called *Jerusalem Conquered.*

All these are inferior to his earlier works. At Rome, whither he had been summoned by Pope Clement VIII to be crowned poet laureate at the Capitol as Petrarch had been, Tasso was striken with a fatal illness and the ceremony was never performed. See *Jerusalem Delivered*.

Taylor, (James) Bayard (1825-1878), American author and traveler, was born at Kennett Square, Pa. In 1844 he published a volume of poems, *Ximena*. Soon afterward he set out on a pedestrian tour of Europe, and, in 1846, published *Views Afoot, or Europe Seen with Knapsack and Staff*. After his return he settled in New York, wrote for the *Tribune*, and, as its correspondent, made extensive travels in various countries. In 1878, he was appointed United States minister to Berlin.

Taylor wrote many volumes of verse, fiction, sketches, essays, translations, and criticisms, besides several books of travel. Among his best poems are "Bedouin Song," "The Song of the Camp," and "The Quaker Widow." Of his novels *The Story of Kennett* and *Hannah Thurston* were in greatest favor. Taylor made an excellent translation of Goethe's *Faust*.

Taylor, (Joseph) Deems (1885-), American composer and musical critic, was born in New York City. After he was graduated from New York University in 1906, he studied music and became musical editor for several encyclopeidas, periodicals, and newspapers, including the New York *World* and *American*. Beginning in 1910, he composed a large number of suites, operas, and symphonic poems, the better known of which include *The Chambered Nautilus*, *The King's Henchman*, and *Peter Ibbetson*. His achievements were recognized by election to the American Academy of Arts and Letters in 1935. He wrote *The Well Tempered Listener* for the guidance of radio audiences and *Pictorial History of the Movies*.

Taylor, Jeremy (1613-1667), English divine, was born at Cambridge. He was graduated from Cambridge; was admitted to Holy Orders about 1633; and shortly attracted the attention of Archbishop Laud, who, in 1636, procured him a fellowship at Oxford. He was soon afterwards made chaplain to Charles I, and from 1638 to 1642 was rector of Uppingham. About 1645 he withdrew to Wales, where he had charge of a school, and, in 1658, he removed to Ireland. After the Restoration he was made bishop of Down and Connor. His chief works are *Holy Living*, *Holy Dying*, *Liberty of Prophesying*, *Ductor Dubitantium*, and *Sermons*. Jeremy Taylor is sometimes styled "the modern Chrysostom" on account of his eloquence.

Taylor, Zachary (1784-1850), American general and 12th president of the United States, popularly known as "Old Rough and Ready," was born in Orange County, Va. He was educated in Kentucky, entered the army as lieutenant in 1808, became major in the War of 1812, and served as colonel in the Black Hawk War, 1832. After defeating the Seminoles at Okechobee in 1837, he received the chief command in Florida. He led the army which entered Mexico in 1846; gained the battles of Palo Alto, Resaca de la Palma, and Buena Vista, and, in 1847, successfully closed the campaign. As Whig candidate, he was elected to the presidency in 1848, and was inaugurated in 1849. Important questions under discussion during his term of office were the admission of California, the boundary between Texas and Mexico, and the extension of the slave power. He died in office and was succeeded by Vice-President Millard Fillmore.

Tchaikovsky (*chī-kôf'skĭ*), **Peter Ilyitch (1840-1893),** Russian composer, was born in the Ural mining region. He studied law at Leningrad, and, in 1859, secured a place in the ministry of justice but soon resigned to study music under Rubinstein at the Conservatory. In 1866, he became teacher of harmony at the Moscow Conservatory, and later he devoted himself entirely to composition and travel.

Eugene Onyegin is the best of his ten operas, which, however, are overshadowed by his great orchestral works. These include the world-famous *Symphonie Pathétique*, *Nutcracker Suite*, and his symphonic poems *Manfred*, *Romeo and Juliet*, and *Francesca da Rimini*. He wrote also overtures, concertos, chamber and piano music, and songs. Tchaikovsky ranks as the greatest composer that Russia has produced.

Teale, Edwin Way (1899-), naturalist, writer, and photographer, was born at Joliet, Ill. Not long after he was graduated from Earlham College, Richmond, Ind., in 1922, he became a science writer. He was on the staff of *Popular Science Monthly* from 1928 to 1941, and since then he has been a free-lance writer and contributing editor of the *Audubon Magazine*. Mr. Teale is an ornithologist, entomologist, and a botanist, and has illustrated many of his nature publications with his own remarkable photographs. Outstanding among the numerous books he has written or edited are the immensely popular *North with the Spring* (1951) and *Autumn Across America* (1956). Eventually there will be two more books in the series, one on summer and one on winter.

Tecumseh (*tê-kŭm'sĕ*), **(1775-1813),** Shawnee chief, was born near Springfield, Ohio. He headed an Indian alliance against the whites in the Northwest, but was defeated by the American general Harrison at Tippecanoe, 1811. In the War of 1812, he became an ally of the English, obtained the rank of brigadier general, and in 1813 commanded the right wing in the battle of the Thames, where he fell mortally wounded.

Teisserenc de Bort, Léon Philippe (1855-1913), French meteorologist, was born at Paris. Joining the staff of the weather bureau at Paris in 1880, he was advanced to chief meteorologist in 1892, but resigned to carry on investigations into the upper atmosphere from a private observatory he had constructed at Trappes, near Versailles. By means of balloons sent up in different latitudes he discovered and, in 1898, described the stratosphere. This discovery was later to become of extreme value for aviation. See *Stratosphere*.

Tennant, Smithson (1761-1815), English chemist, was born at Selby, Yorkshire. He studied botany, chemistry, and medicine at Cambridge, where he was graduated in medicine in 1790. Settling soon afterward on an estate near Cheddar, he conducted a series of agricultural and other experiments. In 1813, he was appointed professor of chemistry at Cambridge. His most notable achievement was the discovery of the metals iridium and osmium, both of which have unique uses in the arts.

Tennyson, Alfred Tennyson, Baron (1809-1892), English poet was born at Somersby, Lincolnshire. He was educated at Cambridge, gaining the chancellor's medal by his poem entitled "Timbuctoo." His literary career dates from the appearance of *Poems, Chiefly Lyrical* in 1830, after which his reputation slowly increased until the publication, in 1842, of *Poems, by Alfred Tennyson* raised him to supremacy among contemporary English masters of verse. In 1847, *The Princess* appeared and, in 1850, the elegies entitled *In Memoriam*.

On the death of Wordsworth in 1850, Tennyson was made poet laureate. In 1852, he issued his magnificent *Ode on the Death of the Duke of Wellington*. *Maud, and Other Poems* appeared in 1855. The *Idylls of the King*, published in 1859, at once took rank among the noblest poems of the language. Next followed *Enoch Arden*, *Aylmer's Field*, and *Tithonus*. In 1875, he published the poetic drama *Queen Mary*, which was followed by *Harold* and *Becket*. Other works were *Locksley Hall Sixty Years After*; *Demeter, and Other Poems*; *Robin Hood*; and *Maid Marian*.

Tennyson was the representative poet of the Victorian era, as Spenser was of the Elizabethan court, Milton of the Protectorate, and Pope of the reign of Queen Anne. In 1884, he was created baron. See *Arden, Enoch*; *Idylls of the King*; *Locksley Hall*.

Terence (*tĕr'ĕns*), or **Publius Terentius Afer (c. 190 B.C.-c. 159 B.C.),** Roman writer of comedies, was born in Carthage, of African origin. He was the slave of a Roman senator, who educated him in Rome and finally gave him his freedom. The success of his first play, *Andria*, in 166, won him the patronage of Lælius and the younger Scipio. While inferior to Plautus in comic power, he excels him in character drawing and metrical skill. Terence's plays served as a model for Molière and other modern dramatists. His extant plays include also *Hecyra*, *Heautontimoroumenos*, *Eunuchus*, *Phormio*, and *Adelphi*. He died while on a trip to Greece made for the purpose of studying the comedies of Menander and other comic poets.

Terry, Ellen Alice (Mrs. James Carew), **(1848-1928),** English actress, was born at Coventry. She made her first appearance on the stage in 1856, as the boy Mamillius in *The Winter's Tale*. In 1867, she appeared for the first time with Henry Irving, with whom, after 1878, she was associated for 24 years, rising to foremost rank among English actresses. Her notable roles include Portia, Hermione, Juliet, Mistress Page, and Viola, in Shakespearean plays; Fair Rosamund in Tennyson's *Becket*; Madame Sans-Gêne in a Sardou adaptation; Clarisse in *Robespierre*; Alice Grey in Barrie's *Alice Sit-by-the-Fire*; and Lady Waynflete in Shaw's *Captain Brassbound's Conversion*. With Henry Irving, Miss Terry made in 1883 the first of many successful visits to the United States. Her writings include *The Russian Ballet* and *The Story of My Life*.

Tertullian (*tĕr-tŭl'ĭ-ăn*), **Quintus Septimius Florens (c. 150 A.D.-c. 230),** a father of the Latin Church, was born at Carthage. He practiced law in Rome and later returned to his birthplace, where he became a presbyter and spent the rest of his life. Well versed in Greek and Roman literature, he was remarkable for his impassioned eloquence, which was given full sway in his most famous work, *Defense of the Christian Religion*.

Tesla (*tĕs'lă*), **Nikola (1857-1943),** American electrical inventor, was born in Smiljan, Yugoslavia. He studied engineering in Graz. In 1884, he came to the United States and for several years was employed in the Edison establishment at Orange, N. J. Subsequently he devoted himself to electrical research and invention, discovering

the principle of the rotary magnetic field, and applying it to the induction motor. Tesla's inventions include dynamos, transformers, induction coils, oscillators, and arc and incandescent lamps. He devoted many years to an attempt to solve the problem of wireless transmission of electric power.

Tetrazzini (*tā'trät-sē'nē*), **Luisa (1874-1904),** Italian coloratura soprano, was born in Florence. She studied under Signor Cecherini and, in 1895, made her operatic debut as Inez in *L'Africaine.* She sang in Rome and other cities, everywhere increasing her fame. In 1907, she won a great triumph at Covent Garden, London. Upon appearing at the Manhattan Opera House, New York, in 1908, she was recognized as a dramatic singer of the first rank. From 1910 to 1913, Tetrazzini made extended concert tours in the United States, and, in 1913-14, she was a regular member of the Chicago Opera Company. Possessing a voice of remarkable purity and beauty, Tetrazzini ranked among the greatest modern coloratura singers.

Thackeray, William Makepeace (1811-1863), English novelist, was born at Calcutta, India. He was educated at the Charterhouse and at the University of Cambridge. After working unsuccessfully as an illustrator, he abandoned art for literature and rose to share with Dickens foremost rank among British novelists of his time. His earlier writings, which appeared under the pseudonym "Michael Angelo Titmarsh," included contributions to *Punch* and several volumes of wit and satire. *Vanity Fair,* which appeared in 1847-48, established his reputation. Then followed *Pendennis, Henry Esmond, The Newcomes, The Virginians,* and *The Adventures of Philip,* which have become classics of English fiction. Thackeray's last novel, *Denis Duval,* was left unfinished at his death. See *Barry Lyndon; Sedley, Mr.; Sharp, Rebecca; Vanity Fair.*

Thales (*thā'lēz*), **(c. 640 B.C.-c. 546 B.C.),** Greek philosopher and scientist, was born in Miletus. Thales is universally recognized as the founder of Greek geometry, astronomy, and philosophy. His claim to be the founder of mathematics rests upon his proofs of some of the elementary propositions of geometry. In astronomy, his most notable achievement was his prediction of an eclipse of the sun, which occurred May 28, 585. In philosophy, he sought a single constituent element, or principle, out of which the world is formed; this he declared to be water, or moisture.

Thanet, Octave. See *French, Alice.*

Thaxter, Celia Laighton (1836-1894), American poet and juvenile writer, was born at Portsmouth, N. H. She spent much of her girlhood and later life on the Isles of Shoals, where her father was the lighthouse keeper. In 1851, she married Levi Lincoln Thaxter, a Browning scholar. Her poetry is reflective of her quiet life and the gentler aspects of nature. Her works include *Among the Isles of Shoals, Idylls and Pastorals,* and *Stories and Poems for Children.*

Themistocles (*thē-mis'tô-klēz*) **(c. 514 B.C.-449 B.C.),** Athenian general and statesman, was born at Athens. He fought at Marathon, and devoted the succeeding years to the upbuilding of the Athenian navy, greatly adding to its power when he was chief archon in 481. On the invasion of Greece by Xerxes, he was appointed commander of the Athenian fleet, and the great naval victory of Salamis was due to his courage, his foresight, and his astute diplomacy. Accused of peculation about 471, he was ostracized and retired for a time to Argos. In 465, he went to the Persian court, where he was received by Artaxerxes, and thereafter lived securely in Magnesia until his death.

Theocritus (*thē-ŏk'rĭ-tŭs*), Greek bucolic poet, flourished about 310-245 B. C. He was reputed to be a native of Syracuse, but very little is known of his personal history. Of his writings about 30 idyls and a number of epigrams are extant. In his poems Theocritus united popular and artistic elements with marvelous skill and is justly called the father of pastoral poetry. Virgil in Latin poetry and Spenser and Milton in English have imitated his style.

Theodoric (*thē-ŏd'ô-rĭk*) **the Great (c. 454-526),** founder of the Ostrogothic kingdom in Italy, was born in Pannonia. For ten years during his youth he was a hostage at Istanbul. In 474, he succeeded his father as king of Pannonia. In 489, he advanced upon Italy, overthrew Odoacer, and became sole ruler. He was then the most powerful of the Gothic kings, with an empire embracing Italy, Sicily, and Dalmatia, besides German possessions. Proving himself a wise and strong ruler, he became one of the great heroes of German legend and figures in the *Nibelungenlied.*

Theodosius (*thē'ô-dō'shĭ-ŭs*) **the Great (c. 346-395),** Roman emperor, was born near Segovia. He accompanied his father, a celebrated Roman general also named Theodosius, on successful campaigns in Britain and elsewhere. His father was beheaded at Carthage in 376 and the son thereupon retired to his patrimonial estates in Spain. Upon the death of Valens, Gratianus called Theodosius from retirement, made him co-ruler, placing, in 379, Egypt and the East under his administration and intrusting him with the protection of the empire against the Goths.

In four years Theodosius pacified the Visigoths, and, in 386, he conquered the Ostrogoths. In 388, he restored Valentinian II to the throne of the Western empire. In 394, Theodosius overthrew the armies of Valentinian's successor, Arbogastes, and reunited the Eastern and the Western empire for a few months preceding his death.

Theophrastus (*thē-ô-frăs'tŭs*) **(c. 372 B. C.-287 B. C.),** Greek philosopher and naturalist, was born at Eresus, in Lesbos. He became a pupil of Plato at Athens and later of Aristotle, at whose death he was made head of the Peripatetic School, which he conducted for 35 years. He maintained the high character of the school, which for a time enrolled more than 2000 students and won distinguished reputation in Greece and in other countries. Aristotle also made Theophrastus guardian of his children and bequeathed to him his library and the original manuscripts of his works.

While in philosophy Theophrastus closely adhered to the teachings of his great master, he was more devoted to natural history than to metaphysics and his chief fame rests upon his botanical works. In his *History of Plants* and in his *Theoretical Botany,* he describes about 500 species then made use of in treating diseases. He wrote treatises *On Mineralogy, On Fire, On the Senses,* and *On Metaphysics.* His famous book of sketches called *Ethical Characters* was widely popular and has often been imitated by modern writers.

Thespis, Greek poet, generally regarded as the father of tragic drama, flourished in the 6th century B. C. Before his time, choruses sang hymns in honor of Bacchus or other dieties, relating to their exploits. According to Diogenes Laërtius, Thespis introduced into the chorus an actor to play the part of the deity or hero. By his dialogue with the leader of the chorus this actor gave dramatic vigor to the story.

The plays of Thespis were usually given under his direction on a rude stage, the paraphernalia for which were transported by wagons and were set up at different places suitable for giving performances. He is said to have lived, however, to see the drama established as a state institution by Pisistratus, 535 B. C.

Thiers (*tyâr*), **Louis Adolphe (1797-1877),** French statesman and historian, was born at Marseilles. He was educated for the law, but discarded it for journalism. During 1823–27 appeared his *History of the French Revolution.* Active in promoting the revolution of 1830, he became minister of the interior in 1832, served in various offices in several cabinets, and, for a brief period in 1840, was premier. Withdrawing from politics, he then wrote his *History of the Consulate and the Empire.* He entered the *corps législatif* in 1863 and, in 1870, resolutely opposed the impending war against Germany. In 1871, he succeeded in effecting peace on the best terms possible, and was elected president of the new republic. He resigned this office in 1873. Thiers was one of the most influential political leaders of France, and, on the collapse of the Empire, was the foremost figure in reconstructing the nation.

Thomas (*tô'mâ'*), **Ambroise (1811-1896),** French composer, was born at Metz. He received his education in music at the Paris Conservatory. His first opera, *La Double Echelle,* published in 1837, was followed by *Betty, Le Caïd, Le Songe d'une Nuit d'Eté, Le Carnaval de Venise, Mignon, Hamlet,* and *Françoise de Rimini.* His *Hamlet* was very successful in France and his *Mignon,* which appeared in 1866, won world-wide popularity. He wrote also many canatas, part-songs, and choral pieces. See *Mignon.*

Thomas, Augustus (1857-1934), American playwright, was born at Saint Louis, Mo. He dramatized Mrs. Burnett's story *Editha's Burglar* in 1887; produced his first original play, *A Man of the World,* in 1889; and soon rose to first rank among American dramatists. The masterly dramatic technique of Thomas is well exemplified in *Arizona* and in *The Witching Hour,* while in *Alabama* his earlier, and in *As A Man Thinks* his later, method is revealed. In 1912, he was elected a member of the American Academy of Arts and Letters. See *Witching Hour, The.*

Thomas, Dylan (*dĭl'un*) **Mariais (1914-1953),** Welsh-born British poet, won immediate acclaim in the mid-thirties with his first two volumes of verse, *Eighteen Poems* and *Twenty-five Poems.* With the publication in 1946 of his *Deaths and Entrances,* he established himself as one of the major British poets of this century. His *Collected Poems,* which appeared in 1952, contained only a few poems written after 1946. Of his small prose output, the semi-autobiographical volume of sketches, *Portrait of the Artist as a Young Dog,* is the best known. A characteristic of all Dylan Thomas's poetry is the rich beauty of its word music. He died in the United States.

Thomas, George Henry (1816-1870), American general, was born in Southampton County, Va. He was graduated from West Point in 1840 and served with distinction in the Mexican War. In 1861, he was appointed brigadier general of volunteers, and, in January 1862, he won the battle of Mill Springs. As major general in command of the center, he saved the battle of Stone River. At Chickamauga, he

rendered the victory a barren one for the Confederates and gained the title of "the rock of Chickamauga." In November 1863, at the battle of Chattanooga, he captured Missionary Ridge. In 1864, he commanded in Sherman's advance on Atlanta. Later the same year, he crushed Hood's army at Nashville.

Thomas, Lowell (1892-), radio commentator, traveler, and author, was born at Woodington, Ohio, but spent his boyhood at Cripple Creek, Colorado, where his father was a physician. He studied at Valparaiso, Indiana, University of Denver, Kent College of Law, and Princeton University. Having been assigned with a group of cameramen to record the history of World War I, he was with different Allied armies in Europe, then joined General Allenby in the Holy Land and met the fabulous Colonel T. E. Lawrence. He toured India with the Prince of Wales and was historian of the first round-the-world flight. Since 1935 he has been radio news commentator and news commentator for 20th Century Fox Movietone. He flew around the world in 1945, making broadcasts from various points. In 1949 he was injured while making a journey to Tibet on horseback over Himalayan trails. His transcribed broadcasts and later his lectures and writings have enabled many people to learn about the mysterious "Shangri-La" country. Among the many books he has written are *With Lawrence in Arabia, The First World Flight, The Sea Devil,* and *Wings over Asia.*

Thomas, Norman Mattoon (1884-), American Socialist leader, was born at Marion, O. He was graduated from Princeton university in 1905 and from Union Theological Seminary in 1911. Ordained to the Presbyterian ministry in the latter year, he occupied several pastorates in New York City. His sympathies being deeply engaged in the interest of social betterment, he founded *The World Tomorrow* in 1918 to forward Socialist aims and was its editor for three years. As a Socialist candidate, he ran for governor of New York State in 1924, for mayor of New York City in 1925, and for president of the United States in 1928, 1932, 1936, 1940, 1944, and 1948. His leadership of the Socialist party was on a high intellectual plane.

Thomas, Theodore (1835-1905), American orchestral conductor was born at Esens, East Friesland, Germany. At the age of 14 he came with his parents to New York City, where he joined the orchestra of the Italian Opera. Thomas was director of the College of Music at Cincinnati, 1878-80, and conductor of the New York Philharmonic Society, 1880-90. He then went to Chicago, where he developed one of the world's great orchestras. He exercised a deep influence upon the development of musical taste in America.

Thomas à Becket. See *Becket, Thomas à.*

Thomas à Kempis. See *Kempis, Thomas à.*

Thompson, Dorothy (1894-), American journalist, was born at Lancaster, N. Y. After being graduated from Syracuse University in 1914, she engaged in social work until 1920 and then went to Europe as foreign correspondent for certain New York and Philadelphia newspapers. She was the wife of Sinclair Lewis, the novelist, from 1928 to 1943. Beginning in 1936, she began writing syndicated articles, mainly interpreting foreign events.

Thompson, Ernest Seton. See *Seton, Ernest Thompson.*

Thomson, Elihu (1853-1937), American electrician and inventor, was born in Manchester, England. After being graduated from Central High School, Philadelphia, 1870, he was a teacher of chemistry and mechanics there until 1880. He then became electrician for the Thomson-Houston and General Electric companies, which manufactured his inventions, covered by more than 700 patents. He invented the process of electric welding which bears his name, many devices in electric lighting and electric motor systems, and a technique for making fused quartz.

Thomson, Sir Joseph John (1856-1940), English physicist, was born near Manchester. He was graduated from Trinity College, Cambridge, 1880. In 1884, he became professor of experimental physics, Cambridge, and, in 1905, professor of physics at the Royal Institution, London. In 1918, he was made master of Trinity College, Cambridge. Thomson's researches on the ionic theory of electricity, on radioactivity, and on the electrical theory of inertia of matter led him to the discovery of the electron, a central event in the history of modern science. He was awarded in 1906 the Nobel prize for physics.

Thomson, Sir William. See *Kelvin, Lord.*

Thoreau (*thō'rō; thō-rō'*), **Henry David (1817-1862)**, American naturalist and author, was born at Concord, Mass. He was graduated from Harvard in 1837, and devoted himself to the study of nature and to writing. Emerson says of him: "He was bred to no profession; he never married; he lived alone; he never went to church; he never voted; he refused to pay a tax to the state; he ate no flesh; he drank no wine; he never knew the use of tobacco; and, though a naturalist, he used neither trap nor gun." This "poet naturalist" built with his own hands a small cabin on the banks of Walden Pond, near Concord, and lived there alone for two years. He gave an account of his experiences in his *Walden,* published in 1854. Among his other works are *Cape Cod, The Maine Woods, Excursions,* and *A Yankee in Canada.* See *Walden.*

Thorndike, Edward Lee (1874-1949), American psychologist, was born at Williamsburg, Mass., and was educated at Wesleyan, Harvard, and Columbia universities. After a year spent as instructor in education at Western Reserve University, he was appointed to the faculty of Teachers College, Columbia University, and became professor of educational psychology in 1904. From 1921 to 1940, he was professor and director of the Division of Psychology of the Institute of Educational Research.

Thorndike became well known for his work in psychological measurement, particularly with reference to its bearing on educational problems. His published works include *Principles of Teaching, Animal Intelligence, The Original Nature of Man, The Measurement of Intelligence,* and *Human Nature and the Social Order.*

Thornton, Sir Henry Worth (1871-1933), British railway manager, was born at Logansport, Ind. Educated at the University of Pennsylvania, he entered the service of the Pennsylvania Railroad in 1894, rose to the post of division engineer in 1899, and was superintendent of various divisions from 1901 to 1911, when he was made general superintendent of the Long Island Railroad.

In 1914, Thornton became general manager of the Great Eastern railway of England. In 1917, he was made also deputy director of inland waterways and docks, and, in the following year, he became inspector general of movements and railways. In 1919, becoming a British subject, he was appointed inspector general of transportation, with temporary rank of major general. In 1922, he was made general manager of all government-owned railways in Canada. His able management and courage in resisting political influences led to greatly increased earnings of the system. He resigned in 1932.

Thorvaldsen (*tôr'vál-sĕn*), **Bertel (1770-1844)**, Danish sculptor, was born at Copenhagen. He studied at the Academy of Copenhagen; in 1793, gained the gold medal in sculpture; and, in 1797, went to Rome for further study. His first great work was the colossal statue "Jason." Except for a visit to Denmark, 1819-20, when he executed the statues of Christ and the twelve apostles, he remained in Rome until 1838. Thorvaldsen's masterpieces include "Entry of Alexander into Babylon," "Cupid and Psyche," "St. John Preaching in the Wilderness," "Christus Consolator," the statue of "Prince Poniatowski," the medallions "Night" and "Morning," and the "Lion of Lucerne." Approaching the purity and repose of Greek art, Thorvaldsen's work is the best which the so-called classicist school has produced in modern sculpture. See *Sculpture.*

Thucydides (*thû-sĭd'ĭ-dēz*) **(c. 454 B. C.-c. 399 B. C.)**, Greek historian, was born at Athens, of a noble Athenian family, and possessed great wealth and influence. Failing in an expedition which he commanded during the Peloponnesian War, he was banished from Athens in 423. During his exile he wrote *History of the Peloponnesian War,* remarkable for the fullness and the exactness of its details and for its philosophical spirit. Thucydides is universally regarded as the first critical historian and the greatest historian of antiquity.

Thurber, James Grover (1894-), American humorist and cartoonist, was born at Columbus, Ohio, where he began journalistic work in 1920. In 1926, he became a contributor to *The New Yorker* magazine, in which most of his drawings and sketches have appeared prior to publication in book form. His publications include *The Owl in the Attic* (1931); *The Seal in the Bedroom* (1932); *My Life and Hard Times* (1934); *The Middle-Aged Man on the Flying Trapeze* (1935); *The Thurber Carnival* (1945); *The Beast in Me and Other Animals* (1948); *The Thirteen Clocks* (1950); and *Thurber Country* (1953). In 1929, he collaborated with E. B. White in writing the book *Is Sex Necessary?* and in 1940 with Elliott Nugent in the play *The Male Animal.*

Thurman, Howard (1900-), Negro clergyman and educator, was born at Daytona Beach, Fla. From the public schools he entered the Florida Baptist Academy and studied later at Morehouse College at Atlanta, Ga. After completing his studies at the Colgate-Rochester Divinity School, he taught at Morehouse College, and at Howard University in Washington. In 1953, he was appointed professor of Spiritual Resources and Disciplines in the School of Theology at Boston University. His best-known books are *Jesus and the Disinherited, Deep Is the Hunger, Meditations of the Heart,* and *Deep River: An Interpretation of Negro Spirituals.*

Tibbett, Lawrence Mervil (1896-), American baritone singer, was born at Bakersfield, Cal. After a junior college course in Los Angeles, he studied singing in Los Angeles and New York. He first appeared on the concert

stage in 1917 and had his operatic debut in Hollywood Bowl in the role of Amonasro in *Aïda*, 1923. Later the same year he sang the part of Valentine in *Faust* with the Metropolitan Opera Company.

Tiffany, Charles Lewis (1812-1902), American merchant, was born at Killingly, Conn. In 1837, in partnership with John B. Young, on a borrowed capital of $1000, he established a stationery and fancy-goods store in New York City. The jewelry part of the business grew rapidly. In 1847, Tiffany began the manufacture of gold jewelry and, in 1848, made immense profits in the diamond trade. The firm became Tiffany and Company in 1851; later it established branches in several European centers, and became the leading importing and manufacturing jewelry firm in the United States. Tiffany adopted the sterling silver standard, .925 fine, which has since become standard throughout the country.

Tiffany, Louis Comfort (1848-1933), American artist, son of Charles Lewis Tiffany, was born in New York City. He studied under George Inness and Samuel Coleman, New York, and under Léon Bailly, Paris, and devoted himself chiefly to decorative art, particularly mosaics, stained glass, and enamels. His best-known invention is the Tiffany favrile glass, which possesses refractive powers capable of iridescent effects. Among his oil paintings are "Algerian Shops" and "The Pool."

In 1918, he established at Oyster Bay, N. Y., the Louis Comfort Tiffany Foundation for art students. To this he deeded his entire art collection, his country home known as Laurelton Hall, a museum, and Tiffany Chapel, together with a substantial endowment for maintenance.

Tilden, Samuel Jones (1814-1886), American statesman, was born at New Lebanon, N. Y. He was educated at Yale and at New York University, and, in 1841, was admitted to the bar. He was a member of the New York legislature in 1846 and of the constitutional convention in the same year. In 1886, he was leader of the Democrats in the state, and attacked and vigorously aided in destroying the "Tweed Ring." In 1874, he became governor of New York; in 1876, he was Democratic candidate for the presidency, and received a majority of the popular vote, but on final count lacked one of a majority in the electoral vote. He left a large part of his fortune of 5 million dollars to found a Free Library in New York City.

Tilly, Johann Tserklaes, Count of (1559-1632), Belgian general, one of the great leaders of the Thirty Years' War, was born near Gembloux, Belgium. He was educated for the priesthood but abandoned the church for the army, receiving his military training under Parma and Alva. Devoted to the Catholic cause, he was given command of the Catholic army at the outbreak of the Thirty Years' War, during which he won many notable battles. In 1630, he succeeded Wallenstein as commander in chief of the Imperial forces. In 1631, he sacked with merciless cruelty the town of Magdeburg, a deed which Gustavus Adolphus avenged by crushing Tilly's forces in two successive battles, at Breitenfeld and at the river Lech, in the latter of which Tilly was mortally wounded.

Timoshenko (*tyĭ-mô'shĕn-kô*), **Semion (1895-),** Russian general was born at Furmanska, Bessarabia. He served in World War I and afterwards in the Red Army. In 1939-40 he commanded in Finland and Poland, and was made marshal and commissar for defense. In 1941 he successfully defended Moscow against the first German attacks, and in the next two years led powerful offensives which reconquered much of Russia.

Timrod, Henry (1829-1867), American poet, was born at Charleston, S. C. He was educated at the University of Georgia, and after some study of law became a tutor, devoting his leisure to writing. In 1860, he published a volume of poems which marked him as one of the most gifted poets of the South. He was ruined by the Civil War. His poetry was published after his death by his friend P. H. Hayne. Among his best poems are *Charleston, At Magnolia Cemetery,* and *The Cotton Boll.*

Timur (*tĭ-moor'; tē-moor'*) **(c. 1336-1405),** Oriental conqueror, sometimes called Tamerlane, was born at Sebz, near Samarkand. In 1361, he succeeded his father as chief of the Turkish tribe af the Berlas. In 1369, he conquered Balkh, and made Samarkand the seat of his empire. He afterward overran Turkestan, subdued Iran, penetrated Russia as far as Moscow, and then, turning to India, captured Delhi. He subsequently invaded Syria, and defeated and captured the Turkish Sultan Bajazet I. This defeat forced the Turks to raise the siege of Istanbul, and prolonged the independence of that city by fifty years.

Tintoretto (*tēn'tô-rĕt'tō*) **(1518-1594),** Venetian historical painter, whose real name was Jacopo Robusti, but he was called Tintoretto—"little dyer"—from his father's trade. He was self-taught except for a few lessons from Titian. He took as his motto "The design of Michelangelo and the coloring of Titian." His work is notable for its mastery of light and shade, vigorous, dramatic action, and rich color. Tintoretto was an exceedingly prolific painter. Among his famous pictures are "The Last Supper," "The Last Judgment," "Paradise," "The Presentation of the Virgin," and "Miracle of Saint Mark."

Tirpitz (*tĭr'pĭts*), **Alfred von (1849-1930),** German admiral, was born at Kustrin on Oder. He became lord high admiral in 1911. In World War I he carried out the German policy of submarine blockade and advocated the "unrestricted marine warfare," which later brought the United States into the war. He retired as head of the navy after the sinking of the *Lusitania.*

Tischendorf (*tĭsh'ĕn-dôrf*), **Lobegott Friedrich Konstantin von (1815-1874),** German biblical scholar, was born at Lengenfeld, Saxony. In 1845, he became professor of theology at Leipzig. His labors in search of the best and most ancient manuscripts of the New Testament resulted in the discovery of the fourth century *Sinaitic Codex* at the monastery on Mount Sinai. Among his works are the editions of the Sinaitic and many other manuscripts, critical editions of the New Testament, and the *Monumenta Sacra Inedita.*

Titchener (*tĭch'ĕn-ĕr*), **Edward Bradford (1867-1927),** American educator, was born at Chichester, England. He was graduated from Brasenose College, Oxford, in 1890 and studied under Wundt at Leipzig. He became assistant professor of psychology in 1892, professor in 1895, and research professor in 1910, Cornell University. Titchener developed the laboratory of experimental psychology at Cornell to a point of great efficiency, making extensive original investigations in the field of general as opposed to individual psychology. His *Experimental Psychology* became a standard work.

Titian, or **Tiziano Vecelli (c. 1477-1576),** the greatest painter of the Venetian school, was born at Capo del Cadore, Venetia, Italy. His early disposition toward art was fostered at Treviso under the Zuccatis, who were masters in drawing and mosaics; but, as he was more inclined to painting, Titian was placed under the tuition of Gentile Bellini at Venice. Again he changed; this time, to Giovanni Bellini, whose less labored manner he preferred. Guided by his own genius, the study of nature, and the example of Giorgione, his older fellow pupil, he soon acquired a bolder touch and more vigorous execution.

It is probable that Titian first employed his talents as decorator of the palaces of the great Venetian nobles. His "Pope Alexander VI Commending Jacopo Pesaro to the Madonna," an alterpiece at Antwerp, was painted in 1502 or 1503.

With Giorgione, in 1507-08, he was occupied in the decoration of the Venetian Exchange. In 1512, he produced "Sacred and Profane Love"; in 1514, "The Tribute Money," "The Assumption of the Virgin," begun in 1516 and finished two years later, has been rated among oil paintings as second only to Raphael's "Sistine Madonna."

Titian's reputation soon spread throughout the whole of Italy. While employed by the Duke of Ferrara from 1518 to 1523, he produced three famous mythological pictures, "Worship of Venus," a "Bacchanal," and "Bacchus and Ariadne." His "Death of Peter, Martyr," the most celebrated of his numerous productions, was finished about 1530. In this year he met Charles V. During their intimate, lifelong friendship, Titian executed countless commissions for the emperor. Perhaps the most remarkable portrait extant is his "Emperor Charles V on Horseback."

Accepting an invitation from Paul III to visit Rome, Titian resided there for three years and painted many potentates and men of distinction. The latter part of his life was occupied in working in Venice, chiefly for Philip II of Spain, for whom he painted portraits and various religious and mythological subjects.

Very little is known of his domestic life, save that he married in 1525 and had three children. His beautiful daughter Lavinia has been immortalized by her father.

The works of Titian are said to number more than 600. As a portrait painter and a master of color, he has never been surpassed. His draftsmanship, however, at times is defective. He is noteworthy for the complete, harmonious perfection of his method and for his mastery of all subjects, whether in the realm of nature or of man. He died in Venice, at 99 years of age. See *Renaissance, The.*

Tito (*tē'tō*), **Marshal, (Jozip Brazovich) (1891-),** Yugoslav partisan leader, was born near Zagreb, Croatia. Conscripted into the Austrian army in World War I, he deserted to the Russians and participated in the Revolution. Returning to Croatia in 1923, he took part in the Communist underground labor movement. In August 1942 he became leader of the Yugoslav partisans resisting the Nazi armies. With assistance from Russia, Great Britain, and the United States, Yugoslavia was liberated and a federated republic established. Tito became the first premier of the new government in January 1946. He has been president of Yugoslavia since 1953.

Tocqueville (*tôk'vĭl;* Fr., *tôk'vēl'*), **Alexis Charles Henri Clérel de (1805-1859),** French statesman and writer, was born at Verneuil. He studied at Metz and at Paris, and in 1825, was admitted to the bar. He was sent in 1831 to

America to report on the penitentiary system and wrote *Democracy in America*, which made a profound impression in Europe. He became a member of the Academy of Moral and Political Sciences and of the French Academy. In 1849 he became vice president of the Assembly and for a short time was minister of foreign affairs. After the *coup d'etat* of 1851, he retired to his Norman estate. He published in 1856 *L'Ancien régime et la révolution*.

Togo (*tō'gō*), **Heihachiro, Marquis** (**1847-1934**), Japanese admiral, was born at Kagoshima. He was sent to England for training, 1873-74. As commander of the *Naniwa*, he sank the Chinese transport *Kowshing* and thereby brought on the war with China. In 1904, he was selected to command the entire Japanese fleet in the hostilities against Russia. Togo won the great naval battle of the Sea of Japan, May 27-28, 1905, sinking 20 Russian ships and capturing or disabling the remainder of the fleet.

Tolstóy (*tŏl-stoi'*), **Liov (Leo) Nikolaievitch, Count** (**1828-1910**), Russian novelist and social reformer, was born in the government of Tula. He studied at the University of Kazan. In 1851, he entered the army, and served in the Caucasus and at Sebastopol. Leaving the army soon after the close of the Crimean War, he devoted himself to literature. His *War and Peace* is regarded as his masterpiece; but his *Anna Karenina*, largely autobiographical, is better appreciated.

Tolstoy wrote much on education, and in his later years devoted himself to religious teaching. He made "Resist not evil" the keystone of the Christian faith. His religious views are set forth in *My Confession*. His writings include also *The Kingdom of God Is Within You*, *The Four Gospels Harmonized and Translated*, *The Cossacks*, *The Kreutzer Sonata*, *Master and Man*, *The End of the Age*, and *Ivan Ilyitch*. See *War and Peace*.

Torrey, John (**1796-1873**), American botanist, was born in New York. He was graduated from the New York College of Physicians and Surgeons in 1818. In 1824, he gave up medical practice to become professor of chemistry and geology at West Point. From 1827 to 1855 he was professor of chemistry at the College of Physicians and Surgeons, serving also as professor of chemistry at Princeton, 1830-54. From 1853 until his death, he was chief assayer in the United States Assay Office, New York. Torrey's numerous scientific publications were chiefly on botany. With Asa Gray he began the publication of the *Flora of North America*, a monumental work of great value.

Torricelli (*tŏr'rē-chĕl'lē*), **Evangelista** (**1608-1467**), Italian physicist and mathematician, was born probably at Piancaldoli, in the Romagna. He was a pupil of Galileo at the University of Florence, and succeeded him as professor of natural philosophy and mathematics in 1642. He invented the barometer and made improvements in lenses for telescopes.

Toscanini, Arturo (**1867-1957**), Italian musical conductor, was born at Parma and received his musical education at the Conservatory of Music there. His brilliant musical gifts secured him the conductorship of the orchestra at La Scala Opera House in Milan in 1898. In 1908, he came to New York and was principal conductor at the Metropolitan Opera House until 1915. From 1926 to 1932, he conducted the Philharmonic Symphony Society at New York. He was guest conductor at the musical festival in Bayreuth, Germany, in 1930 and later years. In 1937, he organized the National Broadcasting Company's symphony orchestra and conducted it until 1954. Toscanini directed without score some hundred operas. In the building of tremendous climaxes, he had few equals.

Toulouse-Lautrec Monfa, Henri de (**1864-1901**), French artist, was born in Paris, and received his training in the studio of Cormon. He was strongly influenced by Degas and the Japanese artists, but showed much originality in treating his favorite subjects. His pictures of ballets and circus acts are full of spirit and action, of what might be called "realism with a light touch." Besides innumerable sketches and a large group of circus pictures, he is remembered for such lithographs as "Moulin-Rouge" and "Japanese Divan," and for his paintings of "The Promenade" and "The Dancing Women." To quote a French estimate, "More designer than painter, his style is cruel but sure and vigorous." It is particularly the sureness of line that makes a collection of his sketches an ideal instruction book for art students.

Toussaint L'Ouverture (*tōō'săN' lōō'vĕr'tür'*), **François Dominique** (**1743-1803**), Haitian soldier and statesman, son of African slaves, was born near Cape Français. He led the insurrection of 1791-92, which resulted in the emancipation of all slaves in the island. In 1796 he was appointed by the French Directory chief of the army, and gained control of the whole island. When Napoleon tried to re-establish slavery in 1801, Toussaint was arrested and sent to a prison in France, where he died.

Toynbee, Arnold Joseph (**1889-**), British historian, was born in London, and received a classical education at Winchester and Oxford. During the World Wars he served in the Intelligence and Research department of the Foreign office. From 1919 he taught at the University of London and the Royal Institute of International Affairs. While Toynbee has written largely of Greece, Turkey, and international relations, his principal work is *A Study of History*, an explanation of the rise and decline of civilizations in terms of their successful or unsuccessful reactions to challenge from within or without. *An Historian's Approach to Religion* was published in 1956.

Trajan (*trā'jăn*), or **Marcus Ulpius Traianus** (**53 A.D.-117 A. D.**), Roman emperor, was born near Seville, Spain. After winning distinction in Parthian and German campaigns, Trajan was adopted by Nerva in 97 as his colleague and successor, and, in 98, became emperor. In civil affairs he ruled wisely, and in his military character he sustained the glory of Rome by defeating the Dacians, Parthians, and Persians. The column of Trajan in Rome was erected to commemorate his victory over the Dacians.

Traubel, Helen (**1905-**), American soprano, was born at St. Louis, Mo. While still in her teens, she sang with the St. Louis Symphony Orchestra. In 1939 she became a member of the Metropolitan Opera, continuing with that organization until 1953. She soon became the Metropolitan's leading Wagnerian singer, the first American-born and completely American-educated soprano to achieve such a status. Her night club appearances in 1953 led to a controversy with the Metropolitan that was the subject of widespread publicity.

Trevelyan (*trē-vĕl'yăn*; *-vĭl'-*), **Sir George Otto** (**1838-1928**), English statesman and author, was born at Rothley Temple, Leicestershire. He was graduated from Cambridge in 1861. He was elected to Parliament in 1865 and held his seat until 1897. He was a lord of the Admiralty in 1868, and held other positions. Trevelyan did much for the abolition of purchase in the army, and for the enfranchisement of agricultural laborers. He wrote *The Early History of Charles James Fox*, *The American Revolution*, and *The Life and Letters of Lord Macaulay* (his uncle).

His son, George Macaulay Trevelyan (1876-), regius professor of modern history at Cambridge and master of Trinity College, holds high rank among English historians. His works include *England in the Age of Wickliffe*, *Garabaldi and the Thousand*, *England under the Stuarts*, and *England under Queen Anne*.

Tripler, Charles Eastman (**1849-1906**), American physicist and inventor, was born in New York City, and was privately educated. In his private laboratory he conducted extensive experiments in electricity and mechanics. His greatest achievement was the production of liquid air, obtained in 1895 by a machine which compressed atmospheric air at a temperature of about 200° below zero. Linde in Germany and Hampson and Dewar in England also accomplished this at about the same time.

Trollope (*trŏl'ŭp*), **Anthony** (**1815-1882**), English novelist, was born in London. He was educated at Winchester and at Harrow, and for many years thereafter held a place in the London Post Office. He produced a long series of entertaining novels, noteworthy for their pleasing realism and truthfulness of detail. Among these are *Barchester Towers*, *Doctor Thorne*, *The Bertrams*, *The Claverings*, *Castle Richmond*, and *The Golden Lion of Granpere*. He wrote also several volumes of travel and an autobiography.

Tromp (*trŏmp*), **Martin Harpertzoon** (**1597-1653**), Dutch admiral, was born at Brielle. He entered the navy in 1624, and as lieutenant admiral defeated a superior Spanish fleet off Gravelines in 1639. In May 1652, he was beaten by an English fleet under Blake but, in November following, severely defeated Blake off Goodwin Sands. In February 1653, Blake, with Monk and Penn, defeated Tromp off Portland. In June, a terrific battle, in which the Dutch were defeated, took place between Tromp and Dean. In the final battle with Monk, in 1653, off the coast of the Netherlands, the Dutch lost 30 men-of-war, but their greatest loss was the heroic admiral, victor in 33 sea-fights.

Trotzky (*trŏt'skē*), **Leon** (**1879-1940**), Russian revolutionary statesman, was born of Jewish parentage at Odessa. His real name was Leon Bronstein. Imprisoned for revolutionary activities in 1901 and 1905, he fled from Russia, and carried on propaganda work in other countries, finally in New York. Returning to Russia in 1917, he rose to power with Lenin, organizing the Red army and negotiating the treaty of Brest-Litovsk. After the death of Lenin in 1924, Trotzky, favoring world revolution, was defeated for party leadership by Stalin, who placed national development first. Trotzky in 1929 took refuge in Turkey, and lived later in France and in Mexico, where he wrote *The Revolution Betrayed*. He was assassinated.

Trowbridge, John Townsend (**1827-1916**), American novelist, juvenile writer, and poet, was born at Ogden, N. Y. After receiving a common school education, he became a journalist. Settling in Boston in 1848, he devoted

himself to authorship. Many of his stories for boys rank with the best of their kind. Among these are *Father Bright, Cudjo's Cave, The Three Scouts, The Silver Medal,* the *Jack Hazard* series, and the *Tide Mill* series. Of Trowbridge's verse, the poem entitled *Darius Green and His Flying Machine* is best known.

Truman, Harry S. (1884-), 33rd president of the United States, was born at Lamar, Mo. and grew up on a farm. He served in World War I as captain in the 129th field artillery. From 1922 to 1934 he was judge and presiding judge of the Jackson County (Mo.) Court, meantime studying law. During his term of service he directed the construction of $25,000,000 of highways and public building.

He was elected United States senator from Missouri in 1934, and re-elected in 1940. As chairman of the special Senate committee to investigate the defense program, he performed great service in bringing to light and correcting waste and mismanagement in defense organizations. In 1944 he was nominated for vice president with President Roosevelt, and was elected.

The unexpected death of President Roosevelt made Truman president, April 12, 1945. He met well the problems thus suddenly thrown upon him. The war was carried to a victorious conclusion. At the Potsdam Conference he met Premier Attlee and Marshal Stalin. He advocated the charter of the United Nations. He met reconversion and attendant labor troubles with courage and resolution.

The election of a Republican Congress in 1946 increased his difficulties. The opposition generally supported the bipartisan foreign policy, but radical differences arose on domestic questions. The president used his veto freely, but was sometimes overruled by Congress. In 1948, he was re-elected, defeating Thomas E. Dewey, and Congress again came under Democratic control. Declining to run for re-election, he retired in January, 1953.

Trumbull, John (1756-1843), American historical and portrait painter, was born at Lebanon, Conn. He was graduated from Harvard in 1773 and studied art at Boston and with Benjamin West in London. He served as aide-de-camp to Washington during the Revolution. In 1817, he was employed by Congress to paint four pictures for the rotunda of the Capitol and, in 1824, completed "The Signing of the Declaration of Independence," "Surrender of Burgoyne," "Surrender of Cornwallis," and "Resignation of Washington." See *Painting.*

Tschaikovsky. See *Tchaikovsky.*

Tucker, Sophie (1884-), American jazz singer, was born in Poland, while her mother was en route to join Sophie's father who had emigrated to America. As a child she sang to the patrons of the small restaurant which her parents operated in Hartford, Conn. Later she sang for her supper in a New York restaurant, and became a vaudeville performer. When in 1914 she organized her own orchestra called "The Five Kings of Syncopation," she soon won the nickname of "The Queen of Jazz," but today she is better known as "The First of the Red Hot Mammas." The autobiography she wrote was named for her most famous song "Some One of These Days."

Tupper, Sir Charles (1821-1915), Canadian statesman, was born in Amherst, Nova Scotia. He studied medicine at Edinburgh University and practiced in his native county. In 1855, he was made a member of the provincial legislature, and he was prime minister of Nova Scotia in 1864-67.

Tupper was among the strongest supporters of Confederation. After its consummation, he was for many years a member of the cabinet in the Dominion Parliament and, as minister of railways and canals, promoted the construction of the Canadian Pacific Railway. In 1896, he became prime minister, but was defeated in the same year.

Turenne (*tū'rĕn'*), **Henri de la Tour d'Auvergne, Vicomte de (1611-1675)**, French general, was born in Sedan, and was brought up in the Protestant faith. In 1630, he entered the French army. He served with distinction under Bernhard of Weimar in 1637-38. In 1642, he conquered Roussillon from Spain, for which service he was made a marshal of France. Commanding an army in Germany in 1643, he defeated the Bavarians, but was himself defeated by their general, Mercy, at Marienthal in 1645. With Condé, he avenged this defeat at Nordlingen, where Mercy was slain. In 1646, he joined the Swedes to complete the conquest of Bavaria and by his victories hastened the close of the Thirty Years' War.

In the civil wars in France the two greatest generals of the period, Condé and Turenne, were on opposite sides, and Turenne, with inferior forces, was uniformly victorious, finally driving Condé from France. Louis XIV made Turenne marshal-general of France and, in 1668, induced him to embrace the Catholic faith. Turenne was killed at the battle of Sasbach.

Turgéniev (*tōōr-gĕn'yĕf*), **Ivan Sergeyevitch (1818-1883)**, Russian novelist, was born in Orel, Russia. After studying at Moscow, Leningrad, and Berlin, he obtained a governmental position at Leningrad. On account of his liberal ideas he was banished, but later was permitted to return to Russia. After 1855 he lived chiefly in Paris. His literary fame rests upon the powerful novels *Fathers and Children, Liza, Smoke, Rudin, Faust, On the Eve, Virgin Soil,* and *Clara Militch.* Turgéniev ranks as one of the greatest prose artists in Russian letters and enjoyed a great reputation throughout Europe.

Turgot (*tür'gō'*), **Anne Robert Jacques (1727-1781)**, French statesman and economist, was born at Paris. He was educated for the Church, but later turned to the law and to political economy. He identified himself with the philosophical and liberal thought of the time, contributed to the *Encyclopédie,* and was a member of the physiocratic school of economists. In 1761, he was made intendant of Limoges, where he introduced many reforms, such as abolishing the method of mending the roads by the compulsory labor of the poor. Under Louis XVI he was put in charge of the finances of the country, and, if his plans had been received with favor by the nobility and the statesmen, France might have been spared the horrors of the Revolution. Among his writings are *Reflections upon the Formation and Distribution of Wealth* and a work on *Usury.*

Turner, Joseph Mallord William (1775-1851), British landscape painter, was born at London. His genius for art was revealed very early, and, at 15, he exhibited a drawing at the Royal Academy. His industry was almost as unexampled as his genius. To the exhibitions of the Royal Academy he contributed over 250 pictures. Among his most celebrated paintings are "Dido Building Carthage," "Sun Rising in the Mist," and "The Fighting *Téméraire,*" in the National Gallery, London; "The Slave Ship," in the Boston Museum; "The Castle of Indolence" and "Grand Canal," in the Metropolitan Museum, New York. Turner surpassed all other English landscape artists of his time. His most striking quality is a splendid, brilliant, though sometimes unrealistic, coloring, combined with an element of subtle mystery. Following 1845, his mind failed. He left his fortune to found a home for "decayed male artists." See *Painting.*

Twain, Mark. See *Clemens, Samuel Langhorne.*

Tweedsmuir, John Buchan, Baron (1875-1940), British administrator and writer, the 14th governor general of Canada, was born at Perth, Scotland. Educated at Glasgow and Oxford universities, he served as private secretary to Lord Milner, 1901-03, then high commissioner to South Africa. He then joined the publishing firm of Thomas Nelson and Sons. In 1916-17, he was attached to the headquarters staff of the British army in France. The next year he was director of information under the prime minister.

From 1927 to 1935 he represented the Scottish universities in the House of Commons. He was raised to the peerage in 1935 and appointed governor general of Canada. He traveled throughout the Dominion, and won the respect and confidence of its people. His writings include a *History of the Great War;* biographies of Montrose and Cromwell; and his autobiography, *Pilgrim's Way.* Among his works of fiction are *Prester John, The Thirty-Nine Steps, Greenmantle, Witch Wood,* and *Huntingtower.* He died of an injury received in a fall.

Tycho Brahe. See *Brahe, Tycho.*

Tyler, John (1790-1862), 10th president of the United States, was born in Greenway, Va. He was graduated from William and Mary College in 1807, studied law, and, in 1809, was admitted to the bar. He was elected five times to the state legislature and three times to Congress. He sympathized with the States'-Rights party, and opposed the United States bank, the protective tariff, and all restrictions of slavery. After serving as governor of Virginia, 1825-27, he was then elected United States senator. From this time he acted with the Whig party, and, in 1840, was elected vice president of the United States.

The death of President Harrison, a month after his inauguration in 1841, made Tyler president. The annexation of Texas and the passing of a protective tariff law were among the important acts of his administration. In 1861, Tyler was president of the peace convention which met at Washington to effect a compromise between the North and the South. He afterward joined the Southern cause and was a member of the Confederate Congress at his death.

Tyndale (*tĭn'dăl*), **William (1486-1536)**, English divine, was born in Gloucestershire. He studied at both Oxford and Cambridge, where he acquired a knowledge of Greek. Impressed with the importance of giving to the people the Bible in their own language, he determined to translate the New Testament into English. Failing to obtain support in London, he went to Germany. In 1525, the New Testament was printed at Worms and was carried to England.

Tyndale remained on the continent, associated with Luther and other reformers, and wrote tracts advocating the reform doctrine. In 1530, he published a translation of the Pentateuch. He separated himself from the other

English reformers by opposing the divorce of Henry VIII from Catherine of Aragon. In 1535, he was arrested and, after a year's imprisonment at the castle of Vilvorde, near Brussels, was publicly executed as a heretic.

Tyndall (*tĭn'dăl*), **John (1820-1893)**, British physicist, was born in County Carlow, Ireland. He began his career as surveyor and railway engineer. He studied in Germany from 1848 to 1851, and in 1853, was made professor of natural philosophy in the Royal Institution, London. Tyndall achieved a great reputation as a populizer of science and for his researches in heat, light, and sound. He donated for the benefit of American science the very substantial proceeds of a lecture tour in the United States in 1872-73. Among his writings are *Faraday as a Discoverer*, *The Forms of Water*, *Notes on Light*, and *The Glaciers of the Alps*.

Ulfilas (*ŭl'fĭ-lăs*), **(c. 311-c. 383)**, translator of the Bible into Gothic, was born in Dacia. He was made bishop in 341; was expelled by his heathen compatriots seven years later; and sought refuge, together with a number of newly converted Christians, in lower Mœsia, where he remained for 30 years. Familiar with Latin, Greek, and Gothic, he undertook to translate the whole Bible, with the exception of *Kings*, into Gothic. The chief manuscript of this work, the *Codex Argenteus*, in silver letters on purple parchment, is now in the University Library at Upsala.

Undset, Sigrid (1882-1949), Norwegian novelist, was born in Kallundborg, Denmark, of a Norwegian father, who took her at an early age to reside in Oslo, Norway. She was educated in a business college and was a municipal clerk at Oslo until 1909, when she began to support herself by her writings. These include *Kristin Lavransdätter*, a trilogy comprising *The Bridal Wreath*, *The Mistress of Husaby*, and *The Cross*. She wrote also *The Axe*, *The Snake Pit*, and *Madame Dorothea*. Her work is characterized by a keen insight into feminine psychology and into the mind of the middle ages. She received the Nobel prize for literature in 1928. When the Germans invaded Norway in 1940, she escaped to the United States.

Untermeyer (*ŏŏn'tĕr-mī'ĕr*), **Louis (1885-)**, American poet and journalist, was born in New York City. He received a high school education and entered a firm of manufacturing jewelers, of which he later became vice president and the manager of a factory at Newark. In addition to his other duties, he joined the editorial staff of *The Masses* and, in the Chicago *Evening Post*, conducted a column under the head "and Other Poets." His poems, noted for their lyric quality are of a high order. Among his writings are *First Love*, *Challenge*, *The Younger Quire*, *These Times*, *The Burning Bush*, *Selected Poems and Parodies*, and *From Another World*.

Urey, Harold Clayton (1893-), American chemist, was born at Walkerton, Ind. He taught in rural schools of Montana before studying at the universities of Montana and California. After he was graduated, he worked two years as an industrial chemist, 1917-19, and then engaged in academic work, first at the University of Montana and later at Johns Hopkins, 1924-29, and at Columbia University, where he was made professor of chemistry in 1934. Specializing in the study of molecules and atoms, he won renown for his discovery of an isotope of hydrogen having an atomic weight of 2, double that of the form already known. Water having a large concentration of molecules including the heavier hydrogen atom is known as "heavy water." His work was crowned by an award of the Nobel prize in chemistry for 1934.

Ussher (*ŭsh'ĕr*), **James (1581-1656)**, British theologian and scholar, was born in Dublin. He was graduated from Trinity College, Dublin, 1600; was ordained deacon and priest, 1601; and was professor of divinity in the University of Dublin, 1607-20. In 1624, he was made archbishop of Armagh. Among his best-known works are *Annals of the Old Testament* and *Chronologia Sacra*. These contain the chronological calculations by Ussher which long appeared in the inner margin of the Bible in the authorized version. According to his calculations, the world was created in the year 4004 B. C.

Van Alstyne, Mrs. Frances Jane. See *Crosby, Fanny.*

Van Buren, Martin (1782-1862), eighth president of the United States, was born of Dutch ancestry, in Kinderhook, N. Y. After becoming a member of the bar, he was elected by the Democratic party to the New York State senate in 1812 and became attorney general in 1815. In 1821, Van Buren entered the United States Senate; was re-elected in 1827; but resigned in 1828 to accept the governorship of New York. In 1829, he became secretary of state in President Jackson's cabinet, resigning in 1831. Following the Senate's rejection of his nomination as minister to England, he was elected vice president of the United States in 1832 and, in 1836, was elected president.

On account of the financial crisis of 1837 and the suspension of specie payments by the banks, he recommended to Congress the establishment of an independent treasury, a measure carried into effect in 1840. Renominated by the Democrats, he was defeated by William Henry Harrison and, in 1841, temporarily retired to private life. His third candidacy for the presidency, in 1844, was frustrated by Southern opposition. Subsequently he joined the Free-Soil party and was its unsuccessful nominee for president in 1848. See *Albany Regency*, *Barnburners*, *Free-Soil Party*.

Vancouver, George (1758-1798), English naval officer and explorer. He served with Captain Cook in his second and third voyages and, in 1791, was sent to Nootka Sound to take possession of disputed territory. Proceeding by way of the Cape of Good Hope, he surveyed and mapped portions of the coasts of Australia and New Zealand and then sailed by way of Tahiti to Nootka. In 1792, he explored the Strait of San Juan de Fuca and discovered the Gulf of Georgia and Vancouver Island. He described his explorations in *A Voyage of Discovery to the North Pacific Ocean and Round the World in the Years 1790-95*.

Vandenberg, Arthur Hendrick (1884-1951), American politician, was born at Grand Rapids, Mich. After studying law at the University of Michigan he worked for *Collier's Weekly*, and edited the Grand Rapids *Herald*. In 1928 he was appointed to the United States Senate, and was later elected for the terms from 1929 to 1952. Vandenberg was a leader in the Republican opposition to the Roosevelt administrations, especially on some of his prewar measures. He heartily supported the war when it came, took part in the formation of the United Nations, and sat in its first assembly. When the Republicans gained control of Congress he became president pro tem. of the Senate, and helped to carry through the bipartisan foreign policy embodied in the Marshall plan. He wrote *Alexander Hamilton, the Greatest American* and *The Trail of a Tradition*.

Vanderbilt, Cornelius (1794-1877), American capitalist, was born near Stapleton, Staten Island, N. Y. He early engaged in steamboat transportation between Staten Island and New York and gained control of the New York and Staten Island lines. Later he established steamship and transfer connections between New York and California. In 1864, he withdrew his capital from shipping and invested it in railroads. In 1867, he secured control of the New York Central Railroad; became its president; and, in 1869, consolidated it with the Hudson River road. By securing the Lake Shore and other railways, he established a trunk line to Chicago. At his death he left a fortune estimated at $100,000,000. A bequest of $1,000,000 founded Vanderbilt University at Nashville, Tenn.

Vandercook, John W. (1902-), American writer and radio commentator, was born in London, but received his education in the public schools of Garden City, N. Y., and, briefly, at Yale University. He has had a varied career as actor, newspaper reporter, editor, world traveler, fiction writer, and radio commentator, in which capacity he has been employed by NBC, The Liberty Broadcasting Company, and The American Broadcasting Company. He is currently conducting a news broadcast for the national labor organizations. He is the author of *Black Majesty*, *The Fools' Parade*, *Murder in Trinidad*, *Caribbee Cruise*, and *Murder in Haiti*, to name but a few titles.

Van Doren, Carl Clinton (1885-1950), American editor and literary critic, was born at Hope, Ill. Educated at the University of Illinois and Columbia University, he taught English at Columbia from 1911 to 1930. He acted also as literary editor of the *Nation*, 1911-22, of the *Century Magazine*, 1922-25, and of the *Literary Guild* in 1934, his judgment of writers being accorded high value. Among his writings are *The American Novel*, *Many Minds*, *Sinclair Lewis*, *Benjamin Franklin* (Pulitzer prize, 1939), and *Secret History of the American Revolution*.

His brother, Mark Van Doren (b. Hope, Ill., 1894), collaborated with him in writing *American and British Literature since 1890*. Mark also wrote *Edwin Arlington Robinson*, *A Winter Diary and Other Poems*, *The Transparent Tree*, and *Liberal Education*.

Van Druten, John (1901-), playwright and novelist, was born in London, the son of a Dutch father and an English mother. He studied law, but instead of practicing taught as a special lecturer in English law and legal history at the University College of Wales in Aberystwyth. His chief interest, however, was in writing, and when his play *Young Woodley* proved a success on Broadway he was well started on his career as a playwright. He dramatized Rebecca West's *The Return of the Soldier* and wrote two novels. Probably his best-known plays are *The Voice of the Turtle* and *I Remember Mama*. He has written the screen plays for several successful films, among them *Parnell* and *Night Must Fall*.

Van Dyck, or **Vandyke, Sir Anthony (1599-1641)**, Flemish painter, was born at Antwerp. He was a pupil of Rubens, and subsequently studied in Venice, Genoa, and Rome. Returning to Antwerp, he painted in the next five years many religious works, including "St. Martin Dividing the Cloak" and "Crucifixion," his greatest work of this type. In 1632, he became court painter to Charles I of England. His full-length picture of "Charles I on Horseback" is his best example of portraiture, the type of

painting for which he is especially celebrated. Most of his later years were spent in England where he amassed a fortune by painting members of the aristocracy. These portraits are characterized by natural pose, elegance, and nobility.

Van Dyke, Henry (1852-1933), American clergyman, educator, diplomat, and author, was born in Germantown, Pa. He was educated at Princeton University and the University of Berlin. He was pastor of the Brick Presbyterian Church, New York City, from 1883 to 1900, when he became professor of English literature at Princeton University. From 1913 to 1917, he was minister to the Netherlands and Luxemburg. Among his works are *The Reality of Religion, The Poetry of Tennyson, The Other Wise Man, The Lost Word, The Ruling Passion, Golden Stars,* and *Half-told Tales.* He was elected to the American Academy of Arts and Letters in 1908.

Van Dyke, John Charles (1856-1932), American art historian and critic, was born in New Brunswick, N. J. and studied at Columbia and in Europe. He was admitted to the New York bar, 1877, but turned his attention to literature. In 1878, he was made librarian of Sage Library, New Brunswick, N. J., and, in 1889, professor of the history of art at Rutgers College. Among his works are *How to Judge a Picture, Art for Art's Sake, Nature for Its Own Sake, Grand Canyon of the Colorado,* and *In Java.* He also edited many valuable art histories. He was elected to the American Academy of Arts and Letters in 1923.

Van Gogh, Vincent (1853-1890), Dutch artist, was born at Groot-Zundert in the Netherlands, the son of a Lutheran minister. After working for a firm of art dealers, he became a teacher and preacher in the mining community of Le Borinage. Here he began to paint the works which were to bring him no money but much posthumous fame. His realistic pictures of peasants were depressingly somber, but after coming in contact with the impressionist group of painters in Paris, he used brilliant colors, intense reds and yellows, for his later pictures. Confinement for insanity, and eventual suicide, cut short his painting career. In recent years there has been a growing appreciation of the originality and powerful intensity of his art, and he has had a vogue which might almost be described as sensational.

Van Loon, Hendrik Willem (1882-1944), author and lecturer, was born in Rotterdam, the Netherlands, and was brought at an early age to America. He was educated at Harvard University and the University of Munich; served as a correspondent of the Associated Press in Washington and during the political disturbances in Russia in 1906 and throughout the course of World War I; lectured widely in America; and was appointed professor of history at Antioch College. His publications are remarkable for their clarification and humanizing of difficult subjects. They include *The Fall of the Dutch Republic, Ancient Man, The Story of Mankind, Van Loon's Geography, Songs of America,* and *Van Loon's Lives.*

Van't Hoff (*vänt hôf'*), **Jacobus Henrik (1852-1911),** Dutch chemist, was born at Rotterdam. In 1878, he was appointed professor of chemistry, mineralogy, and geology at Amsterdam and, in 1896, became professor of chemistry at Berlin. He was the founder of stereochemistry, in which the structure of molecules is shown by the relation of atoms composing them. In 1901, he received the Nobel prize for chemistry.

Vargas, Getulio (1882-1954), Brazilian political leader, was born in Sao Borja, Rio Grande do Sul. Expelled from Military College for participating in a student uprising, in succession he served as a private in the army, studied law, edited a newspaper, became prosecuting attorney, and was elected to the state legislature. Vargas became a member of the Brazilian Congress and, in 1926, was named minister of finance.

Resigning to become governor of Rio Grande do Suo, he quelled a rebellion and gave attention to economic reforms, which included the encouragement of the growth of labor unions. In 1930 he was a candidate for the presidency of Brazil. Congress declared him defeated, whereupon he pronounced the count fraudulent and seized the government. He instituted a long series of political and social reforms. A proposed constitution was superseded in 1937 by presidential decrees which made Vargas a virtual dictator. After the outbreak of World War II, Vargas opposed pro-Axis elements and supported our policy of inter-American solidarity. He was deposed in 1945, but was reelected in 1950.

Vasari (*vä-zä'rē*), **Giorgio (1511-1574),** Italian art historian, painter, and architect, was born at Arezzo. He studied under Michelangelo and Andrea del Sarto, and entered the service of Duke Cosimo de' Medici, with whom he remained throughout his life. Vasari was one of the most versatile artists of the later Renaissance and an architect of ability. His greatest service to art is his world-renowned *Lives,* which furnishes our chief knowledge of the artists of the Italian Renaissance. Vasari has been termed the founder of modern art history and art criticism.

Vassar, Matthew (1792-1868), American philanthropist, was born in Norfolk, England. At four years of age, he came to America with his father, who settled on a farm near Poughkeepsie and established a brewery in that city. The son subsequently succeeded to his father's interests and amassed a fortune. In 1861, he donated $400,000 to the institution in Poughkeepsie later known as Vassar College. By his will he provided for a further donation of about $400,000 to Vassar.

Veblen (*vĕb'lĕn*), **Thorstein B. (1857-1929),** American economist and author was born on a Wisconsin farm. He was educated at Carleton College and at Yale University, and taught political economy at the University of Chicago, 1892-1906, and at Stanford University until 1909, when he was made professor of economics at the University of Missouri. In 1918, he became a teacher in the New School for Social Research, New York. His merit as economist was to put his finger on, and challenge, suppositions which his contemporaries were not conscious of as elements in their conclusions. His publications include *The Theory of the Leisure Class, The Theory of Business Enterprise, The Higher Learning in America, The Vested Interests,* and *The Engineers and the Price System.*

Vedder, Elihu (1836-1923), American painter, was born in New York, studied in Paris and Florence; and, in 1867, settled in Rome. Gifted with a weird and powerful imagination, Vedder rose to distinction by his original, virile, intellectual style. In 1884, he won world-wide reputation with his series of striking illustrations for Fitzgerald's *Omar Khayyäm.*

Among Vedder's best-known paintings are "Roman Girls on the Seashore," "Cumæan Sibyl," "Lair of the Sea Serpent," all in the Boston Museum; "The African Sentinel" and "The Pleiades," in the Metropolitan Museum, New York; "Storm in Umbria," Art Institute, Chicago; and "The Keeper of the Threshold," Carnegie Institute, Pittsburgh. He was made a member of the American Academy of Arts and Letters in 1908.

Vega (*vā'gä*), **Garcilaso de la (1503-1536),** Spanish soldier and poet, was born at Toledo. Early adopting the profession of arms, he gained a distinguished reputation for bravery in the wars carried on by Emperor Charles V against the French and the Turks. He wrote a number of sonnets, eclogues, and other poems, and is sometimes called "the Spanish Petrarch." His poems rank high in European literature for delicacy of expression and place him among the most gifted and artistic of Spanish poets. He was mortally wounded while storming a castle near Frejus, France.

Vega, Garcilaso de la (c. 1540-1616), Spanish historian, known as "the Inca," was born at Cuzco, Peru. He was the son of a Spanish conquistadore who had married a niece of the last Inca emperor of Peru. At the age of 20, he went to Spain and never again visited America. He lived at Cordoba throughout most of his life. His first work was a *History of Florida,* containing an account of the conquest of the country by Hernando de Soto, and was followed by his largest work, *Royal Commentaries of Peru,* which was a history of the royal Incas.

Vega Carpio (*vā'gä kär'pyō*), **Lope Felix de (1562-1635),** generally known as Lope de Vega, Spanish dramatist, was born at Madrid. He was a student of Alcala; served in the Portuguese campaign and in the Armada in 1588; was secretary to the Duke of Alva, the Marquis of Malpica, and the Marquis of Sarria; was banished from Madrid because of a quarrel; and, about 1614, took priest's orders.

The mere list of Lope's books presents a picture of unparalleled mental activity. Of his numerous works, 431 plays and 50 religious pieces are extant. His plays, both in comic and in tragic vein, cover a vast range of historical, legendary, religious, and everyday subjects.

Lope de Vega first emphasized the *pundonor,* or point of honor, as a controlling principle of Spanish cultured life. By ignoring the restrictions of the so-called classic unities, he did for Spain what Shakespeare did for England—created a National Theater. A few of his many noted plays are *El castigo sin venganza, Porfiar hosta morir, Si no vieran las mujeres,* and *La fuente Ovejuna.*

Velásquez (*vā-läs'kāth*), **Diego Rodriguez de Silva y (1599-1660),** Spanish painter, was born at Seville, Spain. He was intended for some liberal profession; but, on account of his unmistakable bent toward art, he was placed as a pupil with Herrera the Elder, with Pacheco, and later with Luis Tristan of Toledo.

In 1618, Velásquez married Pacheco's daughter, Juana. In April 1622, he visited Madrid, where he was presented by Fonseca, canon of Seville, to Olivares, the minister. In the first months of 1623, he received a letter recalling him to the capital. A portrait of Fonseca, which he had painted, met with such favorable recognition that he was commissioned to paint Don Ferdinand, the king's brother, and later Philip IV himself. In the autumn, Philip's portrait was finished; and, from that time, the life of Velásquez was spent in the service of the king. He was formally installed with a studio in the palace, a residence in the

city, and a monthly stipend. The interest and admiration of the king continued through 40 years of growing intimacy.

In 1627, Velásquez completed the "Expulsion of the Moriscos," and, in August 1628, Rubens arrived in Madrid just as Velásquez was finishing his famous "Topers." No direct echo from Rubens can be traced in the work of the Spaniard; but, through his advice, Velásquez made his first journey to Italy in 1629. His time there was spent in studying the Italian masters and in completing the "Forge of Vulcan" and "Joseph's Coat."

Early in 1631, Velásquez was again in Madrid. In 1634, he was permitted to hand down to his son-in-law, Mazo-Martinez, his court appointment, but was himself continued as an honorary attaché. In 1638, probably, he painted "The Crucifixion." The great equestrian portrait of Philip in the Prado was executed in 1644. To these years, also, belong the portraits of dwarfs, fools, and other eccentric members of Philip's household. "The Surrender of Breda," perhaps the finest purely historic picture in the world, was painted in 1647.

In January 1649, Velásquez embarked on his second visit to Italy. At Rome, he painted the portrait of Innocent X, now considered one of his finest works. He returned to Madrid in 1651. In 1652, he was appointed marshal to the king. His "Tapestry Weavers," "Maids of Honor," "Portrait of Alonzo Cano," "Æsop," "Mœnippus," and the later portraits of Philip and his family belong to this period.

Not only was Velásquez the greatest of Spanish painters, but his impressionism has constituted him the foremost master of modern painting. He is the most objective of painters; the subject itself tells the whole story. His draftsmanship is firm, his modeling is delicate, and his subdued color scheme enables him to use occasional patches of bright color with telling effect. He has been termed the painter's painter.

Venizelos (*vĕn'ĕ-zā'lŏs*) **Eleutherios (1864-1936),** Greek statesman and diplomat, was born near Canea, Crete. He was graduated in law from the University of Athens, 1886.

He attracted notice first in 1897 as one of the leaders of the Cretan insurrection that resulted in the removal of Turkish rule from Crete. In 1908, he led the movement for the union of Crete and Greece. In 1910, he was premier of Crete, but was invited to Athens, where he carried out a revision of the constitution, reorganized the army and the navy, and laid the foundation for the Balkan League, which made war against Turkey in 1912. In the second Balkan war, Venizelos led in forming an alliance against Bulgaria.

In 1914, as premier of Greece, Venizelos became a champion of the Allies and urged the nation to join them. He was vigorously opposed by King Constantine, and, in March 1915, he resigned the premiership. Upon the abdication of King Constantine in June 1917, Venizelos became virtually the ruler of Greece. Under his direction, Greece joined the Allies and gained great advantages at the Paris Peace Conference. In 1920, however, he was defeated at the polls and retired until 1928, when he was elected premier. He was again defeated in 1933. Venizelos led an unsuccessful revolt in 1935, after which he fled to the Italian Isle of Casos and later to France.

Verdi (*vâr'dē*), **Giuseppe (1813-1901),** Italian composer, was born at Roncole. He began his musical training at seven, attended the Academy at Busseto, and later studied at the Conservatory of Milan. His first opera, *Oberto*, appeared in 1839, and was followed by *Nabucco*, *I Lombardi*, and *Ernani*, 1842-44. Thereafter Verdi was regarded as the foremost composer in Italy. In 1851, he produced *Rigoletto* and, in 1852, *Il Trovatore* and *La Traviata*, whose phenomenal success won him international fame.

Changing from his earlier melodic style to his later dramatic method in *Aïda*, 1871, Verdi began his final and greatest period. His celebrated *Manzoni Requiem* followed in 1874 and *Otello* in 1887. In 1892, he closed his productive career with *Falstaff*. See *Italian Opera, Stories of the Leading Operas.*

Verhaeren (*vĕr-hä'rĕn*), **Emile (1855-1916),** Belgian poet, was born at Saint Amand, near Antwerp. He was educated at Ghent and at the University of Louvain. In 1881, he was admitted to the bar at Brussels, but soon decided upon a literary career, at first devoting his energies to the cause of "Young Belgium" and impressionistic art.

In his early poetical works, *Les Flamandes*, 1883, and *Les Moines*, 1886, he displays great strength. His pictorial method is applied to psychological studies, to descriptions of the cities, villages, and fields of Belgium; to the tragedies of farms deserted for the towns; and to the constant destruction of the fields by growing cities.

In 1898, he wrote the lyric drama *Les Aubes*, which has been widely translated, followed by *Le cloître* and *Philippe II.*

Verne (*vĕrn*), **Jules (1828-1905),** French novelist, was born at Nantes. He studied law, but turned to literature, producing his *Cinq semaines en ballon* in 1863. In this work, Verne struck the rich and then unexplored vein of scientific adventure. His fertile imagination anticipated some of the later discoveries in aerial and submarine navigation, and his work to some extent influenced the writings of Rider Haggard and H. G. Wells. Among his other works are *Twenty Thousand Leagues Under the Sea*, *The Mysterious Island*, *Around the World in Eighty Days*, *Michael Strogoff*, *From the Earth to the Moon*, *The Adventures of Captain Hatteras*, and *The Purchase of the North Pole.*

Verrazano (*vĕr'rät-sä'nō*), **Giovanni da (c.1480-c.1527),** Florentine navigator, sailed in 1524 on a voyage of discovery in American waters and, on sighting Cape Fear, coasted along the shore until he reached what is now New York bay, continuing his explorations as far as Rhode Island and New Hampshire.

Vesalius (*vē-sā'lĭ-ŭs*), **Andreas (1514-1564),** Belgian anatomist and physician, was born in Brussels. He lectured on anatomy at Basel, Padua, and elsewhere, 1537-44, and was appointed physician to Charles V and later to Philip II of Spain. Vesalius was the pioneer of comparative anatomy, which he studied by dissection of the human body. He performed several operations involving removal of the breast. His great work was *De Corporis Humani Fabrica.* He died in Zante, where he had been shipwrecked on his return from Jerusalem.

Vespasian (*vĕs-pā'zhĭ-ăn*), or **Titus Flavius Vespasianus (9 A.D.-79 A.D.),** Roman emperor. His father was of humble origin but his mother was the sister of a Roman senator. In the reign of Claudius, he was appointed to a military command in Britain, 43, when he conquered the Isle of Wight, and was afterward governor of Africa under Nero, who sent him to the East to conduct the war against the Jews.

After the death of Vitellius, 69, he was proclaimed emperor by the soldiers and ruled with wisdom, moderation, and firmness. The most important events of his rule were the destruction of Jerusalem by Titus and the conquest of North Wales by Agricola. The Colosseum was built in his reign.

Vespucci (*vĕs-pōōt'chē*), **Amerigo (1451-1512),** Italian navigator, was born at Florence. He was first employed in the commercial house of the Medici; in 1492, went to Spain; and, about 1495, became a member of a commercial firm in Seville.

In 1497, Vespucci embarked at Cadiz in one of a fleet of five ships commanded by Alonso de Ojeda; after 37 days' sailing, reached America; coasted along the continent for several hundred leagues; and returned to Spain, 1498. Columbus had previously landed on the mainland of America, so that to him doubtless belongs the honor of being the discoverer of the continent; but the discovery had been kept a state secret, and the prior publication of Vespucci's narrative led to his name being given to the continent. He made several other voyages, first in the service of Spain and afterward of Portugal.

Many scholars doubt the authenticity of Vespucci's narratives of discovery, since the extant abridged translations of them contain many statements difficult to reconcile with known facts.

Viaud (*vyō*), **Louis Marie Julien (1850-1923),** "Pierre Loti," French writer of Huguenot ancestry, was born at Rochefort. He entered the navy in 1867, became a lieutenant in 1881, and resigned in 1898.

Viaud traveled extensively and, in 1879, produced *Aziyadé*, picturing life on the Bosporus. This was followed by a long series of novels displaying remarkable power of impressionistic description. In 1891, he was elected to the French Academy. His works include *Le mariage de Loti*, *Le roman d'un enfant*, *Fantôme d'orient*, *Le désert*, *Figures et choses*, and *Le pèlerin d'Angkor.*

Victor Emmanuel II (1820-1878), first king of modern Italy, was born in Turin. After serving gallantly in the army, he became king of Sardinia by the abdication of his father, 1849. From the Austrian conquerors of his country he succeeded in obtaining the withdrawal of their demand that the Sardinian constitution should be abolished. This liberal constitution, granted by his father, he faithfully maintained, thereby winning the confidence of the Italian nation. On the advice of Cavour he made many reforms and took part in the Crimean War.

With the help of the French, the battles of Solferino and Magenta were fought against Austria, but the peace of Villafranca between Austria and France left Italy still far distant from its hoped-for unity. But Tuscany, Modena, Parma, and the Romagna voted for annexation to Sardinia, and the Prussian alliance in 1866 gave Venice to Italy. Following the withdrawal of the French after Napoleon's overthrow in 1870, the people of Rome voted for union with Italy and, July 2, 1871, Victor Emmanuel formally entered Rome, the capital of a united Italy.

Victor Emmanuel III (1869-1947), king of Italy, was born at Naples, 1869. In 1887 he entered the army, and became commanding general in 1897. In 1896 he married

Princess Helena, daughter of Prince Nicholas of Montenegro, and ascended the throne after the assassination of his father, King Humbert, in 1900. When Italy entered World War I in 1915, he took nominal command of the army. On Mussolini's rise to power, the king prudently adhered to a purely formal role. His studies on coins resulted in his monumental *Corpus nummorum italicornum.*

After Italian defeats in World War II, Victor Emmanuel was able to demand Mussolini's resignation in 1943. A new ministry under Marshal Badoglio obtained an armistice. After the fall of Rome, the king delegated all his powers to Crown Prince Humbert as Lieutenant General of the Realm and retired from the throne on June 5, 1944. He formally abdicated May 9, 1946.

Victoria, Alexandrina (1819-1901), queen of Great Britain and Ireland, was born at Kensington Palace. She was the only child of Edward, Duke of Kent, fourth son of George III, and, on the death of William IV, she succeeded to the throne in 1837 and was crowned queen in 1838.

In 1840, she married Albert, Prince of Saxe Coburg Gotha, by whom she had nine children. He died in 1861. The jubilee of her reign was celebrated in 1887 and her diamond jubilee in 1897.

The chief events of her reign were the establishment of the penny post; the repeal of the Corn Laws; the annexation of the Punjab; the Crimean War; the Indian Mutiny, followed by the assumption of sovereignty over India; wars in Afghanistan, China, South Africa, and Egypt; and the Fenian and Home Rule agitations in Ireland.

Queen Victoria was strictly impartial in the party politics of her reign. The strict standard of propriety which she set for her court had a wide social influence and was reflected in the literature of the period, which has become known as the Victorian period.

Vigée-Lebrun (*vē'zhā'lē-brŭN'*), **Marie Anne Elisabeth (1755-1842),** French painter, was born in Paris, daughter of a painter. In 1776, she married Jean B. P. Lebrun, picture dealer and grandnephew of Charles Lebrun. Her great beauty and the charm of her painting speedily made her very popular. Her portrait of Marie Antoinette, in 1779, led to a lasting friendship with the queen. She painted numerous portraits of the royal family. At the outbreak of the Revolution, she left Paris for Italy, and, after a tour through Europe, arrived in London in 1802. There she painted portraits of the Prince of Wales, Lord Byron, and others, and later returned to France.

Her figures are well posed, well drawn, and always admirably presented. She is best known by her portraits of herself and her daughter.

Vigny (*vēn'yē'*), **Alfred, Comte de (1799-1863),** French poet and novelist, was born at Loches, France. He entered the French army at 16 and served 12 years. In 1822, he published a small volume of verse, followed in 1824 by *Eloa,* an exquisite piece of mystic fantasy. He then issued his collected *Poèmes antiques et modernes*; *Cinq-Mars,* a notably popular historical romance; a translation of *Othello*; and a drama, *La maréchale d'Ancre.* After 1830, he published chiefly prose works, including *Stello, Servitude et grandeur militaires,* and a drama entitled *Chatterton.* A volume of verse under the name *Destinées* and his *Journal d'un Poète* were published after his death. In 1845, he was elected to the Academy.

Villon (*vē'yôN'*), **François (1431-c.1463),** French lyric poet, thief, and vagabond, was adopted as a waif by a relative, Chaplain Guillaume de Villon, who gave him his name and provided as much education for him as an undisciplined student could absorb. In the time of Louis XI, when underworld crime was paralleled by upper-class intrigue, Villon had more than his share of exciting adventures. Consorting with a band of ruffians called "the Coquillards," he engaged in thievery and worse forms of rascality, spent some time in prison and lived dangerously, with the threat of banishment or the gallows constantly hanging over him. Nevertheless he found time for literature and became the first of the modern French poets. He took the old and artificial verse forms such as the ballade, the rondeau, and the lay, and made them fresh and vital. His writings were brought together in two collections, designated respectively as *Petit Testament* and *Grand Testament.*

Vincent de Paul (*vĭN'sĕN' dē pōl'*), **Saint (c.1576-1660),** French philanthropist and ecclesiastical reformer, was born at Pouy, Gascony. After two years of slavery among Tunisian pirates, he escaped and went to Paris, where he became curate of Clichy and preceptor to Cardinal de Retz. He established a foundling hospital at Paris in 1640, organized the congregation of the Missions, and instituted the order of Sisters of Charity. He was canonized in 1737.

Vinci (*vēn'chē*), **Leonardo da (1452-1519),** Italian painter, sculptor, architect, scientist, and engineer, was born at Castello da Vinci, near Florence. His father placed him, at the age of 18, with Verrocchio, a versatile Florentine artist. In this early period Leonardo produced several religious and mythological works, and showed talent for architecture and engineering.

From 1482 to 1499, which may be considered the most active and glorious period of his life, Leonardo was at Milan, in the service of the duke, Ludovico Sforza, constantly inventing arms and war machinery. He was engaged in the architecture of the cathedral; he supervised all the pageants and masques; he improved the neighborhood by canals and irrigation; he produced a colossal statue of the duke.

As the founder of the Milanese Academy, Leonardo composed his *Treatise on Painting,* which was first published in Paris in 1615, and contained his studies in optics, perspective, anatomy, libration, and proportion. He did little painting during these years, but in 1496 he began his greatest work, "The Last Supper," in the refectory of the Dominican Convent of Santa Maria delle Grazie. It was painted on the wall in tempera, and it soon partly decayed, but about 1907 Cavaliere Cavanaghi succeeded in restoring it, with remarkable skill and effectiveness.

In 1500, Leonardo returned to Florence; two years later, he entered the service of Cesare Borgia, Duke of Romagna, as architect and engineer. To this period belong many fine paintings, one of which, his portrait of Mona Lisa, is probably the most famous portrait in the world.

In 1514, Leonardo went to Rome at the invitation of Pope Leo X; but friends of Michelangelo and Raphael prejudiced the pope against him. He again visited Milan in 1516 and supervised the pageant produced in celebration of the victory of Marignano. Leonardo then went to France to plan canals in the department of Cher and Loire. While engaged in this task, he painted little.

It may be laid to Leonardo's gigantic conceptions, his unattainable ideals of perfection, and his insatiable thirst after new achievements that he left only three or four works of supreme beauty and perfection. Every art and almost every science engaged his attention; in all, he anticipated in various points the discoveries of later philosophers and scientists. It is to his eternal honor that he first dissipated the film of ignorance that impeded the progress of the arts. He was, unquestionably, the founder of the Italian process of oil painting, and he effected, by his exquisite taste and profound knowledge of nature, a nearer approach to perfection than had ever been attained.

Vinson, Frederick Moore (1890-1953), American administrator and jurist, was born at Louisa, Ky., and was educated at Centre College, Kentucky. He practiced law, and served seven terms in the House of Representatives, paying particular attention to finance and taxation. From 1937 to 1943 he was associate justice of the Court of Appeals for the District of Columbia. In 1943 he was named director of economic stabilization, with the duty of holding down rising wages and prices. In 1945, after serving as federal loan administrator, and director of war mobilization, he was appointed by President Truman secretary of the treasury. In June 1946 he was appointed chief justice of the Supreme Court.

Virgil, or **Publius Virgilius Maro (70 B. C.-19 B. C.),** Roman poet, was born at Andes, a small village near Mantua. His father, a well-to-do farmer, sought to give his son the best education that could be obtained. Accordingly, Virgil was sent in turn to Cremona, Milan, Naples, and Rome. Of frail physique and of delicate health, the boy shrank from the ruder avocations of oratory and arms which appealed to his more robust companions. Instead, he devoted himself with zealous intensity to study, thus laying the foundation of a rich and varied knowledge scarcely less remarkable than was his extraordinary poetic genius.

Returning subsequently to his paternal home, the youthful poet found that his father's farm had been sequestrated in the confiscations after Philippi. Virgil succeeded in regaining it, however, through the influence of his patron Asinius Pollo, who, later, introduced him to Mæcenas and the Emperor Augustus.

Several minor works are ascribed to Virgil's youth, but their authenticity has not been satisfactorily proved. The first important work through which his genius shines was the *Eclogues,* or *Bucolics,* a series of pastorals written in 42-37 B. C., when he was still young and under the influence of Theocritus. They are full of delightful pictures of the country of his boyhood. To one of these pastorals a special significance was attached by the early Christians, inasmuch as the poet prophesies the birth of a wondrous child, which was interpreted to mean that of Christ. This poem is still called the *Messianic Eclogue.*

The *Georgics,* written in 37-30 B. C., are four books dealing with husbandry. The purpose of these, perhaps the most finished poems in Latin literature, was to win the Romans back to the soil.

The *Æneid,* Virgil's great masterpiece, written at the instance of Augustus in 29-19 B. C., remained unrevised at the time of the poet's death. It is said that Virgil desired

to burn it, but, happily, it was saved to posterity. This great national epic profoundly impressed the entire Roman world. In it was beheld the highest expression of Roman genius and the embodiment of the idealized spirit of Roman nationality. For commentators, it was the source of all wisdom and morality, and Christian writers regarded its author as an inspired prophet. Thus Dante in his *Divine Comedy* represented Virgil as his guide through the greater part of the abode of the dead.

In character, Virgil was shy and retiring, courting seclusion and, as far as possible, shunning publicity. His personal friends who had access to him in his privacy at Campania were won by his graciousness and charm of manner. Earnest and sincere in all his dealings, he was known as one with deep religious feelings toward the gods. The influence of the *Æneid* on subsequent Roman writers cannot be overestimated. The greatest Roman epic ever written, for purity of style and transcendency of expression, it remains today unsurpassed.

The Italian government took steps in 1924 to purchase Virgil's burial place near Naples and to construct there a garden in the Greco-Roman style. See *Æneas, Æneid.*

Vishinsky, Andrei (1883-1954), Soviet lawyer and diplomat, was born in Odessa and studied law at Kiev University. Like other members of the Social Democratic Party who engaged in revolutionary activities under the czar's regime, he was constantly in trouble with the police. In 1920 he joined the Communist party. As prosecutor for the state in the Moscow trials of 1936 and 1938, and as one of the fathers of the Soviet judicial system, he received many official honors. In the latter part of World War II, he was Russia's representative on the Allied Mediterranean commission, after which Vishinsky gave increasing attention to foreign affairs. He served as vice premier, deputy commissar for foreign affairs, and delegate to the United Nations.

Vittoria Colonna. See *Colonna, Vittoria.*

Vizetelly (*vĭz'ĕ-tĕl'lĭ*), **Frank Horace (1864-1938),** editor and encyclopedist, was born in London, Eng., and was educated in France and at Arnold College, Eastbourne, Eng. He was connected with his father's publishing firm from 1882 to 1891, when he sailed for America and joined the editorial staff of Funk and Wagnalls Company, New York, becoming general editor of Funk and Wagnalls *New Standard Dictionary* in 1913. His editorial activities were instrumental in the production of numerous reference works, including the *Jewish Encyclopedia.* He was editor also of "The Lexicographer's Easy Chair" in the *Literary Digest* and office editor of more than 100 miscellaneous publications on English, public speaking, medicine, history, social reform, travel, and other subjects. Among the works written by him are *A Dictionary of Simplified Spelling* and *Words We Misspell in Business.*

Vladimir (*vlăd'ĭ-mĭr*; R., *vlä-dyē'mēr*) **the Great (?-1015),** Russian emperor, who reigned from 980 to 1015. He added largely to the kingdom by conquest, but is best known for the introduction of Christianity into the Empire. He embraced the doctrines of the Greek Church and was baptized at Kherson in 988 at the time of his marriage to Anna, sister of Constantine IX of Istanbul.

Volstead, Andrew Joseph (1860-1947), American legislator, was born in Goodhue County, Minn., and was educated at Saint Olaf's College and Decorah Institute. He was admitted to the bar in 1894 and developed a practice at Granite Falls, Minn., of which he was at one time mayor. He was elected to Congress in 1903 and continued to sit until 1923. He was the author of the Volstead Act, which gave effect to the amendment to the Constitution regarding the prohibition of intoxicating liquors.

Volta (*vōl'tä*), **Alessandro, Count (1745-1827),** Italian physicist, was born at Como. In 1774, he became professor of physics in the Royal School at Como, and, 1779, in the University of Pavia. He devised the electrophorus, the electroscope, and various experiments, such as that resulting in the ignition of gases in a closed vessel by means of the electrical spark. In 1800, he announced his important discovery of the voltaic battery. The volt, the unit of electric pressure, was named for him.

Voltaire (*vōl'târ'*), **Jean François Marie Arouet (1694-1778),** French writer and critic, was born at Chatenay near Paris. To the influence of his godfather and first teacher, the Abbé de Chateauneuf, may be traced his first acquaintance with the skeptical literature then in vogue in France.

His further education was obtained in the Jesuit College of Louis-le-Grand. Following his return from the Netherlands, where he had acted as secretary to the French ambassador, he entered an attorney's office; but he found this calling uncongenial. A satire on the deceased French monarch sent Voltaire to the Bastille in 1717.

In 1722, he made the acquaintance of Rousseau in Brussels, but they separated with enmity. The publication of *La Henriade* in 1724 attracted general attention to Voltaire's genius; but he was soon in disgrace on account of a satire against a courtier; and he was again thrown into the Bastille in 1726. Liberated on condition that he quit Paris, he went to England. The three years spent there were important for the friendships and knowledge gained and for their influence upon his *History of Charles XII* and his *Letters on the English* published on his return to Paris. Shortly afterward came his *Zaire.*

He retired in 1734 to Cirey in Lorraine. During his five years' residence there, he wrote his dramas *Merope* and *Mahomet,* his *Treatise on Metaphysics,* much of his *Age of Louis XIV,* and his *Elements of the Philosophy of Newton.* The appearance of his *Princess of Navarre* won him the favor of Louis XV, various appointments at court, and his election to the French Academy in 1746. To this period belong *Zadig* and other Oriental tales.

In 1743, Voltaire had been successful in a mission to Frederick the Great to secure Prussia's alliance with France. Many invitations from Frederick followed, and, in July 1750, Voltaire was at Berlin as the king's chamberlain. Here he completed his *Century of Louis XIV.* In 1753, a rupture came between the two, and Voltaire returned to France.

About 1755, he wrote his mock-heroic poem "The Maid." Five years later, he established himself at Ferney near Geneva. Here he finished his *Essay on the Manners and Spirit of Nations,* a philosophy of history. His *Candide,* the most remarkable of his prose fictions, appeared in 1758. He now became the founder of a new group of thinkers, who, under Diderot and D'Alembert, embodied their ideas in the *Encyclopedia.* At the age of 84, Voltaire went to Paris for the presentation of his new play *Irene.*

Voltaire was the sovereign writer of his century. He had no equal in power of simplification and popularization, in keen metaphors and ready satire. He placed the greatest discoveries and theories of science within the reach of the people. His name is still a rallying point for critics of Christianity and the Church.

Von Braun, Wernher. See *Braun, Wernher.*

Von Bülow (*fŏn bü'lō*), **Hans Guido (1830-1894),** German pianist and conductor, was born in Dresden. He began to study law at Leipzig, but soon devoted himself to music. He studied under Wagner and Liszt. In 1864, he became conductor of the Royal Opera at Munich and produced there the first performances of Wagner's *Tristan und Isolde* and *Die Meistersinger.* From 1880 to 1885, he conducted the Meiningen Orchestra, which he made the most celebrated in Germany.

Von Karman, Theodore (1881-), engineer and aerodynamicist, though American by adoption, was born at Budapest, Hungary. His basic training at the Budapest Royal Technical University was supplemented by practical experience in the employ of a firm manufacturing machinery and by further study at the University of Göttingen. Having served for several years as Director of the Aeronautical Institute of the University of Aachen, he was appointed in 1928 as research associate at the California Institute of Technology, and in 1930 he settled permanently in California. He has served as Director of Research at the Guggenheim Airship Institute at Akron, Ohio, as adviser to the Wright-Patterson Air Force Base at Dayton, Ohio, as a member of the scientific advisory committee of the Ballistic Research Laboratory at the Aberdeen, Md., Proving Ground, and as chairman of NATO's aeronautical research group. In addition to writing numerous articles, he has collaborated on two books: *General Aerodynamic Theory,* with J. M. Burgers, and *Mathematical Methods,* with M. A. Biot.

Wagner, Robert Ferdinand (1877-1953), American legislator, was born at Nastatten, Germany. He was brought to New York as a child and received his schooling there, being graduated from the New York Law School in 1900. His law practice led him into politics, in which he vigorously sponsored labor and social welfare legislation. He was one of the chief proponents of Workmen's Compensation Laws, factory inspection measures and laws for the limitation of the hours of labor. After serving in the New York legislature from 1905 to 1918, he was appointed to the New York Supreme Court and later to the Appellate Division, from which he resigned in 1925 to take a seat in the United States Senate. Legislation which he sponsored in that body includes the National Industrial Recovery Act, the Social Security Act, the National Labor Relations Act, the Railroad Pension Act, and the United States Housing Act. In 1941, he urged legislation to meet anticipated economic consequences of a cessation of World War II.

Wagner, Robert Ferdinand, Jr. (1910-), American public official, was born in New York City, a son of United States Senator Robert F. Wagner (1877-1953) of New York. He was educated at Yale, where he received his academic degree in 1933 and his law degree in 1937. He also attended the Harvard School of Business Administration. He was for several years a member of the New York

State Assembly (1937-41), and during World War II served with the U. S. Army Air Force (1942-45), from which he was discharged with the rank of lieutenant colonel. In 1946 he was made a member of the New York City Tax Commission, and then became successively commissioner of housing and buildings, chairman of the City Planning Commission, and borough president of Manhattan. A Democrat in politics, Robert F. Wagner, Jr. has been mayor of New York City since 1954.

Wagner (*väg'nĕr*), **Wilhelm Richard (1813-1883)**, German composer, romantic poet, and philosopher, was born at Leipzig, Prussia. After the death of his father, from whom Wagner inherited his love for the theater, his mother remarried and removed to Dresden, Saxony. There, in 1821, Wagner was sent to the Kreuzschule. The bent of his tastes and his passion for poetry early found expression in translations from Homer and in the writing of a tragedy based on *Hamlet* and *King Lear*.

Earlier Works. In 1827, the family removed to Leipzig. Weber, then conductor of the Leipzig Opera, and Beethoven's music so captivated the boy's artistic temperament that he decided to set his youthful tragedy to music. In 1830, he entered the University of Leipzig, where his career was marked both by individuality and by brilliant talents. For the next three years, he composed many works after standard models; in 1833, he began his long career as an operatic composer with *The Fairies*.

In 1836, Wagner married an actress, Minna Planer. During the years 1837-39, spent in Riga, he completed the libretto and first two acts of the opera *Rienzi*, and, with this, he resolved to try his fortune in Paris. He sailed first, however, to England, experiencing an exceedingly tempestuous voyage from which he gained his first inspiration for *The Flying Dutchman*.

The years in Paris were filled with bitter experiences; he left in 1842 with *Rienzi* unperformed. This was first produced in October 1842, at Dresden, and the performance led to his appointment as chapelmaster there in 1843. *The Flying Dutchman* was produced in 1843. *Tannhäuser*, two years later, proved a complete failure in Dresden, but it was produced in Weimar by Liszt in 1849 with better results. This event led to a lifelong friendship between Wagner and Liszt.

Years of Exile. *Lohengrin*, which had been suggested during his stay in Paris, was finished early in 1848 and was about to be performed in Dresden the following year, when Wagner became an active leader in the revolutionary outbreak there. Shortly after the suppression of the movement, news reached Wagner in Weimar that a warrant had been issued for his arrest. He fled to Paris, then to Zurich; and, for nearly 12 years, the bitterness of exile was added to the hardship of poverty. In 1850, he was appointed director of the Zurich Musical Society and of the orchestra of the theater. During these years, Liszt was Wagner's most faithful friend and benefactor. Liszt first produced *Lohengren*, in 1850, at Weimar. This performance started the historic "Wagner question" in art circles.

Life in Munich. Wagner went to London in 1855 for one ill-fated season as conductor for the Philharmonic Society. In 1861, he received permission to return to Germany. For three years he struggled, and he was about to give up the unequal contest with fortune when Ludwig II of Bavaria induced him to settle in Munich. *Tristan und Isolde* of 1865 was followed by *Die Meistersinger* three years later. *Siegfried* was completed in 1869. In the following year, Wagner married Cosima, the daughter of Liszt.

In 1870, the pianist Tausig sent an appeal to the admirers of the new Wagnerian music throughout the world; and, in 1876, Wagner's hopes were attained in the erection at Bayreuth of the theater where the ideas of his later operas could be carried out. Wagner had settled at Bayreuth in 1872, and here he produced his *Nibelungen* trilogy. In July 1882, his stormy career was crowned by the first performance of *Parsifal*, which, with its sacred allegory, its lofty nobility of tone, and pure mysticism, stands above criticism, praise, or blame.

Operatic Innovations. Wagner was a musician of the highest type and a poet of supreme eminence in romantic drama. He aimed to reform the whole structure of opera. He used the Beethoven development of instrumental music as a basis and introduced his own radical developments in vocal music and poetry. By locating his operas in the dreamland of myth and legend, he endeavored to remove all sense of dramatic inconsistency. The orchestra was, for him, no longer a mere accompaniment to the singer; it became a running parallel of the play, heightening its dramatic effect; and he utilized all the arts of painting, sculpture, and architecture to further the visible unfolding of the opera. See *Flying Dutchman, Lohengrin, Meistersinger, Parsifal, Ring of the Nibelung, Tannhäuser*.

Wald, Lilian D. (1867-1940), American social worker, was born at Cincinnati, Ohio. Receiving a nurse's training in New York, she founded Henry Street Settlement there to provide nurses where needed at private homes in the district. From this grew the institution of visiting nurses later established in numerous localities. She originated the idea of the Federal Childrens' Bureau, organized the first city school nursing, and originated the country nursing work of the Red Cross. She wrote *The House on Henry Street*.

Walker, Horatio (1858-1938), Canadian painter, was born in Listowel, Ont. After studying miniature painting at Toronto, he located in New York, where he devoted himself chiefly to animal, figure, and landscape painting. While influenced by the Barbizon painters, he was practically self-taught. He chose his subjects largely from French Canadian types, portraying them somewhat in the style of Millet. Among his works are "The Harrower," in the Metropolitan Museum, New York; "Oxen Drinking" and "Ave Maria," Corcoran Gallery, Washington; "Sheepshearing," Albright Gallery, Buffalo; and "The Woodcutter," in the Saint Louis Museum.

Walker, Nellie Verne (1874-), American sculptor, was born at Red Oak, Iowa, the daughter of a marble cutter. She studied under Lorado Taft and at the Art Institute, Chicago, where she later became an instructor. Her artistic efforts were devoted chiefly to portrait busts and to ideal groups for memorials. One of her finest works is "Her Son," at the Art Institute, Chicago. Other examples are the statue of Chief Keokuk, overlooking the Mississippi River at Keokuk, Iowa; the Decker Memorial at Battle Creek, Mich.; and the Stratton Monument at Colorado Springs, Colo.

Walker, William (1824-1860), American adventurer, was born at Nashville, Tenn. He was graduated from the University of Nashville; studied law; and was admitted to the bar. Later he studied medicine at Edinburgh and Heidelburg, and afterward engaged in journalism in New Orleans and San Francisco.

In 1853, Walker attempted unsuccessfully to found a new republic in northern Mexico. He next planned an expedition against Nicaragua, and, in 1855, he took the capital, Granada. He was elected president, and his government, recognized by the United States, restored slavery. Meanwhile his enemies were closing in on him, and, in 1857, he surrendered for protection to a United States sloop of war.

In 1858, he attempted to lead a band of adventurers against Honduras, but was foiled by shipwreck. In 1860, he conducted a second expedition against Honduras and captured Truxillo, but was soon compelled to flee. Subsequently he surrendered himself to the captain of a British warship, by whom he was turned over to the Honduran government. Condemned by court-martial, Walker was shot at Truxillo.

Wallace, Alfred Russel (1823-1913), English naturalist and traveler, was born in Monmouthshire. He was educated as a surveyor and an architect, but devoted his attention to natural history after 1845. He visited South America and the Malay Archipelago; on his return published the results of his observations; and, simultaneously with Darwin, announced the theory of natural selection. Among his works are *Contributions to the Theory of Natural Selection, Geographical Distribution of Animals, The World of Life*, and *Letters and Reminiscences*.

Wallace, Henry (1836-1916), American agricultural editor and author, was born at West Newton, Pa. He was graduated from Jefferson College and attended also Allegheny Theological Seminary and Monmouth Theological Seminary. He entered the United Presbyterian ministry and held pastorates in Illinois and Iowa, 1863-80. After editing the *Iowa Homestead*, 1883-95, he established and became editor of *Wallace's Farmer*, which rose to prominence among the agricultural journals of the Mississippi Valley. He wrote, among other books, *Plymouth Brethren, Clover Culture, The Skim-Milk Calf*, and *Letters to the Farm Folk*.

Wallace, Henry Agard (1888-), American agricultural economist and statesman, was born in Adair County, Iowa. After he was graduated from Iowa State College in 1910, he helped edit *Wallace's Farmer*, founded by his grandfather, Henry Wallace, and became editor on the death of his father in 1924. As a result of a merger in 1929, this journal became the *Iowa Homestead and Wallace's Farmer*.

Although a Republican, Wallace supported Roosevelt, the Democratic candidate in the presidential election in 1932. Roosevelt chose him as secretary of agriculture in 1933, and it fell to his lot to administer the Farm Relief Act of 1933 and succeeding acts which were designed to stabilize agriculture while providing an "ever normal granary."

In 1940, upon Roosevelt's insistence, Wallace was nominated by the Democrats as vice president. The ticket was elected and Wallace served, 1941-45. He was chairman of the Board of Economic Warfare, 1941-43, and of the Supply Priorities, and Allocation Board. In 1945, President Roosevelt nominated him as secretary of commerce, to which office had been joined control of the Reconstruction Finance Corporation. Conservative opposition led to the

separation of the financial powers from the cabinet post before his confirmation. In September 1946 a difference of opinion on foreign policy caused President Truman to ask for his resignation. In 1948 he ran for the presidency as the candidate of a third "Progressive" party.

Among Wallace's publications are *Agricultural Prices*, *Corn and Corn Growing*, and *The Price of Freedom*.

Wallace, Lewis (1827-1905), American soldier and novelist, was born at Brookville, Ind. He was first lieutenant in the Mexican War; began the practice of law in Indiana, 1848; entered the Union army in the Civil War, becoming a brigadier general in 1861 and serving until the close of the struggle. He was governor of New Mexico, 1878-81, and, from 1881 to 1885, he was United States minister to Turkey. His novel *Ben Hur*, 1880, achieved remarkable success. Among other well-known works from his pen are *The Fair God* and *The Prince of India*.

Wallace, Robert Charles (1881-), Canadian geologist, was born at Orkney, Scotland, and was graduated from Edinburgh and Gottingen universities. In 1910, he was appointed a lecturer in geology in the University of Manitoba and, in 1912, became professor and head of the department of geology there. He undertook many investigations on the geology of Manitoba, aiding materially in the development of the province's mineral resources. In 1918-21, he was commissioner of northern Manitoba and, in 1927-28, commissioner of natural resources for Manitoba. He was president of Alberta University from 1928 to 1936, when he became principal of Queens University. He is the author of *Dolomitization Processes* and *A Liberal Education in a Modern World*.

Wallace, Sir William (c. 1270-1305), Scottish patriot, headed the uprising of 1297, against the English and won a victory at Stirling Bridge, after which he crossed the border, devastated northern England, and, on his return, was named the guardian of Scotland. The next year, however, he was defeated by Edward I at Falkirk, after which, deserted by the nobles, he carried on a guerilla warfare for several years. He was declared an outlaw in 1304 and was captured, sent to London, and was hanged.

Wallenstein (*wŏl'ĕn-stīn*; G., *väl'ĕn-shtīn*), **Albrecht Wenzel Eusebius von (1583-1634),** duke of Friedland, German military leader, was born in Bohemia. At the head of a formidable army raised by him for the service of the emperor and paid for from his own resources and from unlimited plunder, he distinguished himself during the Thirty Years' War by his successes in Moravia, Bohemia, and northern Germany, and was rewarded with the dukedoms of Mecklenburg and Friedland. His enemies succeeded in procuring his dismissal in 1630, and he retired to Prague, where he lived with all the state of a sovereign.

The successes of Gustavus Adolphus compelled the emperor in 1632 to place Wallenstein again in command with almost regal authority. He foiled Gustavus at Nuremberg, but was defeated at Lutzen. At length he was accused of treason; his commission was revoked; and he was assassinated by some of his own officers. A famous trilogy by Schiller is based on Wallenstein's career.

Walpole, Horace (1717-1797), Earl of Orford, English author, son of Sir Robert Walpole, was born in London. He was graduated from Cambridge, and entered Parliament in 1741. Although he remained a member of the House of Commons until 1768, he devoted himself chiefly to literary and artistic pursuits. In 1747, Walpole purchased the estate of Strawberry Hill, Twickenham, the building and the adornment of which occupied him throughout much of his life. In this house he collected many works of art and curiosities and established a private printing press, at which several of his own works and some others were printed.

He is now remembered chiefly for his *Letters*, which are of great literary value. These extend over a period of 60 years and are remarkable for their wit and humor and for their delineations of the society of the time.

Walpole, Sir Hugh Seymour (1884-1941), British novelist, was born in New Zealand. He was educated at Cambridge, and, during World War I, he served with the Russian Red Cross. Many of his novels have settings in earlier periods of history, which are reproduced in a very convincing manner. He excels in describing scenes which verge on horror. Among his best known novels are *The Wooden Horse*, *The Dark Forest*, *The Secret City*, *The Young Enchanted*, *The Cathedral*, *Rogue Herries*, *The Fortress*, and *The Inquisitor*. He was knighted in 1937.

Walpole, Sir Robert (1676-1745), English statesman, was born at Houghton, Norfolk. He was educated at Cambridge, and entered Parliament in 1701 as a Whig. He held various cabinet offices and was prime minister from 1721 to 1742, the first to exercise in that office power based on party loyalty. As chancellor of the exchequer, he had to deal with the difficulty resulting from the collapse of the South Sea Company, and he was one of the first to urge the establishment of a sinking fund for the purpose of reducing the national debt. He was an enemy of war and a strong supporter of the Protestant succession. On his retirement in 1742 he was created Earl of Orford.

Walter, Thomas Ustick (1804-1887), American architect, was born in Philadelphia. In 1833, he made the designs for the Girard College Building, which, on its completion in 1847, was pronounced the finest specimen of classic architecture in the United States. In 1848, his design for the extension of the Capitol at Washington, D. C., was adopted. Appointed government architect, he removed to Washington and remained there until the completion of the work. He designed also the extensions of the patent-office, treasury, and post-office buildings, and the dome of the Capitol.

Walton, Izaak (1593-1683), English writer, was born at Stafford, England. He was a linen draper in the city of London. At 50 years of age, he retired from business and thenceforward devoted himself to literary pursuits and to angling, the latter of which seems to have been his passion. His *Compleat Angler* is still a popular book, especially pleasing for its quiet and quaint dialogue and for its glimpses of rural scenery, manners, and pastimes. See *Compleat Angler, The*.

Wanamaker, John (1838-1922), American merchant, was born at Philadelphia. He was educated in the public schools and, for a time, was an errand boy. Entering mercantile life in Philadelphia, 1856, he developed an enormous retail business. He also reopened in New York in 1896 the department store founded by A. T. Stewart. He was an organizer and director of the Merchants' Bank and was a director of the Philadelphia and Reading Railway.

Wanamaker was the first salaried Y. M. C. A. secretary, and he erected many Y. M. C. A. and college buildings in India, China, Japan, and Chosen. He was also the founder and, for many years, the superintendent of the Bethany Sunday School. From 1889 to 1893, he was postmaster general in President Harrison's cabinet. He sent two relief ships to Belgium in 1914. A bronze monument was erected to his memory by the school children of Philadelphia.

Ward, Aaron Montgomery (1843-1913), American merchant and originator of mail order merchandising, was born at Chatham, N. J. At the age of five, he was taken to live at Niles, Mich., where he attended the public schools. He acquired his first experience in merchandising at Saint Joseph, Mich., beginning as a clerk in a general store, of which he was made manager in three years. In 1866, he obtained employment with Field, Palmer, and Leiter, later Marshall Field & Company, Chicago, and, after two years' experience, became traveling salesman for a Saint Louis firm.

In 1872, with his brother-in-law, G. R. Thorne and with the assistance of one clerk, he established the mail order house of Montgomery Ward and Company. Under Ward's management, this firm developed a vast business extending to all parts of the world, employing 6000 persons and handling sales amounting to $70,000,000 annually. In civic affairs, he was noted for his persistent and successful efforts to preserve Grant Park to the city of Chicago.

"Ward, Artemus." See *Browne, Charles Farrar*.

Ward, Barbara (1914-), English economist, editor, and writer, is the wife of Commander Robert A. Jackson. Her education included study in France and Germany, as well as in England, and the point of view expressed in her articles on economics is that of a person with a broadly international perspective. She has been a University Extension Lecturer on Economics and has served on the staff of *The Economist*. Her books include *Turkey, 1941*; *The West at Bay*; and *Policy for the West*. In *Faith and Freedom* her interpretation of history takes a serious view of Western civilization, not only from an economic standpoint but also on the basis of religious and philosophical considerations.

Ward, Mrs. Humphry (1851-1920), née Mary Augusta Arnold, English novelist and writer, niece of Matthew Arnold, was born at Hobart, Tasmania. In 1872, she married Thomas Humphry Ward, a well-known critic and writer. Her first notable success was *Robert Elsmere*, 1888, a religious problem novel defending the "higher" criticism of the Bible. Among her subsequent works are *Marcella*, *The Testing of Diana Mallory*, *Marriage á la Mode*, *Canadian Born*, *Eltham House*, *The War and Elizabeth*, and *A Writer's Recollections*.

Ward, John Quincy Adams (1830-1910), American sculptor, was born at Urbana, Ohio. He began the study of law, but, in 1850, turned his attention to sculpture. His first work was done in Washington, where he executed busts of Alexander Stephens and others. After 1861, his home was in New York. His "Indian Hunter," "A Private of the Seventh Regiment," "Pilgrim," and "Shakespeare" are in Central Park, New York; his colossal statue of Washington is on the steps of the Subtreasury Building, New York; and his statue of Henry Ward Beecher stands in Brooklyn.

Strong, virile, and broadly but simply conceived, Ward's

work ranks high in contemporary American sculpture. He was elected a member of the American Academy of Arts and Letters in 1905.

Warming (*vär'ming*), **Johannes Eugenius Bülow (1841-1924),** Danish botanist, was born in the Island of Mano, in the North Sea. After study in Bonn, and travel in Brazil, he was graduated from the University of Copenhagen in 1871. He became professor there in 1876, and taught there and at Stockholm until 1911. Warming established the position of plant ecology, and made valuable researches in Arctic botany, morphology, and taxonomy. He wrote *Systematic Botany* and *Ecology of Plants*.

Warner, Charles Dudley (1829-1900), American author, was born at Plainfield, Mass. He was graduated from Hamilton College in 1851 and practiced law in Chicago, 1856-60, when he settled at Hartford, Conn., engaging in editorial work. He became associate editor of the Hartford *Courant* in 1867 and, in 1884, coeditor of *Harper's Magazine*, in which appeared his papers on the South, on Mexico, and on the West. In 1873, he wrote, with Mark Twain, *The Gilded Age*. His other works include *My Summer in a Garden, Back-log Studies, Being a Boy, Captain John Smith,* and books of travel, such as *In the Levant*.

Warren, Earl (1891-), American politician, was born in Los Angeles, and was educated at the University of California. He practiced law in Oakland from 1914 to 1938, when he was elected attorney general. In 1943, he was elected governor of California and in 1946 was re-elected, with both the Republican and Democratic nominations. He accepted the Republican nomination for vice president in 1948, but his party was defeated. In 1953 President Eisenhower appointed him Chief Justice of the U. S. Supreme Court.

Warren, Joseph (1741-1775), American soldier, was born at Roxbury, Mass. He was graduated from Harvard in 1759 and became a physician in Boston, 1764. He associated himself with Samuel Adams and other ardent Whigs and, in 1772, became a member of the committee of correspondence. In 1774, he was a member and president of the Massachusetts Congress and chairman of the Committee of Public Safety. He had much to do with the success at Lexington and, in 1775, was commissioned major general. Overruled by a majority of the council, which resolved to fortify Bunker Hill, he went there as a volunteer, refusing to take the chief command offered to him by both Prescott and Putnam. He was killed during the battle.

Warren, Robert Penn (1905-), American novelist and educator, was born at Guthrie, Kentucky. A graduate of Vanderbilt University, he studied also at the University of California and at Oxford, England, where he was a Rhodes Scholar. He has been Professor of English at the University of Minnesota and at Yale University, but has devoted a considerable part of his time to writing. Besides poetry he has written criticism, textbooks, and fiction. His novel *All the King's Men* was awarded the Pulitzer prize and was widely commended for its appraisal of contemporary American life and its political and social problems. *World Enough and Time* is a work of historical fiction. Critical works and textbooks are *Understanding Fiction, Modern Rhetoric,* and *Fundamentals of Good Writing*.

Warwick, Richard Neville, Earl of (1428-1471), surnamed "the king-maker." Wealthy, powerful, and of royal blood, he was the most prominent figure in the Wars of the Roses. With his support the Yorkists, in 1461, placed Edward, Duke of York, on the throne as Edward IV. After a quarrel with Edward, Warwick, in 1470, joined the Lancastrians and, with French assistance, reinstated Henry VI. Edward, however, returned with assistance from Burgundy, and at the battle of Barnet, in 1471, the Lancastrians were defeated and Warwick was killed. Warwick is the hero of Lytton's novel *The Last of the Barons*.

Washington, Booker Taliaferro (c. 1858-1915), American educator of the Negro, was born near Hales Ford, Va., the son of a mulatto slave and of a white man. He was graduated from Hampton Institute, Va., Harvard, and Dartmouth. He was a teacher at Hampton Institute until elected by the state authorities, 1881, as head of Tuskegee Institute, which he organized and made highly successful. He became a well-known and able writer and speaker on racial and educational subjects. His publications include *Sowing and Reaping, Up From Slavery, Future of the American Negro, Character Building, Story of My Life and Work, Working With Hands,* and *The Negro in Business*. Elected to the American Hall of Fame in 1945.

Washington, George (1732-1799), first president of the United States, was born in Westmoreland County, Virginia, February 22, 1732. He was the son of Augustine Washington, a planter, and of Mary Ball, his second wife. His ancestors belonged to an old English family, traceable as far back as the 13th century.

Education. The province of Virginia offered but scanty opportunities for education. Reading, writing, arithmetic, and some other branches of mathematics alone were within the reach of Washington. It is said that he was a diligent student, but that his passion for active sports and military exercise was displayed at a very early age. Another tradition states that, while he was at school, his reputation for truth and judgment was so well established that his fellow pupils were accustomed to make him the arbiter of their disputes, seldom failing to be satisfied with his decision.

Early Career. After leaving school in the autumn preceding his 16th birthday, Washington went to reside with his brother Lawrence at Mount Vernon. There he became acquainted with the Fairfax family, from whom he obtained employment as a surveyor of large tracts of territory in the rich valley of the Allegheny Mountains. In this service, at which he was engaged during the summer months of the years 1748-1750, Washington established a high professional reputation by his skill and accuracy. The acquaintance which he gained with the wilderness and its inhabitants was of great use to him later in military expeditions. By the practice of economy he saved money and purchased property before reaching his majority.

In 1751, Washington entered the military service. The frontiers were threatened at that time by the French and Indians, and the militia was put in a condition for defense. The province was divided into districts, and Washington received charge of one of these districts as adjutant general with the rank of major. He entered into his duties with zeal and alacrity and applied himself to the study of tactics.

Military and Political Activities. After the outbreak of the French and Indian War, Washington made himself so prominent a figure by his brave but unsuccessful defense of Fort Necessity in 1754 that he was commissioned commander in chief of all the Virginia forces in 1755. He served in the same year as an aide to General Braddock. In the attempt to take Fort Duquense, which, because of Braddock's refusal to take advice, resulted in disaster, Washington's clothing was riddled with bullets, but he escaped unhurt. The war in Virginia was soon at an end. Washington resigned his post, married Mrs. Martha Custis in 1759, and settled at Mount Vernon.

His life for the next 15 years was that of a typical Virginia planter, a consistent member of the Episcopal Church, a large slaveholder, a strict but considerate master, and a widely trusted man of affairs. He was repeatedly elected to the legislature and, in 1774, was sent as a delegate to the Continental Congress. With this appointment his national career began.

Washington's associates in Congress recognized his military ability at once, and most of the details of the work looking toward preparations for armed resistance against England were left by common consent to him. War broke out in Massachusetts, and, after the affairs at Lexington and Concord, Washington was unanimously elected commander in chief of the armed forces of the united colonies. Refusing any salary, he accepted the office despite his skepticism as to his fitness for it. He was commissioned June 15, 1775, and reached Cambridge, Mass., July 2, taking command of the levies there assembled against the British garrison of Boston.

Washington drove the British out of Boston in March 1776, and, from that time until his death, he was the foremost man on the continent. The military operations of the remainder of the war are familiar to all readers of American history. The war was actually over when Washington received the surrender of Cornwallis at Yorktown; but not until December 23, 1783, did he resign his commission and retire to Mount Vernon.

Presidency. When the Federal Convention met at Philadelphia in May 1787 to frame the present Federal Constitution, Washington was present as a delegate from Virginia, and a unanimous vote soon made him the presiding officer. After the Constitution had been ratified and the time had come to elect a president, in 1789, there was no hesitation. The unanimous vote of the electors made Washington the first president of the United States and re-elected him in 1793. The success of the new system of government was due mainly to the presence at that time of such a character as Washington; for he prevented party contest until the new government was firmly established. Refusing a third term of office, Washington left the presidency in 1797 and resumed his life as a planter.

Character. Washington was distinguished less by the brilliancy of his talents than by his moral strength, sound judgment, and plain, but excellent, understanding. Of all great men in history he was perhaps the most invariably judicious and evenly poised. A resolution introduced in the House of Representatives five days after his death and passed unanimously states exactly, if a trifle rhetorically, the position of Washington in American history: "First in war, first in peace, and first in the hearts of his countrymen."

He died on December 14, 1799, when commander in chief of a provisional army raised in the expectation of open war with France. His remains were laid in a private vault at Mount Vernon, where his tomb has since been converted into a national shrine. He was elected to the American Hall of Fame in 1900.

Watson, John (1850-1907), better known by his pseudonym "Ian Maclaren," British preacher and writer, was born of Scottish parents at Manningtree, Essex. He was educated at Edinburgh University and at Tübingen; was ordained a minister of the Free Church of Scotland; and had important pastorates in Glasgow and Liverpool.

In 1894, Watson acquired wide fame by a series of Scottish prose idyls entitled *Beside the Bonnie Brier Bush.* This work portrayed humble and pious Scottish life and scenes. The volume was followed by *The Days of Auld Lang Syne, Rabbi Saunderson,* and other stories. His religious writings embrace *The Mind of the Master, The Potter's Wheel,* and *The Pure of Souls.*

Watson, John Broadus (1878-), American psychologist, was born at Greenville, S. C.; was educated at Furman University and the University of Chicago, where he was an instructor in 1903-08; and, in 1918, became professor of psychology at Johns Hopkins University. He is regarded as the founder of the School of Behaviorism, that is, the branch of psychology which ignores consciousness and studies psychic activity solely in terms of observable behavior. He resigned his professorship in 1920 and joined an advertising agency in 1924. His writings include *Animal Education, Homing and Related Activities of Birds,* and *Behaviorism.*

Watt, James (1736-1819), Scotch engineer and inventor, was born at Greenock on the Clyde, Scotland. He was educated mainly at the Greenock Grammar School, which he was unable to attend regularly on account of poor health. He early showed an exceptional mechanical ingenuity and acquired skill in drawing and in carpentry.

In 1755, Watt placed himself under a maker of mathematical instruments in London. He went to Glasgow in 1756 and was soon employed by the university there in fitting up the instruments in the Macfarlane Observatory. His constant intercourse with the professors of the university and his ready access to books enabled him to acquire a considerable knowledge of science.

During the winter of 1763-64, Watt repaired a working model of the Newcomen engine, kept for the use of the natural science class in the college. He was impressed with its contrivance, but he soon perceived its defects. It was worked by means of atmospheric pressure, steam being used only in producing, by its condensation, a vacuum in a cylinder into which a piston was forced by the pressure of the air. Watt found that about four-fifths of the steam, and consequently of the fuel, was wasted. At length, in 1765, he hit upon the expedient of the separate condenser. He did not rest content, but resolved to make steam his motive power. This done, he received a patent for his engine in 1769.

In 1774, Watt entered into partnership with Matthew Boulton at Soho, near Birmingham, and laid the foundation of one of the principal establishments in England for the construction of steam engines. He continued also to prosecute his scientific investigations. In 1782, he invented a double-acting engine, in which steam was admitted into the cylinder on each side of the piston alternately instead of on one side only. To his first three distinct inventions—the condenser, the employment of steam above and below the piston, and parallel motion—Watt later added the crank, the flywheel, and the governor. By 1785, his engine had become available for the most delicate, as well as for the most laborious, forms of industry. See *Steam Engine.*

Watteau, Antoine (1684-1721), French painter, was born in Valenciennes. He learned painting as assistant to various artists. In 1708, he entered the studio of the keeper of the Luxembourg, where he painted "The Departing Regiment" and other camp pictures. His "Embarkment for Cythera" and "The Seasons" illustrate the style for which he is chiefly noted, a light hearted gracefulness in pronounced contrast to the classical severity which prevailed at the time. His gay groups, often fanciful, in charming out-of-door settings, set a fashion in French art.

Watterson, Henry (1840-1921), American journalist and orator, was born at Washington, D. C. He was privately educated; entered journalism in Washington as a reporter; served in the Confederate army; and subsequently founded, 1868, the Louisville *Courier-Journal.* Under his brilliant editorship, this newspaper rose to foremost rank.

In 1876-77, Watterson was a member of Congress and, in 1876, was temporary chairman of the national Democratic convention. In other national conventions he was chairman of the platform committee. He is said to be the author of the phrase "tariff for revenue only." He opposed Bryan and the Democratic platform of 1896 and the nomination of Wilson in 1912. He published a *History of the Spanish-American War, Oddities of Southern Life and Character, Abraham Lincoln,* and *The Compromises of Life.*

Watts, George Frederick (1817-1904), English painter and sculptor, was born at London. He studied in the Royal Academy and later in Italy. Watts's art is didactic, many of his works symbolize the power of love and the danger of riches. His best paintings are in the Tate Gallery, London. Among these are "Love and Life," of which a replica is in the White House, Washington; "Love and Death," "Love Triumphant," "Faith," and "Hope." Other well-known works from his brush are "Sir Galahad" and "Orpheus and Eurydice." Among his many noted portraits are those of Gladstone, Tennyson, Browning, Swinburne, Matthew Arnold, William Morris, Carlyle, Meredith, Leighton, Rossetti, and Burne-Jones. His sculpture is distinguished for its boldness and nobility of style.

Watts, Isaac (1674-1748), English hymn writer and theologian, was born at Southampton. From 1696 to 1701, he was tutor in the family of Sir John Hartopp. He became minister of the independent church at Mark Lane, London, 1702, resigning in 1712 because of ill health. Watts is generally regarded as the founder of hymnology in English. His *Hymns* includes the well known sacred songs "Oh God, Our Help in Ages Past" and "When I Survey the Wondrous Cross." He wrote also *Psalms of David* and *Divine and Moral Songs for Children,* the latter containing "How Doth the Little Busy Bee." His other writings include *Logic,* theological treatises, and books on geography.

Waugh, Evelyn Arthur (1903-), English novelist, has written critical works on Rossetti and Campion but his reputation rests on his fiction. Perhaps his best-known novel is *Brideshead Revisited,* but his satiric novels of war experience, such as *Men at Arms* and *Officers and Gentlemen* are considered by some readers to be examples of his best work, so far.

Wavell, Field Marshal Archibald Percival, Earl of Cyrenaica and of Winchester (1883-1950), British soldier. Trained at Sandhurst Military College, he served in the South African War. During World War I he was wounded in France, was attaché with the Russian army in the Caucasus, and was with Allenby's army operating from Egypt. In World War II he was sent again to Egypt to defend it against the Italian invasions from the west and south. Here he organized a mechanized force which at the end of 1940 drove the Italians from Cyrenaica and threatened the collapse of the Italian empire. The detachment of a large part of his forces to resist the German invasion of Greece enabled the Germans, now in control of Libya, to counterattack and again threaten Egypt. In June 1941 Wavell was sent to India, where he remained as viceroy until 1947, in charge of Indian defense and readjustment. He was raised to the peerage as viscount in 1943, and was made an earl in 1947.

Wayne, Anthony (1745-1796), American general, was born at Easttown, Pa. At the outbreak of the Revolutionary War, he raised a regiment of volunteers, of which he was appointed colonel, and was sent on an expedition to Canada. He commanded at Ticonderoga until 1777, when he was made brigadier general and joined Washington in New Jersey; led the attack at Germantown; captured supplies for the distressed army at Valley Forge; distinguished himself at Monmouth, was defeated at Paoli; but achieved a brilliant victory in the storming of Stony Point, 1779. His courage and skill greatly assisted Lafayette in Virginia, 1780. He aided in the siege of Yorktown and commanded in Georgia. By his dash and audacity, he acquired the sobriquet of "Mad Anthony." He became major general and commander in chief in 1792.

Webb, Sidney (1859-1947), English socialist writer and politician, was born in London. He was educated at private schools in London and Switzerland and at the City of London College. After seven years in the civil service, he was called to the bar in 1885. He was one of the early members of the Fabian Society and became known as an exponent of socialism. In 1892, he married Beatrice Potter (1858-1943), a writer on sociology and economics, who thereafter was nearly always associated with her husband in authorship and socialist activities.

Webb became a member of the city council of London in 1892 and served on several government commissions concerned with economic conditions. In 1914, he was elected to the national executive of the Labor party, the constitution of which was remodeled closely in accordance with his views. He and his wife were active in founding the *New Statesman* and the London School of Economics and Political Science. In 1923, he was elected to parliament and, in 1924, became a cabinet member of Great Britain's first Labor government. When this government returned to power in 1929, he was made minister for the dominions and colonies. He was also elevated to the peerage as Baron Passfield, but his wife refused to share in the honor.

Besides several works published by himself, he is co-author, with his wife, of *Industrial Democracy, English Poor Law History, The Prevention of Destitution,* and *Soviet Communism: A New Civilization?*

Weber (*vā'bĕr*), **Ernst Heinrich (1795-1878),** German physiologist and anatomist, brother of Wilhelm Eduard Weber, was born at Wittenberg. Educated in medicine at Wittenberg and Leipzig, he was made professor of com-

parative anatomy at Leipzig, 1818; professor of human anatomy, 1821; and professor of physiology, 1840. Weber's fame rests chiefly upon his pioneer researches on the sense organs. His investigations upon the ear, upon the tactile senses, and upon what was then designated as the "space sense" initiated the experimental movement in psychology. His formula expressing the relation of sensation to intensity of stimulus, now universally known as Weber's law, was the first notable generalization in psychophysics.

Weber, Karl Maria von (1786-1826), German composer, was born at Eutin. He early gave proof of musical talent; studied at Salzburg and Munich; and became director of the German Opera at Dresden. His first great production was *Der Freischütz*, 1821, which established his fame. It was followed by his masterpiece, *Oberon*, produced in London in 1826. Weber founded the Romantic School of German Opera and exercised a profound influence upon Wagner. He wrote also some excellent piano and orchestral music and songs. See *Freischütz, Der*; *Oberon*.

Weber, Wilhelm Eduard (1804-1891), German physicist, was born at Wittenberg. He was educated at Halle. In 1825, with his brother, E. H. Weber, be began the publication of *Die Wellenlehre*. Weber became assistant professor of physics at Halle, 1827, and professor at Göttingen in 1831, but was removed for political reasons in 1837. He was professor of physics at Leipzig from 1843 to 1849, when he regained his former position at Göttingen.

Weber's most notable contribution to electrical science was the introduction of an absolute system of electrical units based on the work of Gauss in magnetism. In 1881, Weber's system, with some modifications, was adopted by the international electrical congress in Paris, and the values of the practical working units—the volt, the ampere, the coulomb, the farad—were defined.

Webster, Daniel (1782-1852), American statesman, lawyer, orator and publicist, was born at Salisbury, N. H. He gained the rudiments of education at home and was sent to Phillips Exeter Academy in 1796; the next year he entered Dartmouth College, where he was graduated in 1801. He then began to study law in the office of Thomas Thompson of Salisbury, and, in 1805, he was admitted to the bar. He removed to Portsmouth, N. H., where he soon acquired distinction.

In 1812, he was elected as a Federalist to the House of Representatives. He was re-elected to the 14th Congress, which met in 1815 and in which he rendered important services in financial legislation. In 1816, he resolved to withdraw from public life and devote himself to his profession. He removed to Boston, where his reputation grew constantly, and he was soon the foremost lawyer of New England. He exhibited great skill in his presentation of important cases, and the effect of his arguments was enhanced by his deep-toned, musical, and powerful voice.

In 1820, Webster was a member of the convention that met to revise the constitution of Massachusetts, and, in December of the same year, he pronounced at Plymouth a memorable oration on the anniversary of the landing of the Pilgrims. In 1822, he was elected by the voters of Boston as a member of the Congress that met in December 1823, and he was subsequently re-elected by a nearly unanimous vote. Several of his famous patriotic orations belong to this period. Webster continued to serve in the House of Representatives until he was transferred to the Senate in 1827.

In January 1830, he made his great argument in defense of the Union and the Constitution. In September, 1837, as a member of the Senate, he opposed the subtreasury bill in an elaborate speech, considered to have been the most effective of all his arguments on the subjects of finance and currency. In 1839, Webster visited France, Scotland, and England, where he particularly won the admiration of Carlyle.

President Harrison appointed Webster his secretary of state in 1841. Three years later, Webster was again returned to the Senate, as the successor of Rufus Choate. In December 1845, he made a speech against the admission of Texas as a slave state, and, in 1847, he declared that he was opposed to the prosecution of the Mexican war for the conquest of territory to form new states of the Union. He was again an unsuccessful candidate for presidential nomination in 1848.

As a result of his support of Clay's "compromise measures" in 1850, Webster was widely criticized by many of his admirers and by the opponents of slavery. Later in the same year, he became secretary of state under Fillmore. In 1852, his desire for the presidential nomination was again frustrated. He was elected to the American Hall of Fame in 1900.

Webster, John (c. 1580-c. 1625), English dramatist. Little of his life is known. He collaborated with a number of writers of the period, and then produced unaided, about 1610, the tragedy *The White Devil*, one of his masterpieces. *Appius and Virginia* followed, and, about 1616, Webster wrote the famous *Duchess of Malfi*. As a master of tragedy, Swinburne ranks Webster second only to Shakespeare.

Webster, Noah (1758-1843), American lexicographer, was born at Hartford, Conn. He was graduated from Yale; was admitted to the bar in 1781; but devoted himself chiefly to literary work. While teaching at Goshen, N. Y., he prepared his *Grammatical Institute of the English Language*, the first part of which became known as *Webster's Spelling Book*. In 1889, it was estimated that more than 60 million copies of this spelling book had been printed.

In 1785, Webster published *Sketches of American Policy*, advocating the formation of a new constitution. In 1807, he produced *A Philosophical and Practical Grammar of the English Language* and commenced his *American Dictionary of the English Language*; but, upon finding difficulties in etymology, he devoted ten years to its study. He then began his dictionary anew and, in 1828, published this great work, which contained 12,000 more words and 40,000 more definitions than any earlier English dictionary. Webster was also a judge, a member of the state legislature, and one of the founders of Amherst College.

Wedekind (*vā'dĕ-kĭnt*), **Frank (1864-1918),** German play writer, was born in Hanover. He first studied law, but soon devoted himself to writing. He traveled extensively; became a vaudeville performer, acting his own plays; and, in 1906, settled at Munich.

Wedekind can be classed in no school of writers. He was an audacious iconoclast, defying morality, accepted beliefs, and established forms, yet possessing to a high degree the art of presenting life and character, of creating illusion, and of producing works of power and beauty. Among his plays are *Pandora's Box*, *The Dance of Death*, *The Love Potion*, *The Young World*, *Censorship*, *The Philosopher's Stone*, *Such Is Life*, *The Awakening of Spring*, and *The Earth Spirit*.

Wedgwood, Josiah (1730-1795), English potter, was born in Staffordshire. On account of the death of his father, also a potter, his schooling ended with his ninth year. After being apprenticed to his brother and later associated with a prominent potter of Fenton, he opened works of his own in Burslem in 1759 and soon began the manufacture of an improved cream-colored domestic earthenware, named queen's ware in honor of Queen Charlotte. After establishing the most successful business in domestic pottery known up to that time, he directed his attention to artistic pottery, using for his patterns and inspiration the classic examples newly recovered from Pompeii and Campania. The result was the famous Wedgwood ware.

Wedgwood was the most successful and original workman known in the history of pottery, and its whole subsequent manufacture has been influenced by his skill. One of his daughters was the mother of the naturalist Charles Darwin.

Weed, Thurlow (1797-1882), American journalist and political leader, was born at Cairo, N. Y. At 14, he was an apprentice in a printing office; established the *Agriculturist* in western New York; edited several other journals; and became famous as the editor, 1830-63, of the Albany *Evening Journal*, the organ of the Whig party. Here he became an acknowledged leader of the Whig and the Republican party. He opposed slavery and supported the harsh reconstruction measures after the Civil War. He was a member of the powerful "political firm of Seward, Weed, and Greeley," which dominated politics in New York for many years. In 1865, he removed to New York City and worked on the New York *Times* and later edited the *Commercial Advertiser*.

Weir, Julian Alden (1852-1919), American painter, was born at West Point, N. Y. He received his first instruction from his father and, after studying at the National Academy of Design, New York, spent three years in Paris, 1873-76, under Gérome. He was one of the founders of the Society of American Artists, 1877, but, in 1898, seceded as one of the "ten American artists." Weir's work consists of portraits, genre and landscape pictures, and etchings. It includes "Portrait of a Young Girl," in the Luxembourg Museum, Paris; "Idle Hours," in the Metropolitan Museum, New York; and "Autumn," in the Corcoran Gallery, Washington, D. C. He was elected to the American Academy of Arts and Letters in 1915.

Weizmann, Chaim (1874-1952), chemist and Zionist leader, was born in Motol, Russia, and was educated at Pinsk, Berlin, and Freiburg. He was a lecturer in chemistry at the University of Geneva and later was appointed as reader in biochemistry at Manchester University. In 1916-19, he was director of the British Admiralty Laboratories, in which capacity he was associated with many inventions of naval and military value. He was president of the World Zionist Organization and Jewish Agency for Palestine, 1921-31, resigning in protest against British restriction of immigration, but returning to that office in 1935. In 1932 he became president of the Hebrew University of Jerusalem. In 1948 he was chosen president of the provisional council of government of the new Jewish state of Israel.

Welk, Lawrence (1903-), American band leader, was born on a farm in Strasburg, North Dakota, where his father had settled as a homesteader in 1878, shortly after coming to this country from Alsace-Lorraine. Next to the youngest of eight children, Lawrence learned from his father how to play the accordian, and his services were soon demanded for local weddings. He wanted an instrument of his own, and his father promised to give him one if he would stay on the farm until he was twenty-one. When given an expensive accordian on his twenty-first birthday, Lawrence began his professional musical career, playing with various bands, though without marked success. Then he began leading his own bands.

For a while after his marriage in 1931, he gave up professional music, because his wife wanted him at home, but everything he tried failed. So he resumed his musical career. After several years as a "Spanish" accordionist with a touring show, he went into the band business again. This time he was highly successful. His "champagne music" was a hit. He began in 1951 appearing five nights a week at a Los Angeles ballroom, and in 1955 became the TV sensation of America.

Welles, (George) Orson (1915-), stage, screen, and radio actor, director, producer, and writer, was born at Kenosha, Wisconsin. Among his stage productions were *Macbeth* with a Negro cast, and *Julius Cæsar* in modern dress. His films include *Citizen Kane, The Magnificent Ambersons,* and *Othello.* His amazingly realistic radio version of H. G. Wells's *War of the Worlds* in 1938 caused a panic among some of his listeners.

Wellington, Arthur Wellesley, Duke of (1769-1852), British general, was born in Ireland. He completed his military education in the Military College of Angiers, France; entered the army as ensign in 1787; and became lieutenant colonel in 1793. While he fought with ability in the Netherlands in 1794, he won his first fame in the Mahratta War in India, 1803.

In 1808, he commanded the first division of the British army sent out from Cork to assist in the expulsion of the French from Spain and Portugal. Throughout the peninsular campaigns, 1809-14, success crowned his efforts and the French were everywhere repulsed or vanquished, Napoleon's ablest marshals, Soult, Victor, Masséna, and Marmont, each suffering defeat. In 1814, he was created Marquis of Douro and Duke of Wellington.

When Napoleon escaped from Elba and again headed an army in France, the defense of Belgium was assigned to an army under Wellington and a Prussian army under Blücher. The battles of Ligny and Quatre Bras were followed on June 18, 1815, by the great battle of Waterloo, in which the power of Napoleon was finally crushed. In 1827, he succeeded the Duke of York as commander in chief of the British army and, from 1828 to 1830, was prime minister of Great Britain. He was buried under the dome of Saint Paul's cathedral.

Wells, Herbert George (1866-1946), English novelist, was born at Bromley, Kent. He studied under Huxley, was graduated from London University with high honors, and taught biology several years. His scientific training prepared him for writing a long series of books remarkable for weird adventure, scientific knowledge, and bold imagination. Beginning with fantastic romances, somewhat in the manner of Jules Verne, he rose to foremost rank among living British novelists. Most of his works bespeak sociological interests and indicate a hope of reforming human affairs in accord with present or future scientific knowledge.

Among his many works are *The Time Machine, The First Men in the Moon, The Invisible Man, Mankind in the Making, The Food of the Gods, A Modern Utopia, The War of the Worlds, Ann Veronica, The New Machiavelli, When the Sleeper Wakes, Mr. Britling Sees It Through, Joan and Peter,* and *Mind at the End of Its Tether.* His *Outline of History,* an attempt to replace national histories by an account of the human race, was one of the most successful books of recent times. He collaborated in producing *The Science of Life.*

Wells, Horace (1815-1848), American dentist, was born in Hartford, Vt. He studied dentistry in Boston and began practice there, but, in 1836, removed to Hartford, Conn. Here, in 1840, he began experimenting with nitrous oxide, or laughing gas as a means of preventing pain in dentistry. After using nitrous oxide successfully in several cases in 1844, he proved its efficiency, at the Harvard Medical School in 1845, being the first to demonstrate publicly the use of an anesthetic in surgical operations. After his return from Paris, where he communicated his discovery to French medical societies, he published in 1847 *A History of the Application of Nitrous Oxide Gas, Ether and Other Vapors to Surgical Operations.* Controversies regarding his discovery as well as experiments upon himself with chloroform affected his mind and he committed suicide.

Wendell, Barrett (1855-1921), American educator and critic, was born at Boston. He was graduated from Harvard and was appointed to the faculty in 1880. In 1898, he became professor of English there. His writings include *The Duchess Emilia, Cotton Mather, William Shakespeare, A Literary History of America, Raleigh in Guiana, The Privileged Classes,* and *The Mystery of Education.* He was elected to the American Academy of Arts and Letters in 1916.

Werner (*vĕr'nĕr*), **Alfred (1866-1919),** Swiss chemist, was born at Mülhausen, Alsace. He was educated at the Zurich Polytechnic School and later studied under Berthelot in Paris. In 1895, he became professor in the University of Zurich. Werner's most important work was in connection with the theory of molecules. He developed the conception of a molecule in three dimensions and demonstrated that two compounds identical in composition might differ in structure and in properties. This theory led him to perform experiments resulting in the formation of many new synthetic compounds of a complex nature. He was awarded the Nobel prize for chemistry in 1913.

Werrenrath, Reinald (1883-), American baritone operatic singer, was born in Brooklyn, N. Y. He was educated at New York University and studied music under various eminent instructors in America. He made his debut in *Pagliacci* at the Metropolitan Opera House, New York, in 1919, later appearing with marked success in recitals and oratorios in leading American cities. He collected and edited *One Hundred Modern Scandinavian Songs.*

Wesley, Charles (1707-1788), English clergyman and hymn writer, was born at Epworth, England, and was associated with his brother John in the Methodist movement. He studied at Christ Church, Oxford, visited Georgia with his brother, and took an active part in the subsequent work in England. He was a clear and simple preacher and a man of fervent piety. He wrote many hymns, which were published in two volumes. Some of them are among the most admired in the English language.

Wesley, John (1703-1791), English preacher and founder of Methodism, was born at Epworth, Lincolnshire, England. When ten years of age, he was sent to school at the Charterhouse in London; at 17, he entered Christ Church College, Oxford; in 1725, he was ordained a deacon in the Church of England; and, in the following year, he was appointed Greek lecturer and moderator of the classics. In 1727, he obtained his M.A. degree and left Oxford to assist his father at Wroote. While serving there, he was advanced to priest's orders in 1728. He then returned to Oxford as a tutor and fellow of Lincoln College.

In 1735, Wesley accompanied General Oglethorpe to Georgia in order to preach as a missionary to the Indians and the colonists. On his return to England in 1738, already impressed with his own unworthiness and failure as a missionary, he became thoroughly convinced that he, who would have converted others, had not yet converted himself. Through the instruction of Bohler, a Moravian pietist, Wesley entered upon a session of prayer, and, on the evening of May 24, 1738, be became aware of a great change of religious feeling within him.

His first act after his conversion was to set out on a journey to the Moravian Brotherhood at Herrnhut in Saxony. He returned, burning with enthusiasm, and began field preaching at Kingswood near Bristol. His purpose was to awaken the spirit of religion slumbering within the Church, and it was rather an order than a sect that he designed to found.

Wesley discovered that he differed widely from the Moravians on the doctrine of Christian perfection and the means of grace, and the ensuing controversy between them terminated in a complete breach. His dispute with Whitefield, occasioned by the latter's doctrine of predestination, soon followed. The first of the societies that later grew into the Methodist Church was formed in 1740. Two years later, the members were divided into groups of 12, each group having a leader who reported to Wesley on the conduct of the members and on the receipt of money. Thus originated the class meetings, which formed a characteristic feature of the new denomination.

In 1744, Wesley summoned the first conference of the Methodist preachers. The Annual Conference became thereafter the governing body of the Methodist societies. Wesley's evangelization extended from England into Ireland in 1749 and to Scotland in 1751. In the latter year, he married a widow named Vazeille, from whom he was ultimately separated in 1771.

Wesley opened a school at Kingswood chiefly for the education of the sons of preachers; he founded an Orphans' Home at Newcastle, Charity Schools in London, and a dispensary at Bristol. During his unparalleled apostolate he traveled 250,000 miles and delivered 40,000 sermons, yet he managed to do a prodigious amount of literary work also. Probably no man ever exerted a greater influence on the religious condition of the people of England, and the organization which he founded spread to the remotest parts of the world. He died at London.

West, Benjamin (1738-1820), American historical painter, was born at Springfield, Pa. He began to paint at an early age, worked in Philadelphia and New York, studied in Italy, 1760-63, and then settled in England. In 1792, he succeeded Sir Joshua Reynolds as president of the Royal Academy. He exercised great influence as a teacher upon early American painters.

West, Rebecca (1892-), is the pen name of an English novelist and journalist, the daughter of a British army officer. Her maiden name was Fairfield, and she married Henry Maxwell Andrews, a banker. Such novels as *The Return of the Soldier*, *Harriet Hume*, and *The Thinking Reed* won her high rank as a writer of fiction. Her travel diary, *Black Lamb and Grey Falcon* (1941), based on a visit to Yugoslavia, is recognized as an unusually accurate piece of observation and description done on a massive scale. Articles which she wrote in reporting the postwar trial of "Lord Haw-Haw" were collected in a volume entitled *The Meaning of Treason*, and essays giving her views on the problems of guilt and punishment in our time are contained in the collection, *A Train of Powder*.

Westermarck (*vĕs'tĕr-märk*), **Edward Alexander, (1862-1939),** Finnish anthropologist, was born at Helsinki. Educated at the University of Finland, he was professor of moral philosophy there until 1890, when he went to England and taught sociology at the University of London from 1907 to 1930. For the next five years he was professor of philosophy at Turku University. His investigations into the history of marriage formed the point of departure for much of the anthropological studies in the succeeding half century. His conclusions were embodied in *The History of Human Marriage*. He wrote also *The Origin and Development of Moral Ideas* and *Marriage Customs in Morocco*.

Westinghouse, George (1846-1914), American inventor and manufacturer, was born at Central Bridge, N. Y. He served in the Union army, 1863-64; was assistant engineer in the United States navy, 1864-65; and then attended Union College to the end of his sophomore year. In 1868, he invented and successfully introduced the Westinghouse air brake, now in universal use. He made inventions in railway signals, steam and gas engines, steam turbines, and electrical machinery. He was the pioneer in introducing into America alternating-current machinery, which rendered possible the development of water power for long-distance electrical transmission. He was elected to the American Hall of Fame in 1955. See *Air Brake*.

Wharton, Edith Newbold (1862-1937), nee Jones, American novelist, was born in New York. She was educated privately and, in 1885, was married to Edward Wharton of Boston. Her first work of fiction, *The Greater Inclination*, 1899, was followed by a series of novels distinguished for subtle character analysis and for careful, finished style. Her works include *The Hermit and the Wild Woman, Glimpses of the Moon, The Mother's Recompense*, and *The Writing of Fiction*. She was elected to the American Academy of Arts and Letters in 1930.

Whipple, George Hoyt (1878-), American physiologist, was born at Ashland, N. H. After he was graduated from Yale and Johns Hopkins universities, he was attached as pathologist to a hospital in the Panama Canal Zone, 1905-07. After serving in a similar capacity at Johns Hopkins University until 1914, he went to the University of California and thence, in 1921, to the University of Rochester, where he became dean of the School of Medicine and Dentistry. For his studies in pathology and for contributions leading to the discovery in 1926 that a diet of liver has curative value in treating pernicious anemia, he received one-third the Nobel prize in medicine for 1934.

Whistler, James Abbott McNeill (1834-1903), painter and etcher, was born in Lowell, Mass. He studied drawing and painting in Leningrad and Paris, and, in 1863, he settled in London. In 1878, Whistler sued Ruskin for libel as a result of criticisms contained in the latter's *Fors Clavigera*. He obtained as damages one farthing and thereafter always wore the coin as a watch charm.

Whistler occupies a unique position in the development of art, embodying something of all the modern tendencies but remaining independent of them. He was a fine draftsman and a master of color value, resembled the Japanese in decorative quality, and imbued his work with subtle, dreamy, unreal effects. He won great distinction also as an etcher. He possessed a gift for keen satire, which he used unsparingly in debates with art critics. His most celebrated painting, "Portrait of My Mother," is in the Luxembourg, Paris. Of almost equal merit is his portrait of Carlyle, now in Glasgow. He was elected to the American Hall of Fame in 1930. See *Painting*.

White, Andrew Dickson (1832-1918), American educator and diplomat, was born in Homer, N. Y. He was graduated from Yale in 1853 and studied later at the University of Berlin. He was professor of history and of English literature at the University of Michigan from 1857 to 1863. In 1867, he became the first president of Cornell University, to which he gave $300,000 and a historical library of 30,000 volumes. He resigned the presidency in 1885. At different periods, he served as minister to Leningrad and as minister, and later ambassador to Berlin. His published works include *Warfare of Science with Theology, Seven Great Statesmen in the Warfare of Humanity with Unreason*, and *The Work of Benjamin Hale*. He was made a member of the American Academy of Arts and Letters in 1908.

White, Elwyn Brooks (1899-), American writer and editor, was born at Mt. Vernon, N. Y. After being graduated from Cornell University, he became a reporter but soon engaged in free lance writing, contributing articles regularly to *The New Yorker*, *Harper's Magazine*, and other periodicals. His miscellaneous articles, many of them written for *The New Yorker*, are distinguished for their urbane manner and genuine, unforced cleverness. He is the author of *One Man's Meat* and other books and is co-editor of *A Subtreasury of American Humor*.

White, Gilbert (1720-1793), English naturalist, was born at Selborne, Hampshire. In 1743 he was graduated from Oriel College, Oxford. Ordained in 1747, he became curate at Swarraton and later at Selborne and at Faringdon, a nearby parish. He spent his life in pastoral duties and in the study of nature. His charming *Natural History and Antiquities of Selborne* is an English classic, admired alike by masters of science and of literature.

White, Lawrence Grant (1887-1956), American architect, was born in New York City, the son of architect Stanford White. After study at Harvard University and the *Ecole des Beaux Arts* in Paris, he entered the firm of McKim, Meade and White, in which he became senior partner. He was president of the American Academy of Design and was a member of the Board of Trustees of the Metropolitan Museum of Art. Among his principal works are the Pennsylvania Railway Station in Newark, N. J., the Regimental Barracks on Governors Island, N. Y., and the Hotel National in Havana, Cuba. He is the author of *Sketches and Designs of Stanford White*, and of a translation of Dante's *Divine Comedy*.

White, Paul Dudley (1886-), American physician, was born at Boston, Mass. and received his education at Harvard College and the Harvard Medical School. The death of a sister from rheumatic fever turned his attention to the study of heart disease. After completing his internship at the Massachusetts General Hospital in Boston, he spent a year at the University College Hospital Medical School in London, working with leading specialists in cardiovascular disease. He was appointed resident in medicine at the Massachusetts General Hospital and became head of the Cardiac Clinic and Laboratory there. As a teacher at the Harvard Medical School and as one of the founders of the American Heart Association, he was already widely known in medical circles during the 1920's for his writings and lectures and for his pioneer work in the use of the electrocardiograph. He has become known to the general public chiefly through his service as consultant in the case of coronary thrombosis suffered by President Eisenhower in September, 1955.

In addition to numerous articles published in medical journals, he is the author of *Heart Disease* (first edition 1931, fourth revised edition 1951) and of *Heart Disease in General Practice* (1937). He is also co-author with Ashton Graybiel of *Electrocardiography in Practice*, which has appeared in three editions—1942, 1946, and 1952.

White, Stanford (1853-1906), American architect, was born in New York City. He was educated privately, studied architecture under C. D. Gambrill, and later worked under H. H. Richardson, being the latter's chief assistant in erecting Trinity Church, Boston. In 1879, he became a member of the firm of McKim, Mead, and White. White designed Madison Square Presbyterian Church, Washington Arch, and buildings of New York University, New York; buildings of the University of Virginia; pedestals and settings for numerous statues; and many private residences. He was killed by H. K. Thaw.

White, William Allen (1868-1944), American journalist and author, was born at Emporia, Kans., and was educated at Emporia College and at the University of Kansas. Devoting himself to journalism, he became, in 1895, editor and proprietor of the Emporia *Gazette*, which he made notable among the small papers of the United States. His "What's the Matter with Kansas?," published in 1896, was widely reprinted and, with other virile, picturesque editorials, gave him a national reputation. His writings include *The Real Issue, The Court of Boyville, In Our Town, A Certain Rich Man, Masks in a Pageant*, and biographies of Woodrow Wilson and Calvin Coolidge.

Whitehead, Alfred North (1861-1947), mathematician and philosopher, was born at Ramsgate, Eng. He was graduated from Cambridge University in 1887 and taught

mathematics there until 1911. He was called to the University of London, where he was professor of mathematics from 1914 until 1924, and then served as professor of philosophy at Harvard University, 1924-36.

Like Bertrand Russell, with whom he collaborated in writing *Principia Mathematica*, Whitehead proceeded from the fundamentals of mathematical reasoning to an interest in the principles underlying other fields of thought, as is indicated by the titles of his more important books. These include *A Treatise on Universal Algebra, The Organization of Thought, The Concept of Nature, Science and the Modern World, Religion in the Making, The Aim of Education*, and *Modes of Thought*.

Whiteman, Paul (1890-), American jazz conductor, was born at Denver, Colo. He first played the viola with the San Francisco Symphony and later in Victor Herbert's orchestra. In World War I he was a navy bandsman, and afterward in 1919 organized his own jazz band in Los Angeles. Ferde Grofe made special arrangements for him. Very popular among Whiteman's first recordings were "Whispering" and "Japanese Sandman." His greatest triumph came when he asked George Gershwin to write a symphonic jazz piece for him and Gershwin responded with his concerto for piano and orchestra, "A Rhapsody in Blue," which Whiteman conducted at the Aeolian Hall in New York in 1924, with the composer as soloist. Whiteman is one of America's top-ranking radio and television conductors.

Whitlock, Brand (1869-1934), American municipal reformer, diplomat, publicist, and novelist, was born at Urbana, Ohio. He was educated in the public schools and at an early age entered journalism. Later he studied law and, in 1894, was admitted to the bar, establishing a successful practice in Toledo. He became widely known for his vigorous writings exposing corrupt political and unfair economic conditions. He was four times elected mayor of Toledo. In 1913 he was appointed minister to Belgium.

Following the outbreak of World War I, Whitlock achieved international reputation for tact, vigor, and efficiency in handling problems of great difficulty, and notably facilitated the work of Belgian relief. He wrote his experiences in *Belgium, a Personal Narrative*. His other writings include *Her Infinite Variety, On the Enforcement of Law in Cities*, and *La Fayette*. He was elected to the American Academy of Arts and Letters in 1918.

Whitman, Walt (1819-1892), American poet, was born at West Hills, L. I. He learned the printing trade, taught school, and wrote for newspapers and magazines. Later he was a newspaper publisher and editor, practiced carpentry, built and sold houses, and traveled extensively on foot.

In 1855 appeared his first collection of *Leaves of Grass*, to the elaboration of which chiefly he devoted the remainder of his life. This work attracted attention first as a result of Emerson's recognition of its merit. It is largely unmetrical, but, for richness of poetic imagination, some of it is unexcelled in American literature. His *Drum Taps*, 1865, recalls the poet's experiences while an army nurse at Washington in the Civil War period.

Although a glorification of democracy and of the average man, Whitman's poetry has not been popular, mainly on account of its express defiance of literary and other conventions. He has long been recognized, however, by European and other critics as one of the outstanding figures in American literature. He was elected to the American Hall of Fame, 1930.

Whitney, Eli (1765-1825), American inventor, was born in Westboro, Mass. He was graduated from Yale, 1792; went to Georgia; and, for a time, read law, while living on the plantation of the widow of Nathanael Greene. Here he invented the cotton gin, from which, however, he realized but little financial profit on account of expensive litigation growing out of the claims of imitators and general disregard of his patents in the Southern states. The Carolinas voted him a moderate compensation. Between 1791 and 1803, the cotton exports were multiplied by 200, largely as a result of the use of Whitney's gin.

In 1798 he became successfully engaged in the manufacture of firearms at factories which he established at Whitneyville, near New Haven, Conn. He was elected to the American Hall of Fame in 1900.

Whittier, John Greenleaf (1807-1892), American poet, was born of Quaker parents at Haverhill, Mass. He learned the shoemaking trade, but early began to write for the press. In 1831, he published his first work, *Legends of New England*, in prose and verse. After editing several papers, he went to Philadelphia to edit the *Pennsylvania Freeman*, an Antislavery paper, the office of which was burned by a mob, 1838. In 1840, he settled at Amesbury, Mass.

Distinguished by simplicity and sincerity, Whittier ranks with the foremost American poets. Among his best-known poems are "Barbara Frietchie," "The Barefoot Boy," "Maud Muller," "The Eternal Goodness," "The Pipes at Lucknow," and some that have been set to music as hymns. He was elected to the American Hall of Fame in 1905.

Wiclif (*wĭk'lĭf*), **John (c. 1320-1384)**, English religious reformer, was born probably near Richmond, in Yorkshire. Studying first at Oxford, he attained a high reputation in theology and logic. He was made master of Balliol and warden of Canterbury Hall. Taking orders, he became rector of neighboring parishes and later was made king's chaplain.

Wiclif insisted boldly on the right of the individual to form his own opinions on the basis of Scripture and reason. Attacking abuses of the Church, he was condemned as a heretic. He suffered no harm, however, since he had made himself a champion of the nation in providing a logical ground for refusing dues claimed by the pope, then residing in France.

He devoted himself to translating the Scriptures, and the Wiclif Bible was the first complete translation of the book into English. Copies of the translation were expounded by followers of Wiclif, who were known as Lollards. Their doctrines were later carried to Bohemia and bore fruit in the teaching of Huss and Jerome. Wiclif is often called the morning star of the Reformation.

Wieland (*vē'lănt*), **Christopf Martin (1733-1813)**, German poet, was born near Biberach, Württemberg. He studied at Tübingen and at Zurich, returning to Biberach in 1760. In 1767, he published the partly autobiographical novel *Agathon*, which did much to establish his literary reputation. After attaining a professorship at Erfurt, 1769, he wrote *Der goldene Spiegel*, a philosophical novel, which so pleased the Duchess of Weimar that she made him tutor to her sons, 1772. With Goethe, Herder, and Schiller, Wieland was a member of the group which for decades made Weimar the Athens of Germany. His numerous works include also *Geron der Adelige*; *Oberon*, his best-known epic; and *Die Abderiten*.

Wiener, Norbert (1894-), American mathematician, was born at Columbia, Mo. A child prodigy, he was graduated from Tuft's College at the age of 15, and while still in his teens earned his Ph.D. degree at Harvard. After studying abroad, he began in 1919 to teach mathematics at the Massachusetts Institute of Technology, where he has been a full professor since 1932. A brilliant contributor to the science of mathematics, he is best known for his formulation of the principles of cybernetics (from a Greek word meaning steersman), which Wiener coined to describe the comparative study of the control and communication system in the human mind and nervous system with that of such mechanical devices as computing machines and other electronic mechanisms. He is the author of *The Fourier Integral and Certain of Its Applications* (1933); *Fourier Transforms in the Complex Domain* (1934); *Cybernetics* (1948); *The Human Use of Human Beings* (1950); and *Ex-Prodigy* (1953), besides many mathematical papers.

Wiggin, Kate Douglas (1859-1923), American author and educator, was born in Philadelphia, Pa. She was graduated from Abbott Academy, Andover, Mass., 1878, and went to California, where she became a successful teacher and organized the first free kindergarten on the Pacific Coast. In 1880, she was married to S. B. Wiggin, a California lawyer, who died in 1889. Following her marriage to G. C. Riggs, 1895, she resided in New York and Maine.

Her first literary success was *The Birds' Christmas Carol*, 1888. Other widely popular stories followed, including *A Cathedral Courtship, Penelope's English Experiences, The Diary of a Goose Girl, Rebecca of Sunnybrook Farm, Mother Carey's Chickens, Penelope's Postscripts*, and *Homespun Tales*. She wrote her autobiography, *My Garden of Memory*, shortly before her death.

Wilberforce, William (1759-1833), English statesman and philanthropist, was born at Hull. He was educated at Saint John's College, Cambridge, and, at 21, entered Parliament as the representative of his native town. His Parliamentary career lasted until 1825. In 1789, he first proposed in the House of Commons the abolition of the slave trade, and, with the aid of Charles James Fox, this measure was carried in 1807. He afterward devoted himself to a movement for the extinction of slavery, the bill being finally passed a few days before his death. He was buried in Westminster Abbey.

Wilde, Oscar O'Flahertie Wills (1856-1900), British dramatist, essayist, and poet, was born in Dublin. After distinguishing himself in the classics at Trinity College, Dublin, he went to Oxford in 1874 and made a brilliant intellectual record. While at Oxford he was the leader of the so-called æsthetic movement, which emphasized the "art for art's sake" dictum of Whistler. He was satirized for this activity in the character Bunthorne in Gilbert and Sullivan's *Patience*.

Beginning in 1884, he devoted his attention to writing poetry, essays, stories, and plays. In 1888, he produced a

volume of charming fairy tales entitled *The Happy Prince*, which was followed by *The House of Pomegranates* and by *The Picture of Dorian Gray*, a novel of sparkling literary cleverness. He wrote the poetic plays *The Duchess of Padua*, *A Florentine Tragedy*, and *Salomé*, but his chief contribution to literature consists of the prose comedies *Lady Windermere's Fan*, *A Woman of No Importance*, and *The Importance of Being Earnest*. For ingenuity, cleverness, and wit these plays are unsurpassed in modern times. His *Ballad of Reading Gaol* and *De Profundis* are the literary result of two years spent in prison after conviction on a charge of immorality.

Wilder, Thornton Niven (1897-), American novelist, was born at Madison, Wisc. Educated at Yale University, the American Academy in Rome, and Princeton University, he taught school at Lawrenceville, N. J., from 1921 to 1928. Meanwhile he began writing novels in which were combined ingenious plots and a style of languid charm. His *Bridge of San Luis Rey* and *Skin of Our Teeth* received Pulitzer prize awards. Among his other works are *The Woman of Andros*, *Heaven's My Destination*, and *The Merchant of Yonkers*. He was made a member of the American Academy of Arts and Letters in 1952.

Wiley, Harvey Washington (1844-1930), American chemist and food analyst, was born near Kent, Ind. He was primarily responsible for the enactment of the Federal Pure Food and Drug Act of 1906 and thereafter largely responsible for its administration. He was state chemist of Indiana from 1874 to 1883, and the Department of Agriculture's chief chemist from 1883 to 1912. Beginning in 1899, he was for many years professor of agricultural chemistry at George Washington University, Washington, D. C. Dr. Wiley wrote extensively on agricultural chemistry and the adulteration of foods. In 1956 the United States government issued a three-cent stamp bearing a portrait of Dr. Wiley, to commemorate the 50th anniversary of the passage of the Pure Food and Drug laws.

Wilhelmina (*vĭl'hĕl-mē'nä*), **Helena Pauline Maria, (1880-)**, queen of the Netherlands, was born at The Hague. She succeeded to the throne of the Netherlands on the death of her father in 1890, although she did not become of legal age until 1898, when she was crowned queen. In 1901, she married Duke Henry (died, 1934), youngest son of the Grand Duke of Mecklenburg Schwerin. When Germany overran the Netherlands in 1940, Wilhelmina escaped with her children to England, returning in May 1945. In September, 1948, Queen Wilhelmina abdicated in favor of her daughter Juliana (born 1909), who had previously acted as regent during her mother's illness.

Wilkes, Charles (1798-1877), American naval officer and explorer, was born in New York City. Entering the navy as a midshipman, 1818, he rose until, in 1830, he became head of the Department of Charts and Instruments. From 1838 to 1842, he commanded, and later wrote an account of, an important exploring expedition, during which he visited the antarctic regions, many groups of islands in the Pacific, and the coasts of California and Oregon.

During the Civil War, he commanded the sloop *San Jacinto*. On Nov. 8, 1861, he stopped the British mail steamer *Trent* and removed the two Confederate envoys, Mason and Slidell, thereby precipitating the Trent affair. Wilkes was made commodore in 1862 and retired, 1866, as rear admiral. His publications include *Western America* and *The Theory of the Winds*. See *Trent Affair*.

Wilkins, Sir George Hubert (1888-), Australian explorer, was born at Mt. Bryan East, S. Australia. Studying engineering at the Adelaide School of Mines, he took up aerial photography. He participated in Stefansson's Canadian arctic expedition, 1913-17, was airplane photographer in World War I, and, in 1923-25, led an expedition into unexplored parts of Australia. He then commanded expeditions both to the arctic and antarctic regions sent by American newspapers and other interests, in the course of which he made numerous corrections in the accepted views of the land and sea configurations in the polar regions.

Wilkins, Mary E. See *Freeman, Mary Eleanor Wilkins*.

Willard, Emma Hart (1787-1870), American educator, was born at Berlin, Conn. She was educated at Hartford Academy and, in 1809, married Dr. John Willard. She established a girls' boarding school at Middlebury, with improved methods of teaching. Partly with state support, she established at Waterford, N. Y., a girls' seminary, which was removed in 1821 to Troy and became well known as the Troy Female Seminary and later as the Emma Willard School. In 1830, she traveled in Europe, and, by her efforts, a school for the training of women teachers was founded in Greece. Among her books are *History of the United States*, *Universal History in Perspective*, *Last Leaves of American History*, and a book of poems, of which the best known is "Rocked in the Cradle of the Deep." She was elected to the American Hall of Fame in 1905.

Willard, Frances Elizabeth (1839-1898), American educator and reformer, was born in Churchville, N. Y. After some years spent in teaching, she became professor of æsthetics in Northwestern University and was made dean of the Woman's College in 1871. She began active temperance work in 1874 as secretary of the National Woman's Christian Temperance Union; in 1879, she was made president of that organization and held the office for nearly 20 years. She founded the World's Woman's Christian Temperance Union in 1883 and, in 1888, became its president.

She was an orator of great eloquence, humor, and power, possessing marked executive ability and a genius for organization. Besides many magazine articles and pamphlets, her writings include *Woman and Temperance and Glimpses of Fifty Years*. She was elected to the American Hall of Fame in 1910. See *Woman's Christian Temperance Union*.

William I (1027-1087), commonly called "the Conqueror," king of England, was born in Normandy. He was the illegitimate son of Robert the Devil, Duke of Normandy, and succeeded to the dukedom in 1035. He laid claim to the sovereignty of England on the death of Edward the Confessor, claiming title to it under the will of that monarch. Harold having assumed the crown, William invaded England in 1066, defeated and slew Harold at the battle of Hastings.

During his reign the feudal system was developed in England, the forest and game laws were introduced, and a survey was made the results of which are embodied in the *Domesday Book*. Possessed of remarkable ability, he ruled strictly, kept excellent order, and won success by his own exertions. He died while waging war with Philip I of France.

William I (1533-1584), called "the Silent," Prince of Orange and Count of Nassau, founder of the Dutch Republic, was born in Dillenburg. At the age of 15, he became page to the Emperor Charles V, who, in 1555, promoted him to the command of the Imperial army on the French frontier.

William opposed Philip's persecution of the Protestants in the principality of Orange, the government of which he had inherited, and in several provinces, of which he had become stadholder. He was compelled to flee to Germany on the approach of Philip's representative, the Duke of Alva, who seized William's property and took his son to Spain as a hostage.

William joined the Huguenots in France, and, in 1572, several Dutch cities chose him as their prince to defend them against the Catholic monarch Philip. The massacre of Saint Bartholomew and numerous Spanish victories drove William to desperate straits, and he was able to save Leiden for the Protestant cause only by cutting the dikes, thus permitting a relieving fleet to approach the besieged city. In 1576, five provinces that had been loyal to Spain joined William, but, in 1578, their forces were defeated at Gembloux by Alva's successor, John of Austria. The Walloon provinces were detached from the Protestant cause, but, in 1579, a league was formed that successfully defended itself against Spain. It comprised the provinces of Holland, Zealand, Utrecht, Friesland, Gelderland, Groningen, and Overyssel. These provinces declared their independence in 1581 and were later organized as the Dutch Republic.

William is known as one of the earliest champions of religious toleration. His sagacity and persevering courage made him a leader in one of the most desperate enterprises that ever led to the foundation of a nation. A price of 25,000 crowns was placed on his head by Philip of Spain, and he was assassinated.

William I (1797-1888), king of Prussia and emperor of Germany. He joined the army at an early age and was engaged in the campaigns of 1813-14 against France. On the coronation of his brother Frederick William IV in 1840, he became governor of Pomerania, and afterward sat in the Prussian diet, where he vigorously supported the Absolutist party. In consequence, he was so disliked by the people that, on the outbreak of the revolution of 1848, he fled to England, though he returned some months later and was elected to the National Assembly.

In 1857, William was commissioned regent, and, in 1861, he ascended the throne. He found in Bismarck an able minister who could rule without a Parliamentary majority. In the Franco-Prussian War, 1870-71, William commanded at the decisive battles of Gravelotte and Sedan and, in 1871, was proclaimed emperor of Germany in the palace at Versailles.

William II, Friedrich Wilhelm Viktor Albert (1859-1941), emperor of Germany, eldest son of Frederick III and Victoria, princess royal of England. Upon succeeding his father in 1888, he took much interest in social questions, and his strong initiative in political affairs brought about the dismissal of Prince Bismarck in 1890. His ability and aggressiveness did much to place Germany in the foremost rank of the world powers. His grandiose and militant speeches, on the other hand, did much to foster sentiments which made it easy to precipitate World

War I. His support of Austrian aggression against Serbia in 1914 and his flagrant violation of Belgian neutrality were among the most effective causes of that stupendous conflict. On the defeat of Germany and the resulting revolution in 1918, William abdicated and fled to the Netherlands, where he remained as a refugee until the German conquest of that country in 1940.

William III (1650-1702), former king of England, was born at The Hague. He was the posthumous son of William II of Orange and, through his mother, was a grandson of Charles I of England. In 1678, being then stadholder of the Netherlands, he went to England, and married Mary, a daughter of the Duke of York, afterward James II. In 1688, he landed with a Dutch army at Torbay, in Devonshire, and was soon after invited by the English Parliament to accept the throne which James had vacated. In April 1689, he was crowned, together with his wife, Mary, with whom he reigned jointly until her death in 1694. In 1690, he defeated James at the battle of the Boyne. He afterward engaged in a war with France, which was ended by the Treaty of Ryswick, 1697.

Williams, Sir George (1821-1905), founder of the Young Men's Christian Association, was born in Somersetshire, England. In 1841, he began work for a London dry goods firm. Two years later, he induced some of the employees to hold prayer meetings at regular intervals. In June 1844, he, with eleven others, formed a society under the name of Young Men's Christian Association, and to Williams belongs the chief credit for its organization. After serving as treasurer of the society from 1863 to 1885, he was made president. In 1894, he was knighted.

Williams, Roger (c. 1604-1683), English colonist and founder of Rhode Island, was born probably in London. He was educated at Cambridge and was ordained a clergyman of the Church of England; but, having embraced Puritan views, he emigrated to New England in 1631 and was assistant pastor at Plymouth from 1631 to 1663, when he became pastor at Salem.

For his insistence on religious liberty, he incurred the opposition of the government; was banished from the colony in 1635; and, in 1636, founded Providence, R. I., with a government based on complete toleration. Here, with eleven others, he founded the first Baptist Congregation in America, 1639. The uniform justice and kindness with which he treated the Indians is frequently referred to in the records of the time. His chief written work is *The Bloudy Tenent of Persecution for Cause of Conscience Discussed.* He was elected to the American Hall of Fame in 1920.

Williams, Tennessee (1914-), American playwright originally named Thomas Lanier Williams, was born at Columbus, Mississippi. He was educated at the University of Missouri, Washington University (St. Louis), and the University of Iowa. Among his successes are *The Glass Menagerie* (1944); *A Streetcar Named Desire* (1947), which won the Pulitzer prize and the Drama Critics' Circle award; *Summer and Smoke* (1949); *The Rose Tattoo* (1951); and *Cat on a Hot Tin Roof* (1955), for which he again received the Pulitzer prize. In 1956 he published *In the Winter of Cities,* a collection of all his poems he wished to preserve.

Williams, William Carlos (1883-), writer and physician, was born in Rutherford, New Jersey. Before receiving his M. D. degree at the University of Pennsylvania in 1906, he studied at Geneva, Switzerland, and afterward at Leipsig. A practicing physician at Rutherford since 1910, he is the author of numerous books of essays, novels, short stories, and poems. Chiefly known as a poet, he was at first a follower of the imagist school of Ezra Pound and Amy Lowell, but by degrees developed his own vein of free verse. The first volume of his long poem in four books on a new New Jersey city entitled *Paterson* appeared in 1946, the last volume in 1951.

Willingdon, Freeman Freeman-Thomas, Viscount (1866-1941), British administrator. He was educated at Eton and Cambridge with a political career in view. Elected to Parliament in 1900, he became junior lord of the treasury in 1905, serving until 1912, when he was made governor of Bombay. He occupied the governorship of Madras from 1919 to 1924; in 1926, was made governor-general of Canada in succession to Lord Byng of Vimy; and, from 1931 to 1936, was viceroy of India. He was buried in Westminster Abbey.

Willkie, Wendell Lewis (1892-1944), American industrialist and politician, was born at Elwood, Ind. Educated at Indiana University, he practiced law at Elwood, Ind., and later at Akron, Ohio. Showing ability in the organization of electric power companies and in advising them as to public relations, he was chosen as president of Commonwealth and Southern Corporation in 1933. He directed litigation and a publicity campaign against the Tennessee Valley Authority. The campaign proved unsuccessful but recommended him as a leader against the New Deal.

In 1940, without obtaining delegates pledged to him, he was nominated as Republican candidate for the presidency of the United States. He conducted an extremely vigorous campaign, relying on himself rather than the party. He was defeated by an electoral vote of 82 against Roosevelt's 449 but continued to express his views on public questions. In the summer of 1942 he traveled around the world, recording his impressions in *One World.* In 1944, the Republican convention ignored him.

Wilson, Alexander (1766-1813), American ornithologist, was born at Paisley, Scotland. Coming to the United States in 1794, he taught school until 1802. Settling near Philadelphia, he became acquainted with the naturalist William Bartram and determined to illustrate the ornithology of the United States. In 1804, he traveled through the wilderness to Niagara, making collections, and described the journey in a poem entitled *The Foresters.* From 1808 until his death, Wilson published seven volumes of *American Ornithology.* He ranks with Audubon among the founders of American ornithology.

Wilson, Allen Benjamin (1824-1888), American inventor, was born in New York. His trade was that of cabinetmaker; but he turned his attention to the problem of mechanical sewing. In 1849, he constructed a sewing machine which contained a device by means of which the material was carried forward by a feeding plate, so that an endless seam could be made at any curve. In 1850, he improved this feature by the principle of the now universally used four-motion feed. At this time he added also the rotary hook and the stationary bobbin. During the same year, he began the manufacture of sewing machines at Bridgeport, Conn. See *Sewing Machines.*

Wilson, Charles Erwin (1890-), business executive and government official, was born at Minerva, Ohio. After he was graduated from Carnegie Institute of Technology in 1909, he worked as an electrical engineer for Westinghouse; later he joined the Delco Remy Company, a General Motors subsidiary, and in 1941 was made president of General Motors. In 1953 President Eisenhower named him secretary of defense.

Wilson, Edmund (1895-), American editor and critic, was born at Red Bank, N. J. Following his graduation from Princeton University, he was a reporter for *The New York Evening Sun,* became Managing Editor of *Vanity Fair,* then Associate Editor of *The New Republic* and later book reviewer for *The New Yorker.* His literary and social criticism is noted for directness and sometimes disturbing frankness. His travel sketches in the volume *Europe without Baedeker* were praised or condemned according to differing points of view, but they were read with interest in either case. Another controversial book was the group of satiric stories contained in his *Memoirs of Hecate County.* Provocative criticism is found in his book *Axel's Castle.*

Wilson, James (1835-1920), American agriculturist, was born in Ayrshire, Scotland. He came to the United States in 1851 and, in 1855, went to Tama County, Iowa, and engaged in farming. He rose to prominence as a member of the Iowa legislature and of Congress and lectured six years at Iowa Agricultural College. In 1897, he was appointed secretary of agriculture, and served continuously for 16 years. During his administration a national forest policy and a system of soil survey were inaugurated, and the work and influence of the department expanded.

Wilson, (Thomas) Woodrow (1856-1924), American educator, publicist, historian, statesman, and 28th president of the United States, was born at Staunton, Va. He was graduated from Princeton University in 1879, and later studied at the University of Virginia and at Johns Hopkins University. He practiced law in Atlanta, Ga., in 1882-83; became associate professor of history and political economy at Bryn Mawr College in 1885; held a similar chair at Wesleyan University from 1888 to 1890; and, in the latter year, was appointed professor of jurisprudence and political economy at Princeton. He was made president of the university in 1902 and continued to act until 1910, when he entered politics and was elected governor of New Jersey for the term 1911-13. In 1912, he was elected Democratic president of the United States, and was re-elected in 1916.

Presidential Administration. In his administration, Wilson frequently appeared in person to address joint sessions of Congress on matters of importance, this reviving a custom long in disuse. He enjoyed at first a marked personal ascendancy in Congress. Three amendments to the Constitution were made in his terms of office—the 17th, providing for the direct popular election of senators; the 18th, or Prohibition Amendment; and the 19th, extending the right of suffrage to women. He opposed the two latter ones. Other events of his administration were the Underwood Tariff Act, the Clayton Anti-trust Law, the establishment of the Federal Reserve banks, the repeal of the Panama Canal tolls, the Workman's Compensation Act, the Eight-hour Railway Wage Law, the purchase of the

Virgin Islands, a punitive expedition into Mexico, and participation of the U. S. in World War I.

Part in World War. Although Wilson made world peace his ideal and was awarded the Nobel peace prize for 1919, yet, by the force of events, he became one of the great war presidents. On the outbreak of the war in 1914, he adopted a policy of strict neutrality. Continued provocation on the part of Germany, especially the sinking of the *Lusitania* in 1915 and the prosecution of unrestricted submarine warfare in direct violation of promises made to the United States government, roused public indignation and led to America's declaration of war against Germany. Wilson at once took steps to unify and centralize all services looking to the efficient prosecution of hostilities. At the same time, by his vigorous idealistic leadership, he rallied the national spirit to a point of effective enthusiasm seldom paralleled in the history of a great nation. He stated in his fourteen points the general terms on which America would be willing to cease hostilities, and, when the Germans were defeated in 1918, their government appealed to Wilson regarding terms for an armistice. The Allies agreed, with reservations, to an armistice on the basis of the fourteen points.

Efforts for Enduring Peace. Wilson went to Paris in 1919 to help negotiate the Treaty of Versailles, to which, mainly through his influence, was attached the covenant of the League of Nations. Wilson is thus to be regarded as the chief founder of the League of Nations, although, on his return to Washington, he found Congress unwilling to join the League or to ratify the treaty. He appealed for popular support, setting out on a speaking tour through the country; but his strength had been overtaxed by his efforts of the preceding years, and, in September 1920, he suffered a collapse, from which he never completely recovered. Among the published works of Woodrow Wilson are *A History of the American People*, *The New Freedom*, and *International Ideals*. He was elected to the American Academy of Arts and Letters in 1908. In his honor was organized, in 1922, the Woodrow Wilson foundation, which awards annually a peace prize of $25,000.

Winchell, Walter (**1897-**), American newspaperman, was born in New York City. He went on the stage at the age of 13, playing the vaudeville circuits. His journalistic career began in 1922 when he started writing a column for *Vaudeville News*. Two years later he joined the staff of the *Daily Graphic*, a New York tabloid newspaper, which he served as columnist, dramatic critic, and amusement editor. In 1929 he became columnist of the New York *Mirror*, a position he still holds. His daily column of lively telegraphic gossip and pungent comments on the news is a widely syndicated American newspaper feature. Winchell is also famous for his Sunday night radio broadcasts. In 1956 he launched his own TV program.

Windaus (*vĭn'dous*), **Adolf** (**1876-**), German chemist. Becoming interested in the investigation of vitamins, he succeeded, while director of the chemical laboratory at the University of Göttingen, in explaining the nature of the chemical substance from which the antirachitic vitamin D is derived. This achievement was signalized by the award of the Nobel prize in chemistry for 1928. He crystallized vitamin D in 1931.

Winthrop, John (**1588-1649**), first governor of Massachusetts Colony, was born at Edwardston, Suffolk, England. He became a lawyer; and, in 1626, was appointed attorney in the court of wards and liveries.

When, in 1629, the London proprietors of the Massachusetts Company decided to transfer the seat of government to the New World, they chose Winthrop governor.

In 1630, he arrived at Salem, Mass., with eleven ships and 900 colonists, removing soon afterward to Charlestown and thence to Boston, which they founded in the same year. He was governor for a total of about 12 years and exercised a powerful influence. His *Journal* is one of the most important sources of early American history.

Wirt, William Albert (**1874-1938**), American educator, was born at Markle, Ind. He was graduated from DePauw University and studied also at the University of Chicago. While superintendent of schools at Bluffton, Ind., 1899-1907, and later at Gary, Ind., he developed methods known as the Gary system, among the chief features of which are the economical use of the school plant, which is kept open evenings, Saturdays, and part time during vacations; combination of elementary and high schools in the same building; and provision for recreation and social centers for parents. The system or modifications of it was later known as "platoon schools."

Wise, Stephen Samuel (**1872-1949**), Jewish rabbi, was born at Budapest, Hungary. Coming to America at an early age, he studied in the College of the City of New York and, in 1901, was graduated from Columbia University. He was a pastor of synagogues in New York and Portland, Oreg., until 1907, when he founded, and became rabbi of, the Free Synagogue in New York. He founded the Oregon State Conference of Charities and Correction and was founder of the first section of the Federation of American Zionists. He became a leader of American liberal thought and an outstanding figure in charitable causes.

Wister, Owen (**1860-1938**), American author, was born in Philadelphia, Pa. He was graduated from Harvard, studied law, and was admitted to the bar in 1889. Beginning in 1891, he devoted himself chiefly to literature and won wide popularity by his stories, particularly those descriptive of Western life. Besides short stories and verse, his writings include *Red Men and White*, *The Virginian*, and *When West Was West*. He was elected a member of the American Academy of Arts and Letters in 1912.

Witte (*vĭt'ĕ*), **Sergei Yulievitch, Count** (**1849-1915**), Russian statesman, was born at Tiflis. He was educated at Odessa, entered the railway administration, and first gained distinction by his clever organization of the transport of troops in the war of 1877-78. In 1903, he was made president of the committee of ministers; was one of the Russian plenipotentiaries in the negotiations for peace with Japan in 1905; and was the first prime minister of Russia. He resigned in 1906. His writings include *The Principles of Railway Rates* and *Friedrich List, Economist*.

Wodehouse (*wo͝od'hous*), **Pelham Grenville** (**1881-**), British humorist, whose amusing novels and short stories are as much appreciated in America as in England, was born at Guildford and educated at Dulwich College. Outstanding in the gallery of Wodehouse characters are Psmith, Bertie Wooster and his inimitable valet, Jeeves, and Mr. Mulliner, all of them ludicrously exaggerated British types. He has also had a hand in writing eighteen musical comedies, most of them produced in America, and has collaborated in writing several plays. Wodehouse was captured by the Germans in France in 1940 and was confined for a while in a prison camp.

Wöhler (*vû'lĕr*), **Friedrich** (**1880-1882**), German chemist, was born near Frankfort on the Main. He studied at the universities of Marburg and Heidelberg; worked under Berzelius at Stockholm; and, in 1836, became professor of chemistry at Göttingen. Wöhler was one of the founders of organic chemistry. In 1828, by laboratory methods, he produced urea, the first organic compound made artificially without the agency of life. He discovered isomerism, and the nickel industry was founded through his invention of a process for producing the pure metal on a large scale. He was the first to produce calcium carbide (1862), from which acetylene is made.

Wolfe, James (**1727-1759**), English general, was born in Westerham, Kent. His first service was in Flanders, where he took part in the battle of Dettingen; in Scotland, he was in the battles of Falkirk and Culloden. His skill and bravery at the attack of Louisburg, 1758, won him the title of "hero of Louisburg." In the final effort to drive the French out of Canada, Pitt gave the command of the invading army to Wolfe. His successful attack on Quebec, September 13, 1759, was one of the most famous exploits in Canadian colonial history. Though defeated in his first attempt, he scaled the cliffs with his army by night, and died in the moment of victory, while his brave antagonist, Montcalm, dying too, said, "It is a great consolation to have been vanquished by so brave an enemy."

Wolfe, Thomas Clayton (**1900-1938**), American novelist, was born at Asheville, N. C. After he was graduated from the University of North Carolina in 1919, he studied drama at Harvard and traveled and studied in Europe. Back in the U. S., he was instructor in English at New York University until 1930, when the success of his *Look Homeward, Angel* enabled him to devote himself solely to writing. In that book, as in *October Fair*, he produced fiction of great power. *The Web and the Rock* and *You Can't Go Home Again* were published after his death.

Wollaston (*wo͝ol'ă-stŭn*), **William Hyde** (**1766-1828**), English chemist and natural philosopher, was born at East Dereham, Norfolk, and was educated at Cambridge. He discovered how to work platinum on a practical scale and first detected the metals palladium and rhodium. He was the first to observe the dark lines in the solar spectrum, 1802. In 1809, he invented the reflecting goniometer and, in 1812, the camera lucida. He furnished the "Wollaston Doublet" to microscopists and adapted concavo-convex lenses for oculists' use.

Wolsey (*wo͝ol'zĭ*), **Thomas** (**c. 1475-1530**), English statesman and cardinal, was born at Ipswich. He was the son of a butcher, and was educated at Magdalen College, Oxford, where he was graduated at 15. Ordained priest in 1498, he rose rapidly and was introduced at the English court, where he gained the esteem of Henry VII and, in 1509, was made dean of Lincoln. After the accession of Henry VIII, he was appointed archbishop of York in 1514 and became cardinal in 1515. The king elevated him to the position of lord chancellor and prime minister.

For about 15 years, he was one of the foremost men in Europe, enjoying great wealth and honor. Among his

other acts, he founded and endowed Christ College, Oxford. In 1529, he was commissioned by Henry to procure from the pope the annulment of the royal marriage with Catherine of Aragon. Failing in the attempt, Wolsey was driven from the court and, in 1530, was arrested on a charge of high treason and died on his way to London.

Wood, Grant (1892-1942), painter, was born on a farm at Anamosa, Iowa, of Quaker ancestry. His early inclination toward art was encouraged by studies in the Handicraft Guild of Minneapolis and the Chicago Art Institute. He worked with the army's camouflage division in World War I, then studied at the Academy Julian in Paris. He returned to Iowa and began to paint people and scenes. Such portrayals of the Midwestern scene as "Woman with Plants," "Young Corn," "Dinner for Threshers," and the famous "American Gothic" are typical. In his classes at the University of Iowa and in his pamphlet, *Revolt Against the City,* he advocated the founding of regional art centers to encourage the development of a native art in America.

Wood, Leonard (1860-1927), American soldier and administrator, was born at Winchester, N. H., and was graduated from Harvard Medical School. He was President McKinley's personal surgeon and became the close friend of Theodore Roosevelt. On the outbreak of the Spanish-American War in 1898, Wood was associated with Roosevelt in raising and leading the famous regiment of "Rough Riders." For his conduct in this war, he became major general. He acted as military governor of Cuba, 1899-1902. He served later as a governor in the Philippines and, returning to America in 1908, was chief of staff until 1914.

His advocacy of preparedness brought him into disfavor with the administration, and he held inferior commands during World War I. He was governor-general of the Philippines from 1921 to 1927. His writings include *The Military Obligation of Citizenship, Our Military History,* and *Universal Military Training.*

Woolf, Virginia (1882-1941), English novelist, was the daughter of Sir Leslie Stephen. In 1912, she married Leonard Sidney Woolf, editor and author, and with him established the Hogarth Press. She was an exponent of the "stream of consciousness" novel, in which her psychological subtlety and artistry in language made her an outstanding figure. Her *Flush* is the autobiography of Elizabeth Barrett Browning's spaniel. Besides *The Common Reader* and other works of literary criticism, her books include *Night and Day, A Room of One's Own,* and *Roger Fry: a Biography.* She drowned herself after two of her houses had been destroyed by German bombs.

Woollcott, Alexander (1887-1943), American journalist, was born at Phalanx, N. J. Educated at Hamilton College and Columbia University, he acted as dramatic critic for the New York *Times* from 1914 to 1922 and later for other New York papers up to 1929, when he began broadcasting on American and British networks. He attracted an enormous following both as writer and broadcaster. His publications include *Enchanted Aisles, While Rome Burns, The Woollcott Reader,* and *Long, Long Ago.*

Woolley, Mary Emma (1863-1947), American educator, was born at South Norwalk, Conn. She taught history at Wheaton Seminary, 1886-91. She was graduated from Brown University, 1894; and, from 1895 to 1900, taught biblical history at Wellesley, becoming professor in 1898. From 1900 to 1937 she was president of Mount Holyoke College, and, for many years, was prominently identified with the development of educational opportunities for women in America and in other countries. President Hoover named her a delegate to the disarmament conference at Geneva in 1932.

Woolworth, Frank Winfield (1852-1919), American merchant, was born at Rodman, N. Y. He received a public school and business college education. In 1879, he opened a 5-cent store in Utica, N. Y., removing in the same year to Lancaster, Pa., where he continued in the same business. This he eventually developed to vast proportions, embracing about 800 "5- and 10-cent" stores in the United States and Canada and more than 50 in Great Britain. In 1911-12, at a cost of $14,000,000, he erected in New York City the Woolworth Building, 792 feet high. This vast structure, designed in modified Gothic style by Cass Gilbert was, at the time of its completion, the tallest inhabited building in the world.

Wordsworth, William (1770-1850), English poet, was born at Cockermouth, in Cumberland, England. He was sent to school first at Penrith; subsequently he was transferred to Hawkshead, Lancashire; in 1787, he was sent to Saint John's College, Cambridge. The future poet of nature was imbued with a lifelong passion for travel. His first tour was made in the autumn of 1790, in France, Switzerland, and Italy. The next year, he took his bachelor's degree at Cambridge; but, except in poetical literature, his knowledge of books was slight.

After a twelve months' sojourn in France, Wordsworth returned to London, where he published two volumes of verse,—*Descriptive Sketches* and *An Evening Walk,*—both written in college. He considered the ministry, but the political beliefs of his early manhood would not have been reconcilable with the position of clergymen in the Church of England. After wandering about for some years, he felt justified in regarding poetry as his true vocation.

He received in 1795 a legacy from his friend Raisley Calvert, which enabled him to live with entire singleness of aim until the settlement of his father's affairs. That autumn, Wordsworth took a house with his sister in Racedown, Dorsetshire, whence he removed two years later to Alfoxden, Somersetshire, in order that he might be near Coleridge. Here the two poets wrote in conjunction the famous *Lyrical Ballads.*

After spending the winter of 1798-99 in Germany with Coleridge, Wordsworth and his sister Dorothy, his most intimate friend and confidant, returned to their native Cumberland and settled at Grasmere. In 1803, he married Mary Hutchinson, to whose amiability his poems pay warm tribute. This same year, he made a trip to Scotland.

With his wife, his sister, and his three children, Wordsworth removed to Allan Bank, 1808, and, in 1813, he established permanent residence at Rydal Mount. A second tour of Scotland, in 1814, resulted in a few poems; in the summer of that year, he published *The Excursion,* one of his longest pieces. Various sonnets belong to this period. In 1820, Wordsworth made a tour of four months on the continent, the fruit of which appeared some time afterward in *Memorials.*

For his remaining 30 years, he lived among his beloved mountains and traveled much, but wrote very little. He made two visits to Scotland; in 1837, he again toured Italy. In 1842, he received a pension from the government, and, in 1843, he accepted nominal appointment as poet laureate of England.

Wordsworth, by his insistence on truth and simplicity of natural feeling, did much toward the revival of English poetry at the opening of the 19th century. He possessed an exceptional and passionate susceptibility to effects of beauty in the material world. From this arose a mystical communion with nature, which pervades the whole body of his poetry.

Wren, Sir Christopher (1632-1723), English architect, was born at East Knoyle, Wiltshire. He was graduated from Oxford, and became professor of astronomy in 1660. As a mathematician and scientist, he was engaged in 1663 by the dean of Saint Paul's to make a survey of the cathedral with a view to certain projected repairs. While thus employed, he became greatly interested in architecture, which he began to study with enthusiasm. In 1666, Saint Paul's was totally destroyed in the great fire, and Wren became the architect of the new cathedral, his masterpiece. His genius here displayed led to his being chosen to plan the most important buildings erected in London in the following 40 years.

Wright, Sir Almroth Edward (1861-1947), English physician and pathologist. After he was graduated from Dublin University, he continued his studies at Leipzig, Strasbourg, and Marburg. He was made demonstrator of pathology at Cambridge University, 1887, and of physiology at Sydney University, Australia, 1889. From 1892 to 1902, he was professor of pathology in the Army Medical School at Netley and was then appointed professor of experimental pathology in the University of London.

Wright was the author of the system of therapeutic inoculations for bacterial infections and introduced the successful method of immunization against typhoid fever by means of inoculation. His writings include *System of Anti-Typhoid Inoculation, Studies in Immunisation,* and *The Unexpurgated Case against Woman Suffrage.*

Wright, Frank Lloyd (1869-), American architect, was born at Richland Center, Wisc. Having studied engineering at the University of Wisconsin, he entered an architect's office in Chicago. In 1893, he began practicing independently and developed a style which became one of the strongest formative influences of 20th century architecture. Breaking sharply with tradition, he laid out buildings with an eye more exclusively to their use and the possibilities of new structural materials. His Imperial Hotel, in Tokyo, was one of the few buildings which withstood the great earthquake of 1923. The Midway Gardens, Chicago, and his own house, Taliesen, at Spring Green, Wisc., were among influential examples of his work, although the sharpness of his break with tradition circumscribed the extent to which his models were followed in America. His ideas were embraced more rapidly in the Netherlands and other European countries than in the United States. He is a member of the American Academy of Arts and Letters.

Wright, Orville (1871-1948), American inventor, was born at Dayton, Ohio, 1871. He was educated in the public schools. With his brother, Wilbur, he constructed the first airplane to fly successfully. After 1903, he devoted his attention mainly to the improvement of the invention, which was manufactured by the Wright Aeroplane Com-

pany. In 1915, he sold his interest in the company and was appointed member of the United States Naval Consulting board. Later he was made director of the Wright Aeronautical Laboratory. He received numerous honors both in America and abroad for his pioneer work in the development of the airplane. A monument to him and his brother was constructed by order of Congress and dedicated in 1932 on Kill Devil Hill near Kitty Hawk, N. C., where the first successful flight took place in 1903.

Wright, Wilbur (1867-1912), American inventor, was born near Millville, Ind. He was educated in the high schools of Richmond, Ind., and Dayton, Ohio. With his brother Orville, he became interested in the problem of mechanical flight, making at Dayton, Ohio, many experiments with kites and gliders. In a series of tests at Kitty Hawk, N. C., one of their machines, powered by an engine of their own design and make, on December 17, 1903, rose of its own power, remained in the air 12 seconds, and carried the operator 120 feet, the first instance of actual mechanical flight. In the fourth flight that day, their plane covered 852 feet in 59 seconds. In 1905, their airplane made a flight of 24¼ miles. Patents were secured and numerous exhibitions were made in the United States and abroad, demonstrating the success of the invention. He was elected to the American Hall of Fame in 1955. See *Airplane.*

Wundt (*vōōnt*), **Wilhelm Max (1832-1920),** German physiologist and psychologist, was born at Neckarau in Baden. He studied at Tübingen, Heidelberg, and Berlin. In 1875, he became professor of philosophy at Leipzig. Wundt was not only the most distinguished investigator in experimental psychology, but was the creator of the modern science of psychology. He united the work of Herbart, Weber, Fechner, and Lotze, bringing into correlation the mathematical, the experimental, the psychophysical, and the physiological movements in psychology. Among his many works are *Human and Animal Psychology* and *Outlines of Psychology.*

Wyant, Alexander Helwig (1836-1892), American landscape painter, was born at Port Washington, Ohio. He began portrait painting in Cincinnati; went to Paris in 1860, where he was much influenced by the work of Corot and Dupré; and later spent three years under Hans Gude at Düsseldorf and Karlsruhe. After 1864, he settled in New York. Losing the use of his right hand, he trained himself to paint equally well with the left, and rose to a distinguished place in American art. Wyant ranks second only to the more versatile Inness among the great painters of the Hudson River School and, in delicate refinement of work, is unexcelled by any American. Notable examples of his landscapes are "A Glimpse of the Sea," "Mohawk Valley," and "Broad, Silent Valley," in the Metropolitan Museum, New York; and "Edge of the Woods," in the Art Institute, Chicago.

Wylie, Philip Gornon (1902-), American writer, was born at Beverly, Mass. After attending Princeton University, he joined the staff of the *New Yorker* magazine, later becoming a writer for Paramount Pictures and Metro-Goldwyn-Mayer. A prolific writer of stories and articles for leading American magazines, he has had many books published. His vigorously expressed social criticism in *A Generation of Vipers* aroused violent controversy. He is perhaps best known for his fishing stories in which the characters of Crunch and Des are featured.

Wyss (*vīs*), **Johann Rudolf (1781-1830),** Swiss educator and author, was born at Bern. He is known chiefly as the author of *Swiss Family Robinson* and of the Swiss national anthem. Most of his life was spent as professor of philosophy at the University of Bern.

Xavier (*zāv'i-ēr*), **Saint Francis (1506-1552),** Jesuit missionary, styled the "apostle of the Indies," was born of a noble family in the north of Spain. At Paris, where he studied and then lectured, he was associated with Loyola in founding the Society of Jesus. He was ordained priest in 1537, lived at Rome in the service of the Society, and was sent as missionary to Portuguese colonies in the East.

Xavier arrived at Goa in 1542, and labored with equal zeal and success among the Europeans and the native population. After a year he visited Travancore, where in a month he baptized 10,000 natives. He then visited Malacca, the Banda Islands, Amboyna, the Moluccas, and Ceylon, where he converted the king of Kandy with many of his people. The mission which he founded in Japan flourished for a hundred years. He returned to Goa in 1552 to organize a mission to China. His strength had been worn out, however, by his labors and privations, and he died in the same year. He was canonized in 1622.

Xenophanes (*zē-nŏf'ā-nēz*), **(c.570 B. C.-?),** Greek philosopher, founder of the Eleatic School, was born at Colophon in Asia Minor. Xenophanes is the first man who is known to have observed the so-called anthropomorphic character of popular religions, which he attacked on the ground that, in them, men conceived of gods in their own image. He taught that there was one god and that he was changeless and eternal. His chief work, *On Nature,* has not survived, but a celebrated sentence has been preserved to the effect that, if oxen had gods, their gods would have the form of oxen. The date of his death is unknown.

Xenophon (*zĕn'ō-fŏn*), **(c.434 B. C.-c.355 B. C.),** Greek historian and military commander, was born at Athens. He was a pupil and friend of Socrates. He joined the expedition of Cyrus against his brother Artaxerxes, and, on its failure and the subsequent treacherous murder of the leaders of the Greek division, he was chosen to lead this force back from a point near Babylon to Trebizond on the Black Sea. After other military service, he retired to Elis.

His principal works are the *Anabasis,* an account of the expedition of Cyrus and of the retreat; the *Memorabilia,* an account of the life and teachings of Socrates; the *Hellenica,* a history of Greece beginning at the point where Thucydides discontinued his *Peloponnesian War*; and the *Cyropædia,* an ideal account of the education of Cyrus the Elder.

Xerxes I (*zûrk'sēz*), **(c.519 B. C.-465 B. C.),** king of Iran, son of Darius I, whom he succeeded on the throne in 485 B. C. In 481, he attempted to subdue Greece by both sea and land. With his army he crossed the Hellespont by means of a bridge of boats; was checked for a time at Thermopylæ by Leonidas and his three hundred; advanced to Athens to see his fleet destroyed at Salamis by Themistocles; and left 300,000 men under Mardonius, who suffered defeat at Platæa in 479. He returned to Asia Minor, and, after an expedition against Babylon, in which he razed its temples to the ground, he was assassinated.

Yale, Elihu (1648-1721), English colonial official, was born at or near Boston, Mass. When four years old, he was taken to England by his father, and he never returned to America. From 1687 to 1692, he was governor of Fort Saint George, Madras, and, in 1699, became governor of the East India Company. Yale College received his name in the charter of 1745. Previously the building and, before that, the school at Saybrook, Conn., had been called by his name. His gifts to the institution amounted to about £500 in money and many books.

Yeats (*yāts*; *yēts*), **William Butler (1865-1939),** Irish poet and dramatist, was born in Dublin. His education was received in his native city and in London. He studied art for a time, but soon turned to literature. He devoted much effort to gathering folklore, which he utilized in poems, plays, tales, essays, and sketches. His new versions of the *Countess Kathleen* and the *Wanderings of Oisin,* with the *Poems* of 1895, marked the rise of a new Irish school and definitely established his fame. An Irish Literary Theater was founded with the assistance of Lady Gregory, Edward Martyn, and George Moore, and Yeats brought to the theater great poetic gifts. He served as senator when the Irish Free State was established in 1922. His writings include *The Celtic Twilight, A Book of Irish Verse, The Wind Among the Reeds, Cathleen ni Houlihan, The Hourglass, Deirdre, The Green Helmet, Plays for an Irish Theater,* and *The Tower.* He received the Nobel prize for literature in 1923. See *Hourglass, The.*

Yerkes (*yĕr'kēz*), **Charles Tyson (1837-1905),** American capitalist and philanthropist, was born in Philadelphia. After receiving a high school education, he became a clerk in a grain commission house. Rising rapidly, he obtained important holdings in the street railway system of Philadelphia and, by 1886, controlled the Chicago street railway system. He later took part in constructing the underground railway system of London, Eng. In 1892, he endowed the famous Yerkes observatory, at Williams Bay, Wisconsin.

Yerkes, Robert Mearns (1876-), American psychologist, was born at Breadysville, Pa. A graduate of Harvard University, he began teaching psychology there in 1901. After 1917, he was engaged in psychological tests for the army, work for the National Research Association, and, beginning in 1924, teaching as professor at Yale University. He specialized in animal behavior and investigated particularly the intelligence of anthropoid apes, assembling a considerable number of animals in the Yale Laboratory of Primate Biology and applying numerous tests to their mentality. His publications include *Almost Human, The Mind of the Gorilla,* and, with his wife Ada Watterson, *The Great Apes.*

Young, Brigham (1801-1877), American religious leader, was born at Whitingham, Vt. In 1832, having become a convert to the teachings of Joseph Smith, he was made an elder of the Church and began to preach at the Mormon settlement at Kirtland, Ohio. Three years later, he was sent as a missionary to New England, where he secured numerous converts. After the death of Joseph Smith, at Nauvoo, Ill., 1844, Young assumed leadership and, in 1847, was chosen president of the Church of Jesus Christ of Latter-Day Saints, commonly called Mormons.

In 1845, he led the first party westward from Nauvoo and reached the Salt Lake Valley in 1847, where he located the site of a new temple and founded Salt Lake City. In 1851, he established a system of public schools. In 1852, he published the "revelation" of Joseph Smith favoring polygamy, which was finally officially prohibited in 1890. In 1868, he established a system of stores called Zion's Cooperative Mercantile Institution, which still controls a large amount of business in Utah.

Young was a leader of great force and remarkable foresight. The substantial growth and material prosperity of the Mormon settlements in Utah under his rule are proof of his administrative ability. When he died, he left about two million dollars, to be divided among numerous wives and more than 50 children. See *Salt Lake City*.

Young, Thomas (1773-1829), English scientist and archeologist, was born at Milverton, of Quaker parents. He was educated in London, Edinburgh, and Göttingen and began a medical practice in London. In 1801, he was made professor of natural history in the newly founded royal institution, but resigned in 1803. He was chosen on the staff of Saint George's hospital in 1811. He retired from practice in 1814 to become an insurance actuary.

In 1818, he was made superintendent of the *Nautical Almanac* and, in 1828, became sole conductor. He was the first to describe and measure astigmatism and is considered the founder of physiological optics. His most celebrated work was his demonstration of the wave theory, which he effected by his discovery of the interference of light. Despite all scientific opposition, he maintained that "radiant light consists of undulations of the luminiferous ether." Young also made notable researches in Egyptian hieroglyphics and was engaged on an Egyptian dictionary at the time of his death.

Younghusband, Sir Francis Edward (1863-1942), English soldier, explorer, and writer, was born at Murree, India. He was educated at Clifton and Sandhurst; entered the British army; and became lieutenant colonel, 1908, for service in India. He undertook numerous difficult travels in unknown parts of Asia, covering parts of Manchukuo, Chinese Turkestan, the Pamir, Tibet, and northern India. In 1904, as the British commissioner to Tibet, he forced his way into the sacred city of Lassa. His writings include *Heart of a Continent, Kashmir, The Heart of Nature, The Epic of Everest, Dawn in India,* and *The Living Universe.*

Ypsilanti (*ĭp'sē-lăn'tē*), **Alexander (1792-1828),** Greek soldier and revolutionary leader, was born at Istanbul. He accompanied his father, Constantine, to Leningrad; joined the Russian army in 1809; and fought with distinction in the campaign of 1812 and 1813, losing an arm at the battle of Dresden. He was made major general in the Russian army in 1817. He became president of the Greek league in 1820 and, in the following year, led an insurrection against the Turks in the Danube provinces. After a series of defeats, he fled to Austria, where he was kept in prison for seven years. Shortly before his death, his release was effected by Czar Nicholas I. His brother Demetrius (1793-1832) succeeded to the command of the Greek revolutionists and, in 1828, forced the capitulation of Aslan Bey at the pass of Petra, virtually ending the war for Greek independence.

Zaharias, Mildred Didrikson (1914-1956), American woman athlete, popularly known as "Babe" Didrikson, was the daughter of a Norwegian ship carpenter who settled in the United States. She was born and reared in Port Arthur, Texas. Even as a youngster, she excelled at many sports, including running, diving, swimming, high-jumping, hurdling, javelin-throwing, basketball, and baseball. She attracted world notice at the 1932 Olympic Games at Los Angeles by winning the javelin throw and the 80-meter hurdles. In 1935 she began to play golf and by 1950 had won all the available championships. She became U. S. Amateur champion in 1946, and the following year was the first American to win the British Amateur title. She then turned professional and in 1948 won the National Open. She was runner-up in 1949, and the winner in 1950 and 1954. Mrs. Zaharias is considered the world's top-ranking all-around woman athlete of this century.

Zamenhof (*zä'mĕn-hôf*), **Lazarus Ludwig (1859-1917),** Russian oculist and linguist, was born at Bielostok, Grodno. He was educated at the universities of Moscow and Warsaw. He settled in Warsaw, where he practiced his profession and became noted for his advocacy of an international language. In 1887, he published his first book on Esperanto, an artificial language which attracted the attention of linguists throughout the world.

Zane, Ebenezer (1747-1811), American pioneer of the Revolutionary period, was born in Berkeley County, W. Va. He held several civil and military offices and attained the rank of colonel. In 1769, he established on the site of the present city of Wheeling the first permanent settlement on the Ohio River. For the protection of the settlers, he built a blockhouse, called Fort Henry, which was several times attacked by the Indians during the Revolutionary War. Zane owned the land where the city of Zanesville, Ohio, now stands and, in 1799, assisted in laying out the original town, at first called Westbourn but in 1802 renamed Zanesville.

Zeiss (*tsīs*), **Carl (1816-1888),** German optician, was born at Weimar. He was educated for medicine. In 1846, he established at Jena the now world-famous optical factory, which still bears his name, being incorporated in 1889 as the Carl-Zeiss-Stiftung.

Zenker (*tsĕng'kĕr*), **Friedrich Albert von (1825-1898),** German physician, was born in Dresden. He was educated in Leipzig and Heidelberg. In 1851, he became attached to the city hospital of Dresden, where, in 1855, he became professor of pathology in the Surgico-Medical Academy. While there he discovered that the disease trichinosis is caused by the trichina worm introduced into the body by eating insufficiently cooked pork from infected pigs. In 1862, he was made professor at Erlangen. See *Trichina.*

Zeno (c. 490 B. C.-?), Greek philosopher of Elea, in Italy, was a favorite disciple of Parmenides. He accompanied him to Athens and there taught the illustrious Pericles. He devoted his great powers of argumentation to enforce the doctrines first broached by Xenophanes and more systematically developed by Parmenides, attempting to demonstrate by ingenious examples the impossibility of motion. His paradoxes of Achilles and the hare and of the flying arrow have, in modern times, been used by Bergson in an attempt to show that motion alone exists. Zeno is said to have been arrested for conspiring to drive the tyrant Nearchus from Elea and to have been put to death by torture.

Zeno (?-c. 264 B. C.), Greek philosopher, was born at Citium, in Cyprus, and flourished in the early part of the 3d century B. C. He was at first a trader. Coming to Athens, he was attracted by the Cynic philosophy, the asperities of which he somewhat modified in doctrines that later became known under the term Stoicism. This name was derived from the *Stoa Poikile,* "painted porch," which he selected for the delivery of his lectures throughout his 58 years of teaching in Athens.

Stoic doctrine honored virtue above all things, esteeming as indifferent all other common objects of desire. Socrates was held up as the examplar of the virtuous man. The Athenians honored Zeno's memory by a public tomb and monument.

Zenobia (*zē-nō'bĭ-ă*), queen of Palmyra, succeeded her husband Odenathus in 267 and showed an independence of her Roman suzerains that resulted in several clashes with the Roman troops. When Aurelian became emperor, he marched with a large army against Zenobia and, after defeating her in several battles, besieged her in Palmyra. She attempted to escape, but was captured and brought to Rome in 272 to adorn the triumph of her conqueror. She was later presented by Aurelian with large possessions near Tivoli, where the remainder of her life was passed. She was a woman of great courage, high spirit, and remarkable beauty. With austerity of morals in private life she combined prudence, justice, and liberality in her administration of public affairs.

Zeppelin (*tsĕp'ĕ-lēn'*), **Ferdinand, Count von (1838-1917),** German inventor, was born at Constance, Baden. He received his education in the Polytechnic School at Stuttgart, in the Military School at Ludwigsburg, and in the University of Tübingen. He entered the army and became a cavalry officer in 1858. In 1863, he came to the United States, where he fought with the Union army in the Civil War. He later returned to Germany.

Zeppelin spent much of his life in experimenting with dirigible balloons. The first large one was built in 1892 and, in 1909, he was able to make a flight from Friedrichshafen to Berlin. In the former place, he established a factory for manufacturing dirigible airships, a large number of which were used by Germany in World War I.

Zeuxis (*zūk'sĭs*), Greek painter, lived about the end of the 4th century B. C. He improved the methods of Apollodorus of Athens and excelled in coloring and expression. He executed small works for private patrons rather than decorations of a public or monumental character. Among his famous works were "Helen," which he presented to the people of Crotona; "Alcmena," given to Agrigentum; "Pan," presented to Archelaus; a youthful "Hercules"; and "Zeus Surrounded by the Gods."

Zhukov (*zhū'kŏf*), **Georgi Konstantinovich (1895-),** Russian general. Enlisting as a private soldier in 1915, he won promotion after the Revolution. He served against the Japanese on the Amur River in 1938-39. In 1941, he directed the armies which saved Moscow from the Germans and, in 1942, turned the tide of war in the northern sector of the front. He organized the Russian offensive

in 1943 and, in 1944-45, commanded the forces which reconquered Poland and captured Berlin.

Ziegfeld, Florenz, Jr. (1869-1932), American theatrical producer, was born at Chicago, where he entered the theatrical business in 1892. He brought military bands from Europe for the world's fair, Chicago, in 1893. Besides producing *Ziegfeld's Follies* annually from 1907, he produced *Papa's Wife, The Parisian Model, Miss Innocence, The Pink Lady,* and many other spectacular shows. He married Billie Burke in 1914.

Zimbalist, Efram (1889-), American violinist, was born at Rostov, Russia, and received his early musical training from his father. He later studied with Leopold Auer at the Leningrad Conservatory. He made his debut at Berlin, Germany, in 1907, after which he toured through Europe. His first appearance in the United States was at Boston in 1911, which was followed by many American tours. In 1914 he married Alma Gluck, the singer, and after her death (1938) married (1943) Mary Curtis Bok. Zimbalist has been director of the Curtis Institute of Music, Philadelphia, since 1941.

Zinzendorf (*tsĭn'tsĕn-dôrf*), **Nikolaus Ludwig, Count von (1710-1760),** was born at Dresden. A chance encounter with a wandering carpenter named Christian David aroused his interest in the Moravian brethren, and he invited the persecuted sect to settle on his estates in upper Lusatia; the colony thus formed was named Herrnhut. In 1737 Zinzendorf was ordained bishop of the Moravians. He afterwards traveled in England and in America, where, in 1741, he founded the Moravian colony at Bethlehem, Pa. He died at Herrnhut.

Zittel (*tsĭt'ĕl*), **Karl Alfred von (1839-1904),** German geologist and paleontologist, was born at Bahlingen, Baden. He was educated at Heidelberg and Paris. In 1866, he was made professor of paleontology at Munich, where he won an international reputation by his researches and publications in paleontology. He accompanied Rohlfs's exploring expedition to Egypt and the Libyan Desert in 1873-74. Among his publications are *The Sahara* and *History of Geology and Paleontology to the End of the Nineteenth Century.* With Schimper and Schenk, he published *Handbook of Paleontology,* a notably important work.

Zola (*zō'lä*; F., *zô'lä'*), **Emile (1840-1902),** French novelist, was born at Paris. He was educated at the Lycée Saint-Louis and settled in Paris. His first important venture in fiction was *Les mystères de Marseille.* In this and in *Thérèse Raquin,* he at once displayed his remarkable power in the critical analysis of human character. With Flaubert and the Goncourts, he founded the naturalistic school of fiction. His famous series known as *The Rougon-Macquart Family* was modeled somewhat after Balzac's *La comédie humaine.*

Among his more notable subsequent stories are *La joie de vivre, Au bonheur des dames, La bête humaine, La débâcle, Le rêve,* and *Lourdes.* The last forms one of a trilogy, which he called *Les trois villes*—Lourdes, Rome, and Paris—all in the extreme realistic vein. His last work, written in the exile occasioned by his courageous advocacy of justice in the notorious Dreyfus case, is entitled *Fécondité.* Zola was one of the most brilliant, impassioned, and sincere of modern French writers. See *La débâcle.*

Zorn (*tsôrn*), **Anders Leonhard (1860-1920),** Swedish painter, was born at Mora, Dalarne. He studied at Stockholm Academy and in London. In 1888, his first oil painting, "Fisherman from Saint Yves," was placed in the Luxembourg Museum. Although traveling extensively, he resided chiefly at Mora, where he devoted himself largely to painting Swedish subjects, excelling in the female figure.

Zorn ranks among the foremost modern portrait painters, combining strong naturalism with fine powers of characterization. Among his well-known figure paintings are "Summer in Sweden," "Dagmar," and "Watering the Horse."

Zoroaster (*zō'rō-ăs'tẽr*), often referred to under the Avestan form of his name, Zarathustra, was the founder of the Persian-Iranian religion, usually designated as Zoroastrianism. Forms of this religion are now held by the Ghebers in Persia and the Parsis in India. There is doubt as to the period in which he lived, some modern scholars placing it in the 7th and 6th centuries B. C.; others, in the 11th and 10th. He seems to have been born in Bactria, in the northwestern part of Iran. His doctrine then spread to Media and Persia.

Tradition leaves space for a period of religious preparation from his 15th to his 30th year, when he received a revelation of the faith and came forward as a reformer of the beliefs of the old Brahmanic creed. He was the leader of a group of chieftains who, after a period of political, military, and religious struggles, established a holy agricultural state. The laws of this state encouraged pastoral labor and thrift.

That Zoroaster was legislator, prophet, pontiff, and philosopher, as tradition asserts, may well be true. The propagation of his religious system occupied him until the time of his death. His end seems to have been violent and to have taken place during the invasion of Iran by the Turanians, who waged a religious war against Vishtaspa.

The present *Avesta,* or *Zend-Avesta,* the bible of Zoroastrianism, is the remnant of a greater religious literature. It includes (1) various hymns, or *gathas,* (2) a collection of liturgical forms, (3) sundry religious laws, (4) mythical fragments devoted to several divinities, and (5) several prayers. The *gathas,* verses from the sermons of Zoroaster, form the oldest and most sacred part of the *Avesta.*

Zoroastrianism teaches that the world is the scene of a conflict between two principles: the good, called Ormuzd; the evil, called Ahriman,—the god of life and the god of death. Every good action helps the one; every evil action, the other. Those who touch what is impure give Ahriman the more power over them. Zoroaster's belief in immortality and in the final triumph of good over evil resembles both the later Jewish and the Christian dogmas. Zoroaster died at the age of 77.

Zuloaga (*sōō'lō-ä'gä*), **Ignacio (1870-1945),** Spanish painter, was born at Eibar, Spain. He studied in Paris, devoting himself to the old Spanish masters, notably Velásquez. He first achieved distinction with his portrait group "Daniel Zuloaga and His Daughters," now in the Luxembourg Museum, Paris. He later settled in Spain, where he traveled extensively in remote districts, portraying with notable individuality, gypsies, bull fighters, beggars, fruit sellers, water carriers, and dancers.

His work is animated, intense, and powerful. While a master of rich and varied color harmonies, he excels in somber effects. In the Metropolitan Museum, New York, he is represented by the "Gypsy Bull Fighter's Family" and by "Mlle. Lucienne Breval as Carmen."

Zurbarán (*thōōr'bä-rän'*), **Francisco de (1598-1662),** Spanish painter, was born at Fuente de Cantos, Estremadura, 1598. He studied painting at Seville and developed a strong, realistic style of an intentionally Spanish character. His "Scenes from the Life of Saint Peter," executed for the cathedral of Seville in 1625, brought him wide fame. Among his important paintings are scenes from "The Life of Saint Buenaventura," in the Louvre, Berlin, and Dresden museums; "Apotheosis of Saint Thomas Aquinas"; "Saint Francis of Assisi"; "Immaculate Conception"; and "The Crucifixion." Through the influence of Velásquez he was made painter to the king in 1633. Zurbarán's religious pictures and fine portraits of monks did for the cloister what the work of Velásquez did for the court.

Zweig (*tswīk*), **Arnold (1887-),** German novelist, was born at Gross-Glogau, Prussia, in 1887. After studying languages, history, and psychology in the leading German universities, he served as a private during World War I. His experiences there inspired several novels, including *The Case of Sergeant Grischa, Young Woman of 1914,* and *Education before Verdun,* characterized by a sharply-etched realism. When the Hitler party rose to power, he left Germany, being of Jewish blood, and, in 1934, took up his residence in Palestine. His later works include *Crowning of a King* and *Insulted and Exiled.*

Zweig, Stefan (1881-1942), Austrian critic and biographer, was born in Vienna. He died by his own hand in Brazil, a refugee from war-torn Europe who had failed to find tranquillity either in England or in the United States. He is noted especially for his combined biographical and critical studies of several groups, for example: Balzac, Dickens, and Dostoievsky; Casanova, Stendhal, and Tolstoi; and Hölderlin, Kleist, and Nietzsche. In *The World of Yesterday* (1942) and other autobiographical writings, he shows keen sensitiveness to cross-currents of prejudice and to psychological problems arising from the disturbed conditions of his time.

Zwicky, Fritz (1898-), American astrophysicist, was born at Varna, Bulgaria, and was educated at Zurich, Switzerland. He came to the United States in 1925 as a research fellow at the California Institute of Technology, Pasadena. In 1927 he was made assistant professor of theoretical physics, associate professor (1929-41), and then professor of astrophysics (1942). An authority on novae and supernovae, he has been astronomer at Mount Wilson and Palomar observatories since 1948. His work in connection with cosmic rays, jet propulsion, and the activity of ions in gases has been notable.

Zwingli (*tsvĭng'lē*), **Ulrich (1484-1531),** Swiss religious reformer, was born at Wildhaus. He served in Italy as a soldier; visited Erasmus at Basel in 1514; and, two years later, at the monastery of Einsiedeln, began to preach freely, opposing the sale of indulgences and favoring changes in doctrine and practice similar to those advocated by Luther. He met Luther in 1529 but failed to agree with certain of his more radical innovations in doctrine. Zwingli was one of the leaders of the Protestant cantons of Switzerland, and was slain in a battle against the Catholic cantons.

STUDY AND REFERENCE GROUPS

IN studying a person's biography we are concerned, not only with the facts of his life, but also with his place in history. We see him, not as an isolated individual, but as one who played his part with others in some important branch of human activity. It is natural to ask, "Who were his predecessors, his co-workers, his rivals, his successors?" Thus, Hannibal is linked with Scipio, Francis I with Henry VIII, and Wellington with Ney and Grouchy as well as Napoleon. A man like Faraday is considered in relation to earlier scientists whose ideas he inherited, and to later ones who profited by his special contribution. The names of Burke, Pitt, and Fox are associated together in the great period of British oratory, as are those of their American contemporaries, Samuel Adams, James Otis, and Patrick Henry. In thinking of the individual, we think naturally of the group to which he belongs.

Plan and Arrangement. To aid the student in fixing the historical position of persons described in the foregoing biographical sketches, the individuals are grouped below in 100 main classifications. These major fields of activity are listed in alphabetical sequence, beginning with "Actors" and ending with "Zoologists." Some of the groups—for example, "Air Line Executives" and "City Planners"— may contain only a few names as yet, but they represent new and growing fields of specialization, in which a person may make an important contribution to society. As a matter of convenience, some of the larger groups are subdivided; for example, "Dramatists" are given three headings: American, English, and World. Both "Rulers" and "Military Leaders" are listed according to the conventional periods of history: Ancient, Medieval, and Modern. Within each group or subdivision the names appear in chronological order, based on the individual's date of birth.

This feature gives the Department of Biography the valuable advantages of the *historical* as well as the *encyclopedic* arrangement. The reader may refer to each biographical sketch alphabetically, as in an encyclopedia; he may study each noted character in the order of his appearance, as in a history; and he may further consider each person's achievements as compared with those of other important figures in the same group or in related groups.

In addition to the 100 principal divisions, there are two special groups found on page 2024, namely: **Hall of Fame** and **American Academy of Arts and Letters.** Because these honors have come in recognition of achievement in many different fields, the names in these lists, with some exceptions, are duplicated in one or another of the 100 divisions. A further classification, **Nobel Prize Winners,** is given in tabulated form on pages 2024–2028.

Explanation for the User. In making reference to a name in any of the groups, the following points should be observed.

1. The name of a man or woman whose sketch is given in the Department of Biography appears usually in but *one* group, representing the field in which the person did his most distinguished work.

2. A number in parenthesis following a name indicates another group in which the person in question achieved a noteworthy degree of distinction. Two or more numbers placed after a name indicate that such a person was distinguished in two or more fields of achievement. The names of these additional fields of effort may be quickly found by turning to the study groups designated by these numbers.

3. A geographical name or abbreviation in Italics indicates the country to which the person belongs.

Illustrative Examples. A few concrete instances will make clear the value of these groups when used for systematic study or reference.

By turning to group (9), the reader will find a list of nearly fifty noted astronomers arranged in chronological order. It begins with Thales, one of the seven wise men of ancient Greece, and ends with Jones, a present-day scientist whose observations have aided in reconstructing our ideas of the universe. The group therefore comprises the leaders of astronomical progress covering a period of 2500 years. By studying the lives of these men in historical order, the reader will be able greatly to enlarge his knowledge of astronomical science.

The newer science of anthropology may be studied in terms of the men listed in group (6), beginning with its founder, Johann Friedrich Blumenbach (1752–1840), and coming down to the present, as represented by Earnest Hooten, who has made special studies in social anthropology, and Raymond Dart, whose South African discoveries have shed new light on man's origin.

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(1) Actors and Actresses:

AMERICAN

Forrest, Edwin
Cushman, Charlotte (98)
Booth, Edwin Thomas
Barrett, Lawrence
Drew, John
Mantell, Robert B.
Goodwin, Nathaniel C.
Skinner, Otis
Sothern, E. H. (94)
Miller, Henry J.
Fiske, Minnie M. (30)
Allen, Viola
Hackett, J. K.
Adams, Maude
Houdini, Harry
Duncan, Isadora
Barrymore, L.
Barrymore, Ethel
Hampden, Walter
Barrymore, J.
Fairbanks, Douglas
Tucker, Sophie
Burke, Billie
Chaplin, Charles S.
Pickford, Mary
Cornell, Katharine
Laughton, Charles (94)
Hayes, Helen
Bankhead, T. B.
Godfrey, Arthur
Dietrich, Marlene
Crosby, Bing
Davis, Bette
Garbo, Greta
Hepburn, Katharine
Martin, Mary
Welles, Orson
Kelly, Grace Patricia

WORLD

Cibber, Colley (13) (30) (94)
Clive, Kitty
Garrick, David (30) (94)
Siddons, Sarah
Kemble, John Philip
Kemble, Charles
Kean, Edmund
Kemble, Frances A.
Kean, Charles John
Irving, Sir Henry
Coquelin, Benoît (25)
Modjeska, Helena
Bernhardt, Sarah (30) (88)
Terry, Ellen Alice
Forbes-Robertson, J.
Duse, Eleonora
Campbell, Mrs. P.
Arliss, George (13) (94)
Anglin, Margaret
Chevalier, Maurice
Hardwicke, Cedric (94)
Fields, Gracie
Lillie, Beatrice
Evans, Maurice (94)
Fokine, Michel
Pavlowa, Anna
Olivier, Laurence
Guinness, Alec

(2) Advertising Executives and Writers:

Calkins, Ernest Elmo
Osburn, Alex. F.

(3) Agriculturists:

Columella, Lucius J.
Judd, Orange (32)
Hellriegel, Hermann
Wilson, James (78)
Wallace, Henry (78)
Benson, Ezra T.

(4) Aircraft Designers and Manufacturers:

Montgolfier, Jacques E. (11)
Montgolfier, Joseph M. (11)
Langley, S. P.
Zeppelin, Count von (11)
Wright, Wilbur (11)
Wright, Orville
Santos-Dumont, A. (11)
Curtiss, Glenn (11)
Martin, Glenn L. (11)
Sikorsky, Igor (11)
Seversky, Alexander P. de (11)
Messerschmitt, Willy

(5) Air Line Executives:

Rickenbacker, Edward V. (11)
Lindbergh, Charles A. (11)

(6) Anthropologists:

Blumenbach, J. F. (74)
Galton, Sir Francis (39)
Lubbock, Sir J. (100)
Powell, J. W. (37)
Bertillon, Alphonse
Fraser, Sir J. G.
Cushing, Frank H.
Westermarck, Edw. Alexander
Hrdlicka, Ales
Lowie, Robert Heinrich
Mead, Margaret
Hooten, Earnest A. (33)
Dart, Raymond (33) (72)

(7) Archeologists:

Ixtlilxochitl, F. de (41)
Young, Thomas (73)

Champollion, J. F.
Curtius, Ernst (41) (69)
Layard, Sir Austen Henry (78)
Cesnola, Count di
Petrie, W. M. F.
Budge, E. A. W. (20)
Breasted, James Henry (20)
Albright, William F.

(8) Architects:

AMERICAN

Bulfinch, Charles
Latrobe, Benj. (34)
Walter, Thomas U.
Renwick, James
Olmsted, Frederick L.
Hunt, Richard Morris
Post, George B.
Richardson, Henry H.
Burnham, Daniel H.
Mead, William R.
McKim, Charles F.
White, Stanford
Kendall, W. M.
Flagg, Ernest
Carrère, John Merven
Coolidge, Charles A.
Cobb, Henry Ives
Gilbert, Cass
Hastings, Thos.
Heins, George Lewis
La Farge, C. G.
Bacon, Henry
Goodhue, B. G.
Wright, Frank L.
Corbett, Harvey W.
Pope, John R.
Delano, W. A.
White, Lawrence Grant
Saarinen, Eero

WORLD

Callicrates
Callimachus (88) (67)
Apollodorus
Brunelleschi, Filippo
Alberti, Leon B.
Bramante
Palladio, Andrea
Fontana, D. (34)
Jones, Inigo (27)
Wren, Sir C. (9) (54)
Garnier, Jean Louis
Lutyens, Sir E. L.
Saarinen, Eliel (19)
Gropius, Walter (33)

(9) Astronomers:

Thales (phil.) (70)
Aristarchus
Fratosthenes (39)
Hipparchus
Ptolemy (39)
Copernicus, Nicolas (54)
Brahe, Tycho (54)
Kepler, Giovanni Domenico (54)
Cassini, G. D. (54)
Flamsteed, John
Halley, Edmund (54)
Bradley, James (54)
Celsius, Anders (46)
Lalande, Joseph Jérôme Le-F. de
Herschel, Sir W. (73)
Bode, Johann E. (54)
Delambre, Jean Baptiste J. (54)
Laplace, P. S. (54) (73)
Herschel, Caroline L.
Bowditch, N. (54)
Bessel, F. W. (54)
Encke, Johann Franz
Herschel, Sir John Frederick William
Airy, G. B. (54) (73) (34)
Leverrier, U. J. J.
Galle, Johann G.
Mitchell, Maria
Adams, John C. (54)
Gould, Benjamin A.
Huggins, Sir William
Clark, Alvan
Newcomb, S. (54) (33)
Lockyer, Sir J. N. (73)
Flammarion, C. (63)
Pickering, E. C. (73) (33)
Lowell, Percival
Barnard, Edward Emerson (33)
Campbell, W. W.
Cannon, Annie J.
Hale, George Ellery
Moulton, F. R.
Morehouse, D. W. (33)
Eddington, Sir Arthur Stanley (73)
Shapley, Harlow (33)
Hubble, Edwin Powell
Jones, Sir Harold

(10) Automobile Manufacturers:

Ford, Henry
Chrysler, Walter P.
Knudsen, William S. (78)
Kaiser, Henry J.
Wilson, Charles E.
Ford, Henry II

(11) Aviators:

Eckener, Hugo
Piccard, Auguste and Jean
Byrd, Richard (37)
Doolittle, James H. (58)
Putnam, Amelia Earhart
Lindbergh, Charles A. (5)
Lindbergh, Anne (36)

(12) Biblical Characters and Saints:

Moses
Paul, St.
Justin (95)
Anthony, St. (95)
George, St.
Athanasius, St. (95) (64)
Basil, St. (95)
Ambrose, St. (49) (95)
Jerome, St. (20) (41) (95)
Chrysostom, St. (64)
Augustine, St. (95)
Geneviève, St.
Benedict, St. (33) (95)
Isodore, St. (20) (95)
Boniface, St. (86)
Dunstan, St. (73) (95)
Olaf, St. (ruler) (73)
Gregory VII (pope) (95)
Bruno, St.
Anselm, St. (33)
Bernard, St. (95)
Becket, Thomas à
Dominic, St. (95)
Francis of Assisi, St. (95)
Anthony of Padua, St. (95)
Louis IX, St. (ruler) (58)
Alexander Nevsky (97)
Aquinas, St. Thomas (33) (70) (95)
Bonaventura, St. (95)
Catherine, St.
Francis of Paola, St.
Loyola, St. Ignatius de (95)
Xavier, St. Francis (86)
Philip Neri, St. (33) (68)
Francis de Sales, St. (64) (95)
Vincent de Paul, St. (68)
Cabrini, St. F. X.

(13) Biographers:

Plutarch
Vasari, Giorgio (67)
Boswell, James
Forster, John
Smiles, Samuel
Strachey, G. Lytton
Ludwig, Emil (41)
Hackett, Francis
Guedalla, Philip (41)
James, Marquis

(14) Botanists:

Theophrastus (70)
Bartram, John
Linnaeus, Carolus (60)
Bonnet, Charles (70)
Jussieu, Antoine Laurent de
Brown, Robert
De Candolle, Augustin Pyrame (18)
Torrey, John (72)
Brongniart, A. T.
Gray, Asa (72)
Hooker, Sir J. D.
Mendel, Gregor Johann (14) (95)
Sachs, Julius von
Sargent, Charles Sprague (38)
Warming, Johannes
Pfeffer, Wilhelm
De Vries, Hugo
Coulter, John M. (33)
Saunders, Charles E. (18)
Fairchild, David

(15) Capitalists and Financiers:

Gresham, Sir T. (68)
Halifax, C. M. (78)
Necker, Jacques (78)
Rothschild, Mayer A. (78)
Rothschild, Mayer A.
Rothschild, Solomon
Rothschild, Nathan
Rothschild, Karl
Rothschild, Jacob
Cornell, Ezra (68)
Rothschild, Lionel
Sage, Russell
Higginson, H. L. (68)
Green, Hetty H. R.
Clews, Henry
Gould, Jay (85)
Morgan, J. Pierpont (68)
Yerkes, C. T. (85)
Rockefeller, J. D.
Rothschild, N., Baron
Baker, George F.
Vail, Theodore N.
Gary, E. H. (49) (53)
Astor, William W.
Candler, Asa G. (68)
Mellon, A. W. (53) (78)
Folger, Henry Clay (68)
Astor, John J. (46)
Kahn, Otto H. (68)
Morgan, J. Pierpont
Loeb, James (68)
Rothschild, L., Baron
Strauss, Lewis L.

(16) Cartoonists:

Davenport, Homer C.
McCutcheon, John T.
Bairnsfather, Bruce

(17) Characters of Note:

Aspasia
Cornelia
Apollonius of Tyana
Ayeshah
Catherine of Aragon
Boleyn, Anne
Grey, Lady Jane
Fawkes, Guy
Stradivari, A.
Casanova
Brummel, Beau
Sacagawa
Barnum, Phineas T.
Pinkerton, Allan
Kellar, Harry
Oakley, Annie
Rasputin

(18) Chemists:

Helmont, Jan B. van
Glauber, J. R. (72)
Cronstedt, Axel Frederic, Baron (37)
Cavendish, Henry (73)
Priestley, Joseph (21)
Scheele, Carl W.
Klaproth, Martin H.
Lavoisier, Antoine Laurent (73)
Berthollet, C. L.
Gregor, William (39)
Tennant, Smithson
Dalton, John (73)
Wollaston, William Hyde (73)
Avogadro, A. (7)
Courtois, Bernard
Davy, Sir Humphry
Gay-Lussac, Joseph Louis (73)
Berzelius, Jöns J.
Guthrie, Samuel (72)
Chevreul, Michel Eugène
Dumas, Jean B.
Wöhler, Friedrich
Liebig, J., Baron von
Bunsen, Robert W.
Draper, John W. (74)
Gerhardt, Charles F.
Fresenius, Karl R.
Hofmann, A. W. von
Kolbe, Adolph W. H.
Cannizzaro, Stanislao
Berthelot, Pierre Eugène M.
Cailletet, Louis Paul
Crookes, Sir William (73)
Mendeléev, Dmitri I.
Baeyer, A. von (100)
Perkin, Sir William Henry
Babcock, Stephen Moulton
Wiley, Harvey W.
Remsen, Ira (33)
Moissan, Henri
Ramsay, Sir William
Van't Hoff, J.
Sabatier, Paul
Arrhenius, Svante August
Curie, Pierre (73)
Buchner, Eduard
Carver, G. W. (33)
Werner, Alfred
Curie, Madame (73)
Haber, Fritz
Grignard, Victor
Weizmann, Chaim (78)
Windaus, Adolf
Soddy, Frederick
McCollum, Elmer V.
Langmuir, Irving
Bergius, Friedrich
Urey, Harold C. (33)
Joliot, Irene Curie
Joliot, Frederic
Seaborg, Glenn T.

(19) City Planners:

Saarinen, Eliel (8)
Abercrombie, Sir Patrick (8)
Le Corbusier (8)
Moses, Robert (78)

(20) Classical and Oriental Scholars:

Einhard (41)
Erasmus, D. (95)
Budaeus
Lily, William (33)

Scaliger, Joseph J.
Galland, A. (33)
Heyne, Christian G.
Jones, Sir William
Rawlinson, Sir Henry C. (78) (96)
Hepburn, James Curtis (72)
Jowett, B. (33) (96)
Harkness, A. (33)
Gildersleeve, B. L. (33)
Goodwin, William W. (33)
Jebb, Sir R. C.
Murray, G. G. A. (33) (96)
Goodspeed, Edgar J. (33) (96)

(21) Clergymen:

Mather, Increase (33) (41)
Edwards, Jonathan (70)
Asbury, Francis
Beecher, Lyman
Beecher, Henry Ward (64)
Spurgeon, Charles H.
Brooks, Phillips (64)
Ireland, John
Conwell, R. H. (33)
McDowell, W. F.
Matthews, Shailer (33)
Cadman, S. Parkes
Ryan, John A.
Duffy, Francis S.
Wise, Stephen
Coffin, Henry S.
McNicholas, John T. (86)
Fosdick, Harry E. (95)
Holmes, John H.
Sockman, Ralph
Keller, James G.
Blake, Eugene Carson

(22) Colonists and Colonial Leaders:

Carver, John
Baltimore, George Calvert (78)
Smith, John (78)
Standish, Miles
Hooker, Thomas (95)
Endicott, John
Winthrop, John
Bradford, William
Stuyvesant, Peter
Alden, John
Williams, R. (86)
Berkeley, Sir W.
Frontenac, Comte de
Andros, Sir Edmund
Bacon, Nathaniel
Penn, William (68)
Braddock, Edw. (58)
Pepperrell, Sir W.
Franklin, Benjamin (28) (36) (46) (47) (78) (83)
Hutchinson, T. (41)
Montcalm, Louis Joseph
Amherst, J., Lord (58)
Gage, Thomas (58)
Adams, S. (64) (78)
Otis, James (64) (78)
Wolfe, James (58)
Howe, Sir Wm. (58)
Lee, Richard H. (58) (64)
Washington, George (34) (58) (78)
Henry, Patrick (64) (78)
Hancock, John (78)
Clark, George Rogers (37)

(23) Composers:

AMERICAN

Foster, Stephen C.
Gottschalk, L. (59)
Buck, Dudley (24)
Paine, John Knowles
Foote, Arthur (24)
Chadwick, G. (24)
Sousa, John Philip (24)
Kelley, Edgar S.
Herbert, Victor (24)
Mahler, Gustav (24)
De Koven, R. (25)
MacDowell, E. (24) (59)
Loeffler, C. M.
Bond, Carrie J. (77)
Damrosch, W. (24)
Nevin, Ethelbert
Parker, H. W. (24)
Cole, R. G. (24)
Hadley, Henry K. (24)
Handy, William C.
Carpenter, John A.
Lieurance, Thurlow
Cadman, Charles W.
Friml, Carl R.
Kern, Jerome
Taylor, Deems (25)
Romberg, Sigmund
Spalding, Albert (59)
Porter, Cole
Hanson, Howard
Gershwin, Geo.
Rodgers, Richard
Barber, Samuel
Diamond, David
Bernstein, Leonard

WORLD

Hucbald
Guido d'Arezzo
Dunstable, John
Dufay, Guillaume
Palestrina, G. da (24)
Lasso, Orlando di
Cavalieri, Emilio del
Peri, Jacopo
Monteverde, Claudio
Cavalli, Francesco
Carissimi, Giacomo
Lully, Jean B. (24)
Bach, Johann Sebastian
Handel, George Frederick (24)
Arne, Thomas A.
Bach, Karl Philipp
Gluck, Christoph W.
Haydn, Joseph (24)
Mozart, J. W. A. (24)
Beethoven, Ludwig van (24)
Auber, Daniel F.
Bishop, Sir H. R. (24)
Weber, Karl M. von
Czerny, Karl (24) (32)
Meyerbeer, G. (24)
Rossini, G. A.
Donizetti, Gaetano
Schubert, Franz P.
Bellini, Vincenzo
Bériot, Charles de (24)
Berlioz, Hector (24)
Glinka, Mikhail I.
Balfe, Michael W.
Mendelssohn-Bartholdy (24)
Chopin, Frédéric (24) (59) (75)
David, Félicien César
Schumann, R. (32)
Liszt, Franz (59)
Thomas, Ambroise
Flotow, Friedrich von
Verdi, Giuseppe
Wagner, R. (30) (77)
Franz, Robert
Heller, Stephen (24)
Gade, Niels Wilhelm
Gounod, Charles F.
Offenbach, Jacques
Franck, César (24)
Bruckner, Anton (24)
Strauss, Johann (24)
Brahms, Johannes
Borodin, Alexander P. (18)
Cui, César A. (34)
Saint-Saëns, Charles C. (24)
Balakirev, Mili A.
Bizet, Georges
Bruch, Max
Mussorgsky, M. P.
Tchaikovsky, P. I.
Dvorák, Antonin
Boito, A. (30) (63)
Massenet, Jules E.
Sullivan, Sir A. S. (24)
Grieg, Edvard H.
Rimski-Korsakov, N.
Parry, Sir C. H. (32)
Godard, Benjamin
Indy, Paul M. d' (24)
Cowen, Sir F. (24)
Huber, Hans
Humperdinck, E.
Sinding, Christian
Elgar, Sir E. (24)
Leoncavallo, Ruggiero
Puccini, Giacomo
Charpentier, Gustave
Chaminade, Cécile
Debussy, Claude A.
German, Edward
Mascagni, Pietro
Strauss, Richard
Sibelius, J. J. C.
Glazunov, Alexander
Bantock, G. (24)
Rachmaninov, S. V.
Coleridge-Taylor, S.
Stravinsky, Igor
Milhaud, Darius
Hindemith, P.
Korngold, Erich W.
Chavez, Carlos
Shostakovich, Dmitri
Britten, Edward B.

(24) Conductors:

Damrosch, Leopold (23)
Thomas, Theodore
Mahler, Gustav (23)
Toscanini, Arturo
Koussevitsky, Serge
Beecham, Sir Thomas
Stokowski, Leopold
Furtwängler, Wilhelm
Whiteman, Paul
Munch, Charles
Barlow, Howard
Fiedler, Arthur
Mitropoulous, Dimitri
Ormondy, Eugene
Kostelanetz, Andre
Welk, Lawrence

(25) Critics:

Hazlitt, William (36)
Carlyle, Thomas (36) (41)
Sainte-Beuve, Charles
Gervinus, Georg G.
Allibone, Samuel A.
Ruskin, John (90)
Higginson, T. W. (36)
Curtis, G. W. (41)
Norton, C. E. (33)
Rolfe, W. J.
Taine, Hippolyte A.
Furness, H.
Lounsbury, T. R. (33)
Pater, Walter H. (36)
Brandes, Georg
Gosse, E.
Moulton, R. G.
Matthews, B. (33)
Lemaitre, Francois
More, Paul Elmer
Shaw, George Bernard (30)
Phelps, W. L. (33)
Cortissoz, Royal
Belloc, Hilaire (36)
Canby, H. S. (13) (33)
Zweig, Stefan
Nathan, George Jean
Van Doren, Carl (13) (41)
Brooks, Van Wyck (13)
Morley, Christopher (36) (63)
Atkinson, Brooks
Devoto, Bernard (32)
Cowley, Malcolm (96)
Rorimer, James
North, Sterling
Prescott, Orville
Barzun, Jacques (33)

(26) Dancers and Choreographers:

Duncan, Isadora
Fokine, Michel
St. Denis, Ruth
Pavlowa, Anna
Nijinsky, Vaslav
Shawn, Ted
Astaire, Fred
Enters, Angna
Markova, Alicia
Fonteyn, Margot
Graham, Martha
Tallchief, Maria

(27) Designers:

Chippendale, Thomas
Sheraton, Thomas
Heppelwhite, George
Hitchcock, Lambert
Steinway, Henry (55)
Goudy, Frederick
Bakst, Leon
Reinhardt, Max
Geddes, Norman Bel
Loewy, Raymond
Schiaparelli, Elsa
Disney, Walter E. (16)
Dior, Christian

(28) Diplomats:

Jay, John
Talleyrand-Perigord
Gallatin, Albert (78)
Castlereagh, Viscount
Metternich, Prince
Ashburton, Lord
Gadsden, James
Seward, W. H. (78)
Adams, C. F. (78)
Cavour, Count (78)
Bismarck, Prince (78)
Bryce, James (36) (41)
Hay, John (78)
Clemenceau, G.
Root, Elihu (49) (78)
Balfour, A. J. (78)
Witte, Count
Asquith, Herbert H. (78)
Jusserand, J. A. (41)
Bethmann-Hollweg
House, E. M.
Orlando, Vittorio
Briand, Aristide
Grey, Edw. Viscount (78)
Lansing, Robert
Venizelos, E. (78)
Gerard, James R. (78)
Stimson, H. L. (78)
Horthy, de N. Nicholas
Whitlock, Brand (47)
Smuts, Jan (58) (78)
Hull, Cordell (78)
Metaxas, John (78)
Blum, Leon (78)
Sforza, Carlo (78)
Morrow, Dwight W. (15) (78)
Tweedsmuir, Baron (63) (78)
Adenauer, Konrad (51)
Litvinov, Maxim
Osmena, Sergeo (78)
Reynaud, Paul
Byrnes, James F. (49) (78)
Halifax, Viscount
Vargas, Getulio
Lothian, P. H. K.
Aldrich, Winthrop
Bryan, Ruth O.
Koo, V. K. W.
Dulles, John Foster (78)
Winant, John G. (78)
Molotov, V. M. (78)
Mesta, Pearl
Acheson, Dean (51)
Ribbentrop, J. von
Herter, Christian (78)

Lie, Trygve
Eden, Anthony (78)
Jessup, Philip (13) (33)
Chou-en-Lai
Bidault, Georges
Romulo, Carlos P. (47) (58)
Ciano, Count
Hoover, Herbert, Jr.(34)
Bohlen, Charles E.
Bunche, Ralph (33)
Shepilov, Dmitri

(29) Discoverers:

Cabot, John (37)
Columbus, Christopher (62)
Ponce de Leon (37)
Cabot, Sebastian (37)
Balboa, Vasco de (58)
Alvarado, Pedro
Cartier, Jacques
Soto, Hernando de
Drake, Sir Francis
Gosnold, Bartholomew
Raleigh, Sir W.
Champlain, S. de (61)
Hudson, Henry (62)
Marquette, Jacques
Hennepin, Louis (86)
La Salle, Sieur de (62)
Joliet, Louis
Clark, William
Lewis, Meriwether
Pike, Zebulon (58)
Fremont, J. C. (58) (78)

(30) Dramatists:

AMERICAN

Payne, John H.
Herne, James A. (1)
Howard, B.
Gillette, Wm. (1)
Thomas, A.
Fitch, W. Clyde
Moody, W. V. (33) (77)
Kennedy, C. R.
Peabody, Josephine P. (77)
Mackaye, Percy (77)
Cohan, George M.
Sheldon, E. B.
Anderson, Maxwell
O'Neill, Eugene G.
Kaufman, George
Connelly, Marc
Crouse, Russell
Hammerstein, Oscar
Sherwood, Robt. E. (13)
Williams, Tennessee

WORLD

Thespis
Aeschylus
Sophocles
Euripides
Aristophanes (43)
Menander (43)
Plautus (43)
Terence (43)
Vega Carpio, Lope
Marlowe, Christopher (77)
Shakespeare, William (77)
Jonson, Ben (77)
Fletcher, John
Webster, John
Beaumont, F.
Ford, John
Calderon de la Barca, Pedro
Corneille, Pierre
Molière (43)
Racine, Jean B.
Congreve, William (43)
Goldoni, Carlo
Lessing, Gotthold E. (25)
Beaumarchais, Pierre de
Alfieri, Count
Sheridan, Richard B. (64) (78)
Schiller, Johann F. (77)
Kleist, Bernd von
Knowles, James S.
Grillparzer, F. (77)
Scribe, Augustin E.
Hertz, Henrik
Hugo, Victor (63) (77)
Augier, G. Victor
Dumas the Younger
Ibsen, Henrik
Sardou, Victorien
Echegaray, Jose
Gilbert, Wm. S. (43)
Perez-Galdos, B.
Strindberg, August
Parker, Louis N.
Pinero, Sir Arthur W.
Shaw, George Bernard (25)
Wilde, Oscar (63)
Hervieu, Paul
Sudermann, H. (63)
Brieux, Eugene
Donnay, Maurice C.
Gregory, Lady
Lavedan, Henri
Hyde, Douglas
Hauptmann, Gerhart (63)
Maeterlinck, Maurice (63)
Schnitzler, Arthur
Annunzio, Gabrielle d'
Wedekind, Frank
Benavente, Jacinto
Galsworthy, John (63)
Bergström, Hjalmar
Phillips, Stephen (77)
Rostand, Edmond (77)
Synge, John M.
Bernstein, Henry L.
Dunsany, Lord
Colum, Padraic
Drinkwater, John
Ervine, St. John
O'Casey, Sean
Coward, Noel (1) (23)
Van Druten, John
Fry, Christopher

(31) Economists:

Bodin, Jean (79)
Quesnay, F. (72)
Hume, David (41) (70)
Smith, Adam
Turgot, A. R. J.
Malthus, Thomas R.
Ricardo, David
Mill, James (41) (70)
Cobden, Richard (78)
Mill, John S. (70) (91)
Passy, F. (78)
Bagehot, Walter (25)
Jevons, William S.
George, Henry (90)
Sumner, William G.
Patten, Simon N.
Hadley, A. T. (33)
Veblen, T. B. (33) (90)
Johnson, E. R. (33)
Fisher, Irving (33)
Moody, John
Babson, Roger
Keynes, J. M.
Nearing, S. (90)
Laski, Harold J.
Gallup, George H. (77)
James, Frank C. (33)
Ward, Barbara (32)

(32) Editors:

AMERICAN

Hale, Sara Josepha
Bennett, J. G.
Greeley, Horace (78)
Bigelow, John
Dana, Charles A.
Bowles, Samuel
Warner, C. D. (63)
Reid, Whitelaw
Watterson, Henry
Pulitzer, Joseph (78)
Stone, Melville E.
Grady, H. W. (64)
Johnson, R. U.
Bigelow, P.
Page, Walter H. (25)
Lummis, C. F.
Perry, Bliss (25) (33)
Bok, Edward (83)
Brisbane, Arthur
Harvey, George B. (28)
Hapgood, N.
Lorimer, George H.
White, W. Allen (13) (63)
Du Bois, W. E. B. (33)
Baker, Ray S. (13) (36)
Grosvenor, G. H.
Hard, William
McCormick, J. Medill
Patterson, J. M.
Wilson, Edmund
White, Elwyn B.
Sulzberger, Arthur H.

WORLD

La Bouchere, H. du Pre
Harden, Maximilian
Northcliffe, Baron
O'Connor, Thomas P.
MacDonald, James A.

(33) Educators:

AMERICAN

Harvard, John (95)
Yale, Elihu
Dwight, Timothy (95)
Morse, Jedidiah
Gallaudet, Thomas Hopkins
Willard, Emma
Pierce, Cyrus
Mann, Horace (78)
Lyon, Mary
Hopkins, Mark (95)
Peabody, Elizabeth
Barnard, Frederick Augustus Porter (54) (73)
Barnard, Henry (32)
Hill, T. (61) (6) (28)
Angell, J. B. (78)
Gilman, D. C. (32)
White, Andrew Dickson (28)
Eliot, Charles W. (18) (78)
Adams, Charles Kendall (41)
Harris, W. T. (70)
Gallaudet, E. M.
De Garmo, Charles
Barnes, Mary S.
Palmer, Alice Freeman
Farmer, Fanny
Washington, Booker Taliaferro
McMurry, Frank M.
Cross, Wilbur Lucius
Finley, John Huston (79)
Garfield, Harry A.
Woolley, Mary Emma
Gulick, Luther H.
Baker, George Pierce
Flexner, Abraham
Kilpatrick, Wm. H.
Wirt, William A.
Bethune, Mary McLeod
Jessup, Walter A.
Flint, Charles W.
Day, Edmund E. (31)
O'Hara, Rev. John F. (95)
Haas, Francis Jos. (78)
Sproul, Robt. G.
Gannon, Rev. Robt. I. (95)
Conant, James B. (18)
Adams, Arthur Stanton
Hatcher, Harlan (41)
Goheen, Robert
Hutchins, Robert M.
Dodds, Harold W. (79)
Johnson, George (21)
Barr, Stringfellow (32)
Thurman, Howard
Hunt, Herold C.
Griswold, Alfred W. (41)
Mumford, Lawrence Q.
Kirk, Grayson L.
Killian, James R., Jr.
Horwich, Frances R.
Pusey, Nathan M.
Allen, James E., Jr.

WORLD

Protagoras (70)
Socrates (70)
Isocrates (25) (64)
Plato (70)
Aristotle (70)
Cicero (36) (64) (78)
Apollonius of Tyana (70)
Quintilian
Clement of Alexandria (95)
Origen (95)
Benedict, St. (95)
Alcuin (95)
Alfred the Great (87)
Anselm, St. (70)
John of Salisbury
Albertus Magnus (95)
Aquinas, St. Thomas (phil.) (70) (95)
Pletho, Georgius Gemistus (70)
Colet, John (95)
Ascham, Roger (28)
Comenius, J. A.
Epée, Abbé de l' (68)
Rousseau, Jean Jacques (91)
Basedow, Johann B.
Pestalozzi, Johann Heinrich
Bell, Andrew (91)
Girard, Jean B.
Herbart, Johann Friedrich (70) (82)
Jahn, Friedrich L.
Lancaster, Joseph
Froebel, F. W.
Diesterweg, Friedrich Adolf Wilhelm
Arnold, Thomas (41)
Braille, Louis
Pitman, Sir Isaac
Fryer, John (28)
Tory, Henry M.
Falconer, Robert A. (95)
Cody, Henry J.
Montessori, Maria (72)

(34) Engineers and Builders:

McAdam, John L.
Stephenson, George (46)
Fairbairn, Sir W.
Brassey, Thomas
Lesseps, Viscount de
Cooke, Sir W. F. (46)
Roebling, John A.
Eads, J. B. (46)
Fleming, Sir S.
Eiffel, A. G. (11)
Lindenthal, Gustav
Hammond, John H.
Goethals, G. W.
Gaillard, D. Du Bose
Parsons, W. Barclay
Modjeski, Ralph
Nixon, Lewis
O'Shaughnessy, M. M.
Steinmetz, C. P.
Cooper, Hugh L.
Strauss, J. B.
Kettering, C. F. (46)
Von Karman, Theodore
Barnes, Henry A.
Braun, Wernher von

(35) Engravers and Etchers:

Mantegna, Andrea (67)
Durer, Albrecht (67)
Holbein, Hans (67)

Van Dyck, Sir A. (67)
Claude Lorraine (67)
Rembrandt (67)
Potter, Paul (67)
Ruysdael, Jacob (67)
Hogarth, Wm. (67)
Bewick, Thomas (60)
Turner, J. M. W. (67)
Durand, Asher B.
Currier, Nathaniel
Jacque, Charles (67)
Millet, Jean F. (67)
Daubigny, C. F. (67)
Whistler, James A. McN. (67)
Dielman, F. (67)
Cole, Timothy
Low, Will H. (67)
Pennell, Joseph
Remington, F.
Gibson, C. D. (44)
Christy, H. C. (44)
Fisher, H.
Flagg, James M. (44)
Kauffer, E. McK.

(36) Essayists:

Cicero (64)
Montaigne
Walton, Izaak (13)
Addison, Joseph (77)
Steele, Sir Richard (30)
Chesterfield, Earl of
Johnson, Samuel (25) (69) (77)
Walpole, Horace
Staël, Madame de
Lamb, Charles (25)
Irving, Washington (13) (41)
Hunt, Leigh (47)
De Quincy, Thomas (25)
Repplier, Agnes
Huneker, James
Le Gallienne, R. (77)

(37) Explorers:

Cabot, John
Columbus, Christopher (62)
Ponce de Leon
Cabot, Sebastian (62)
Balboa, Vasco de (58)
Alvarado, Pedro
Cartier, Jacques
Soto, Hernando de
Gosnold, Bartholomew
Raleigh, Sir Walter
Champlain, S. de (61)
Hudson, Henry (62)
Marquette, Jacques
Hennepin, Louis (86)
La Salle, Sieur de (62)
Joliet, Louis
Bruce, James
Vancouver, G.
Clark, William
Park, Mungo
Lewis, Meriwether
Pike, Zebulon M. (58)
Franklin, Sir John (61)
Fremont, John C. (58)
Livingstone, David (86)
Barth, Heinrich (40)
Speke, John H.
Markham, Sir C. (40)
Nordenskjöld, Nils (40)
Muir, John
Przhevalski, N. (100) (39)
Emin Pasha (72)
Stanley, Sir H. M. (47)
Greely, A. W. (58)
Peary, R. E (6) (61)
Nansen, Fridtjof
Kingsley, Mary (18)
Younghusband, Sir F. E. (58)
Borchgrevink, Carston E.
Cook, Frederick A. (72)
Hedin, S. A. (39)
Scott, Robert Falcon
Amundsen, Roald
Abruzzi, Duke of the
MacMillan, Donald B.
Shackleton, Sir E. H.
Stefansson, V. (6)
Mawson, Sir Douglas
Andrews, R. C. (60)
Hubbard, Bernard R. (39)
Wilkins, Sir Geo. H.
Byrd, Richard E. (11)
Hillary, Sir Edmund

(38) Foresters:

Sargent, Charles Sprague (14)
Davey, John
Pinchot, Gifford (78)

(39) Geographers and Oceanographers:

Strabo
Mercator, Gerardus
Humboldt, F. H. (18) (73)
Espy, James Pollaed
Reclus, Jean J. E.
Marsh, Othniel (100)
Cope, Edward D. (100)
Gannett, Henry
Merriam, John C.

(40) Geologists and Paleontologists:

Hitchcock, E. (33) (95)
Lyell, Sir Charles
Miller, Hugh
Dana, James D. (33)
Dawson, Sir John W. (33)
Le Conte, Joseph (73)
Hayden, Ferdinand V.
Geikie, Sir Archibald
Zittel, Karl A. von
King, Clarence (46)
Chamberlin, T. (33)
Osborn, Henry F. (33) (100)
Wallace, R. C.

(41) Historians:

Herodotus
Thucydides (64)
Xenophon (33)
Polybius
Nepos, Cornelius
Sallust
Livy
Josephus, Flavius
Tacitus, Publius (64)
Arrian
Eusebius of Caesarea
Cassiodorus
Bede, the Venerable
Einhard
Anna Comnena
Froissart, Jean
Vega, Garcilaso de la
Hakluyt, Richard
Holinshed, Raphael
Pepys, Samuel (13)
Gibbon, Edward
Hallam, Henry
Guizot, Francois
Sparks, Jared (33)
Grote, George (78)
Lockhart, John G. (13)
Ranke, Leopold von
Prescott, Wm. Hickling
Bancroft, George
Macaulay, T. B. (36) (78)
Fergusson, James
Creasy, Sir E. S.
Lossing, Benson J.
Motley, John L.
Graetz, Heinrich
Mommsen, Theodore
Froude, James A.
Gregorovius, F. (77)
Freeman, Edw. A.
Parkman, Francis
Smith, Goldwin (33) (79)
Lea, H. C.
Stubbs, William (95)
Gardiner, Samuel R.
McCarthy, Justin
Bancroft, H. H.
Stephen, Leslie (13)
Acton, Baron (33)
Bourinot, Sir J. G.
Morley of Blackburn, Viscount (13) (36)
Green, John R.
Lecky, W. E.
Adams, Henry (13)
Trevelyan, Sir G. O. (78)
Symonds, J. A. (25)
Fiske, John
Doughty, C. M.
Rhodes, J. F. (36)
McMaster, J. B. (33)
Hart, Albert B. (33)
Tarbell, Ida M. (13)
Sedgwick, H. D. (36)
Robinson, J. H. (33)
Andrews, Charles M.
Howe, De Wolfe (13)
Wells, Herbert G. (63)
Hazen, Charles D.
Hendrick, Burton J. (47)
Ferrero, Guglielmo
Beard, Charles A. (33)
Trevelyan, G. M.
Adams, J. T. (36)
Ludwig, Emil (13)
Van Loon, Hendrik W.
Schlesinger, Arthur M.
Toynbee, Arnold J.
Guedalla, Philip (13)
Nevins, Allan
Carmer, Carl (63)
Angle, Paul
Mason, T. Van Wyck
Commager, Henry Steele

(42) Horticulturists:

Burbank, Luther
Bailey, L. H. (14) (33)

(43) Humorists and Satirists:

Aristophanes (30)
Menander (30)
Plautus (30)
Terence (30)
Juvenal (77)
Apuleius (63)
Rabelais (36)
Cervantes (63)
Butler, Samuel (77)
Moliere (30)
Swift, Jonathan (36)
Smith, Sydney (36)
Barham, Richard H. (77)
Halliburton, Thomas C.
Jerrold, Douglas
Shaw, Henry Wheeler
Browne, Charles T.
Clemens, Samuel (63)
Bierce, Ambrose (63)
Nye, Edgar Wilson
Bunner, Henry C. (63)
Jerome, Jerome K. (63)
Mason, Walt
Ade, George (30)
Burgess, F. G.
Dunne, Finley Peter
Leacock, Stephen B. (31)
Beerbohm, Max (36)
Irwin, Wallace (63)
Chesterton, Gilbert K. (36) (63) (77)
Rogers, Will
Mencken, Henry L. (32)
Guest, E. A.
Adams, F. P. (77)
Wodehouse, P. G.
Thurber, James G.

(44) Illustrators:

Rowlandson, Thomas
Cruikshank, George
Dore, Paul G. (67)
Du Maurier, George (63)
Vedder, Elihu (67)
Crane, Walter
Frost, Arthur B. (48)
Abbey, E. A. (67)
Pyle, Howard (48) (67)
Beardsley, Aubrey
Fisher, Harrison
Flagg, James M.
Kent, Rockwell (67)

(45) Industrialists:

Slater, Samuel
Krupp, Alfred
Carnegie, A.
Phipps, Henry
Frick, H. C.
Rhondda, Lord
Schwab, C. M.
Ford, Henry
Chrysler, Walter P.
Kaiser, Henry J.
Gifford, W. S.
Wilson, Charles E.
Curtice, Harlow
Reed, Philip D.
Ford, Henry II

(46) Inventors:

AMERICAN

Fitch, John
Stevens, John (34)
Evans, Oliver
Fulton, R. (34)
Whitney, E. (53)
Hoe, Robert (53)
Cooper, Peter (53) (68)
Morse, Samuel F. B. (67) (73)
Allen, Zachariah (53)
Bogardus, James
Goodyear, Charles
Borden, Gail (53)
McCormick, C. H. (53)
Otis, Elisha Graves
Hoe, Richard M. (53)
Colt, Samuel (53)
Corliss, G. H. (53)
Gatling, Richard J.
Howe, Elias (53)
Sholes, C. L.
McKay, Gordon (53)
Wilson, A. B. (53)
Gordon, C. G.
Gray, Elisha
Dolbear, A. E. (33)
Hyatt, John Wesley
Hammond, J. B.
Hoe, Robert (53)
Maxim, Sir H. S. (34) (53)
Holland, John Philip
Selden, G. B.
Westinghouse, George (53)
Bell, Alexander Graham (33) (73)
Edison, Thomas Alva
Tripler, Charles E. (73)
Berliner, Emile
Frasch, Herman
Thomson, Elihu
Eastman, George (53)
Fiske, B. A. (61)
Mergenthaler, Ottmar
Browning, John M.
Acheson, E. G.
Ives, Frederic Eugene
Tesla, Nikola (34)
Lewis, Isaac N.
Diesel, Rudolf
Sperry, E. A.
Hewitt, Peter C. (34)
Bakeland, Leo Hendrik
Hall, C. M. (18) (53)
De Forest, Lee
Ives, Herbert Eugene (73)
Birdseye, Clarence
Maxim, Hiram Percy (34)
Kettering, Charles F. (34)
Alexanderson, E. F. W.

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Gutenberg, Johannes
Palissy, Bernard de (18) (73)
Böttger, J. F. (18)
Papin, Dennis (73)
Newcomen, Thomas
Ged, William
Harrison, John
Dollond, John
Arkwright, Sir Richard (53)
Hargreaves, James
Jacquard, Joseph M.
Crompton, Samuel
Senefelder, Aloys
Daguerre, Louis Jacques (67)
Ericsson, John (34)
Armstrong, Sir W. G. (34) (53)
Bessemer, Sir Henry (34) (53)
Geissler, Heinrich (53)
Albert, Joseph
Nobel, A. B. (18) (53)
Benz, Karl
Parsons, Sir C. A. (34)
Claude, Georges
Marconi, Guglielmo (34)

(47) Journalists:

Bowles, Samuel
Reid, Whitelaw (78)
Graham, Hugh
Pulitzer, Joseph (83)
Stone, Melville E.
Ochs, Adolph S. (83)
Northcliffe, Baron (78) (83)
Irwin, W. H. (63)
Cobb, Irvin S. (43)
Kaltenborn, H. V.
Beaverbrook, William (78) (83)
Hansen, Harry
Costain, Thomas B.
Woolcott, Alex (36)
Hall, James Norman
Lawrence, David
Duranty, Walter
Wallace, Henry A. (3) (78)
Broun, Heywood
Lippmann, Walter (36) (79)
Davis, Elmer
De Kruif, Paul (74)
Thompson, Dorothy
Seltzer, Louis B.
Winchell, Walter
Eisenhower, Milton (33) (78)
Sheean, James Vincent
Pyle, Ernest T. (32)
Ingersoll, Ralph
Gunther, John (41)
Vandercook, John W.
Wylie, Philip
Murrow, Edw. R.
Reston, James B.
Seaton, Frederick A.
Alsop, Stewart
Daly, John Charles
Riesel, Victor
Agronsky, Martin

(48) Juvenile Writers:

Aesop
La Fontaine, Jean de (63)
Perrault, Chas. (36) (77)
Grimm, J. L. (69)
Goodrich, Samuel G.
Andersen, Hans C.
Optic, Oliver
Hughes, Thomas
Trowbridge, J. T. (63) (77)
Alcott, Louisa May (63)
Carroll, Lewis (54)
Eggleston, Edward (32) (63)
Dodge, Mary E. M.
Cox, Palmer (44)
Harris, J. C. (63)
Pyle, Howard (44) (67)
Lagerlöf, Selma (63)
Wiggin, Kate Douglas (33) (63)

(49) Jurists:

Jeffreys, Baron
Erskine, Lord (64)
Marshall, John (78)
Taney, Roger B.
Brougham, H. (70) (78)
Story, Joseph
Chase, S. P. (78)
Field, Stephen J.
Fuller, Melville W.
Harlan, J. M.
Holmes, Oliver W.
Brandeis, L. D. (79)
Hughes, C. E. (28) (78)
McReynolds, J.
Landis, Kenesaw M.
Cardozo, B. M. (52)
Hand, Learned
Frankfurter, Felix (33)
Allen, Florence E.
Black, Hugo L. (78)
Burton, H. H. (78)
Rutledge, W. B.
Vinson, F. M. (78)
Warren, Earl
Harlan, John M.
Hastie, William Henry
Brennan, Wm. Jos.

(50) Labor Leaders:

Gompers, Samuel
Mitchell, John
Green, William
Lewis, John L.
Hillman, Sidney
Meany, George
Reuther, Walter P.

(51) Lawyers:

Choate, Rufus
Field, David D.
Lockwood, Belva
Choate, Joseph H.
Ingersoll, Robert G. (64)
Kellogg, Frank B. (28) (78)
Darrow, Clarence
Clarke, John H.
Landis, James M. (78)
Stevenson, William Edward
Dewey, T. E. (78)
Brownell, Herbert Jr.
Clement, Frank Good

(52) Legal Writers:

Gaius (49)
Justinian (87)
Bracton, H. de (95)
Littleton, Sir T. (49) (51)
Coke, Sir E. (49) (51)
Hale, Sir M. (51)
Blackstone, W. (49)
Bentham, Jeremy (31) (70)
Kent, James (49) (51)
Livingston, E. (70)
Story, Jos. (49) (51)
Dana, R. H. (49)
Dwight, T. W. (33) (49)
Ames, J. B.
Hutchins, H. B.
Pepper, G. W. (78)
Pound, Roscoe (33)

(53) Manufacturers:

Alströmer, Jonas
Wedgewood, Josiah
Whitney, E.
Slater, Samuel
Hoe, Robert (46)
Cooper, Peter (46) (68)
Allen, Zachariah
Borden, Gail
McCormick, C. H. (46)
Hoe, Richard M. (46)
Krupp, Alfred
Colt, Samuel (46)
Faber, Johann
Corliss, G. H. (46)
McKay, Gordon (46)
Wilson, A. B. (46)
Pullman, G. M. (46)
Armour, Philip D.
Carnegie, A. (15) (68)
Solvay, Ernest (18) (46)
Phipps, Henry (68)
Hoe, Robert (46)
Maxim, Sir H. D. (34) (46)
Westinghouse, G. (46)
Frick, H. C. (15)
Eastman, George (46)
Beck, Sir Adam
Schwab, C. M. (15) (45)
Ford, Henry (45)
Du Pont, T. Coleman (15)
Hall, C. M. (18) (46)
Chrysler, Walter P. (10) (45)
Kaiser, Henry J. (45)
Wilson, Charles E. (45)
Blough, Roger M.
Ford, Henry II

(54) Mathematicians:

Anaximander (9) (70)
Euclid
Archimedes (46)
Apollonius
Cardan, J. (33) (70) (72)
Napier, John
Briggs, Henry
Gunter, Edmund (9)
Bernoulli, James
Bernoulli, John
Euler, Leonhard
Clairant, Alexis Claude (9) (73)
Alembert, J. d' (36) (70)
Lagrange, Joseph Louis, Count
Fourier, Jean Baptiste Joseph, Baron (73)
Gauss, Karl F.
Cauchy, A. L., Baron
Abel, Niels Henrik
Hamilton, Sir W. R.
Pierce, Benjamin (9)
Russell, Bertrand A. (70)
Jeans, James H. (9)
Wiener, Norbert

(55) Merchants:

Faneuil, Peter (68)
McGill, James (68)
Girard, Stephen (68)
Astor, John Jacob
Lawrence, Abbott (68)
Tiffany, C. L.
Eaton, Timothy
Field, Marshall (68)
Wanamaker, John (78)
Altman, Benjamin
Ward, Montgomery
Straus, Nathan (68)
Lipton, Sir T. (92)
Woolworth, Frank W.
Rosenwald, Julius (68)
Penney, James C.
Shaver, Dorothy

(56) Metallurgists:

Babbitt, Isaac
Bessemer, Sir Henry
Hall, C. M. (18) (46)

(57) Meteorologists:

Boyle, Robert (18) (73)
Lavoisier, Antoine Laurent (18)
Dalton, John (18) (73)
Gay-Lussac, Joseph Louis (73)
Espy, James P.
Helmholtz, Hermann L. F. von (73) (74)

(58) Military Leaders:

ANCIENT

Miltiades
Themistocles (78)
Cimon
Pelopidas
Alcibiades (78)
Camillus, Marcus
Epaminondas (78)
Alexander the Great (78)
Pyrrhus
Hamilcar Barca
Fabius, Maximus
Hannibal
Scipio Major
Scipio Minor
Marius, Gaius
Sulla, Lucius (87)
Spartacus
Crassus, Marcus (78)
Lucullus, Lucius
Pompey (78)
Cassius
Cæsar, Julius (78) (87)
Antony, Mark (78) (64)
Ariovistus
Drusus, Nero C.
Arminius
Aurelianus (87)

MEDIEVAL

(476 A.D. to 1492 A.D.)
Belisarius
Charles Martel (78)
William I, *Eng.* (78)
Godfrey of Bouillon
Saladin (87)
Richard I, *Eng.* (87)
Genghis Khan (87)
Wallace, Sir W.
Bruce, Robert (87)
DuGuesclin, Bertrand
Edward, the Black Prince (87)
Timur (87)
Bajazet I (87)
Glendower, O. (87)
Hunyadi János
Joan of Arc
Warwick, Earl of (87)

MODERN

Boabdil
Pizarro, Francisco
Bayard, Chevalier
Berlichingen, G. von
Cortes, Hernando (37)
Alvarado, Pedro de
Foix, Gaston de
Bourbon, Charles
Gustavus I Vasa (78)
Alva, Duke of (78)
Conde, Louis I, Prince de
William the Silent (78)
John of Austria
Guise, Henri de Lorraine (78)
Henry IV of France (78)
Sidney, Sir Philip (77)
Tilly, Johann T.
Maurice, Prince of Orange (78)
Wallenstein, A. von
Gustavus II Adolphus (78)
Turenne, Vicomte de
John III Sobieski (78)
Marlborough, Duke (78)
Eugene, Prince
Frederick the Great (78)
Herkimer, Nicholas
Putnam, Israel
Kalb, Baron de
Burgoyne, John (30)
Clive, Baron (78)

Rochambeau, C. de
Gates, Horatio
Stark, John
Steuben, Baron
Marion, Francis
Washington, George (22) (34) (78)
Clinton, Sir Henry
Cornwallis, Marquis (78)
Allen, Ethan (78)
Dumouriez, Charles F.
Warren, Joseph (72)
Blücher, Gebhard von
Greene, Nathanael
Toussaint L'Overture, Francois
Kutuzov, Mikhail
Wayne, Anthony
Kosciusko, Tadeusz
Pulaski, Casimir
Knox, Henry
Lee, Henry (78)
Lafayette, Marquis de (78)
Barclay de Tolly, M.
Moore, Sir John
Grouchy, Marquis de
Hofer, Andreas
Jackson, Andrew (78)
Murat, Joachim
Napoleon Bonaparte (78)
Brock, Sir Isaac
Wellington, Duke of (78)
Ney, Michel
Soult, Nicolas
Davout, Louis N.
Harrison, William H. (78)
Jomini, Henri, Baron
Napier, Sir Charles J.
Bolivar, S. (78)
Taylor, Zachary (78)
Scott, Winfield
Ibrahim Pasha
Campbell, Sir Colin
Ypsilanti, Alexander
Havelock, Sir Henry
Santa Anna A. de
Moltke, Count von
Johnston, Albert S.
Anderson, Robert
Johnston, Joseph E.
Lee, Robert E. (33)
Garibaldi, G.
Hooker, Joseph
Kearny, Philip
Meade, George G.
Early, Jubal A. (49)
Thomas, George H.
Bragg, Braxton
Beauregard, P. G. T.
Hampton, Wade (78)
Sherman, W. T.
Longstreet, James
Grant, U. S. (78)
Burnside, A. E. (78)
Hancock, Winfield S.
Jackson, T. J.
Hill, Ambrose P.
Pickett, George E.
McClellan, George B. (78)
Howard, Oliver Otis (33)
Hood, John Bell
Sheridan, Philip H.
Roberts, Sir F. S.
Gordon, Charles G.
Stuart, James E.
Custer, George A.
Miles, Nelson A.
Oyama, Iwao, Prince
Kuroki, Count
Hindenburg, Paul von (78)
Kuropatkin, Alexei
Gallieni, Joseph S.
Nogi, Count
Cadorna, Count Luigi
Kitchener of Khartum
Connaught, Duke of
Foch, Ferdinand
Joffre, Joseph J.
French, Lord John D.
Bliss, T. H.
DeWet, C. R.
Petain, Henri P.
Baden-Powell, R. S.
Allenby, Sir Edmund
Diaz, Armando
Haig, Douglas
Botha, Louis (78)
Byng, Sir Julian
Funston, Fred
Ludendorff, E.
Badoglio, Pietro
Currie, Sir Arthur
MacArthur, Douglas
Marshall, George C. (28)
Brauchitsch, W. von
Keitel, Wilhelm
Donovan Wm. J. (49)
Stillwell, Joseph
Wavell, Sir A. P.
Patton, George S.
Arnold, H. H.
Newall, Sir C. L.
Gort, John S.
Montgomery, B. L.
Eisenhower, D. D. (33)
De Gaulle, Charles
Alexander of Tunis, Vct.
Franco, Francisco (78)
Bradley, Omar
Mao Tse-Tung (78)
Timoshenko, S.
Zhukov, Gregory
Clark, Mark
Doolittle, James H. (11)
Clay, Lucius D. (78)
Rommel, Erwin
Ridgway, Matthew B.
Mitchell, William (General "Billy")
Gruenther, Alfred
Norstad, Lauris

(59) Musicians:

AMERICAN

Nordica, Lillian
Schumann-Heink, E.
Fremstad, Olive
Homer, Louise
Garden, Mary
Hofmann, Josef (75)
Martin, Riccardo
Farrar, Geraldine
Stokowski, Leopold A.
Werrenrath, R.
Gluck, Alma
Hayes, Roland
Tibbett, Lawrence M.
Ponselle, Rosa
Rodgers, Richard
Swarthout, Gladys
Anderson, Marian
Traubel, Helen
Pons, Lily
MacDonald, Jeanette
Stevens, Rise
Munsel, Patrice

WORLD

Garcia, Manuel del P.
Paganini, Niccolo (98)
Garcia, Manuel
Malibran, Maria F.
Bull, Ole Bornemann (98)
Chopin, Frederic F. (23) (75)
Liszt, Franz (23) (75)
Lind, Jenny
Rubenstein, A. (23)
Faure, Jean B. (23)
Von Bulow, Hans G.
Joachim, Joseph
Clauss-Szavardy, W.
Guilmant, Felix
Paderewski, I. (23) (75) (78)
Melba, Nellie
Albert, E. F. d' (23)
Calve, Emma
Lauder, Sir Harry
Caruso, Enrico
Chaliapin, Fyodor Ivanovich
Tetrazzini, Luisa
Kreisler, Fritz (23) (98)
Schweitzer, Albert (65) (70) (72) (95)
Kubelik, Jan (98)
Grainger, Percy (23) (75)
McCormack, John
Martinelli, G.
Bori, Lucrezia
Zimbalist, E. (98)
Galli-Curci, Amelita
Elman, Mischa (98)
Flagstad, Kirsten
Heifetz, Jascha (98)

(60) Naturalists:

White, Gilbert (14)
Audubon, J. J. (67)
Baer, Karl Ernst von
Fabre, Jean Henri
Comstock, Anna B. (33) (44)
Hornaday, W. H.
Hudson, W. H. (63)
Seton, E. T. (67)
Beebe, William (47)
Teale, Edwin Way

(61) Naval Commanders:

Coligny, G. de
Hawkins, Sir John
Drake, Sir F. (37) (62)
Raleigh, Sir W. (37)
Tromp, Martin H.
Blake, Robert
Morgan, Sir Henry
Iberville, Sieur de
Boscawen, Richard
Hopkins, Esek
Rodney, Lord
Howe, Richard, Earl
Barry, John
Jones, John Paul
Nelson, H., Viscount
Bainbridge, William
Decatur, Stephen
Lawrence, James
Perry, Oliver Hazard
Farragut, D. G.
Foote, Andrew Hull
Porter, David D.
Dewey, George
Schley, Winfield S.
Mahan, A. T. (36)
Sampson, W. T.
Sigsbee, Charles D.
Evans, Robley D.
Togo, Count
Tirpitz, Alfred von
Sims, W. S.
Beatty, Sir David
Leahy, William D. (78)
King, Ernest J.
Stark, Harold R.
Halsey, W. F.
Cunningham, Sir A.
Nimitz, C. W.
Mountbatten, Louis

(62) Navigators:

Diaz, Bartholomew (37)
Vespucci, A. (37)
Gama, Vasco da (37)
Magellan, F. (37)
Verranzo, G. da
Frobisher, Sir M. (61)
Davis, John (37)
Baffin, William
Bering, Vitus (37)
Cook, Captain J. (37)
Bougainville, L. A. de (37) (39)
Laperouse, Count de (37)
Flinders, M. (39)
Wilkes, C. (37) (61)

(63) Novelists and Story Tellers:

AMERICAN

Brown, Charles Brockden
Cooper, James Fenimore
Hawthorne, Nathaniel (48)
Stowe, Harriet B. (47) (91)
Melville, Herman
Wallace, Lewis (58) (78)
Davis, Rebecca Harding
Jackson, Helen Hunt (77)
Alger, Horatio
Howells, W. D. (25) (36)
Smith, F. Hopkinson (34) (67)
Harte, Bret (77)
James, H. (36)
Cable, George W.
Hardy, Arthur S. (78)
Boyesen, Hjalmar (36)
Allen, James Lane
Burnett, Frances H. (30) (48)
Jewett, Sarah Orne
Page, Thomas Nelson (78)
Crawford, F. M.
Atherton, Gertrude
Deland, Margaretta Wade (36)
Bacheller, Irving
Garland, Hamlin (77)
Wister, Owen
Long, J. L. (49)
Freeman, Mary E.
Porter, W. S. ("O. Henry") (47)
Wharton, Edith
Fox, J. W., Jr.
Davis, R. H. (47)
Dixon, Thomas (30)
Ford, P. L. (41)
McCutcheon, G. B.
Nicholson, Meredith
Herrick, Robert (33)
Porter, Gene Stratton (100)
Tarkington, B. (30)
Norris, Frank
Rice, Alice C. H.
Adams, Samuel Hopkins
Churchill, Winston
Dreiser, Theodore (47)
Stein, Gertrude
Glasgow, Ellen A.
Cather, Willa (36)
Anderson, Sherwood (47)
London, Jack (91)
Rinehart, Mary R. (30)
Beach, Rex (30)
Glass, Montague
Fisher, Dorothy C. (36)
Cabell, James B.
Erskine, John
Post, Emily (47)
Hergesheimer, J.
Kyne, P. B.
Norris, Kathleen
Heyward, Du Bose
Roberts, Kenneth L.
Lewis, Sinclair
Dell, Floyd
Gardner, Erle Stanley
Ferber, Edna
Buck, Pearl
Marquand, John P.
Bromfield, Louis
Fitzgerald, F. Scott
Faulkner, William
Wilder, Thornton
Hemingway, E.
Adamic, Louis
Mitchell, Margaret
Wolfe, Thos. C.
Caldwell, Erskine
Preston Steinbeck, John
Cozzens, James Gould
Farrell, Jas. T.
Kantor, MacKinlay
O'Hara, John Henry
Warren, Robt. P.
Michener, James
Stuart, Jessie H.
Saroyan, William
Hersey, John

ENGLISH

Malory, Sir Thomas
Bunyan, John (95)
Defoe, Daniel (47)
Richardson, Samuel
Fielding, Henry
Sterne, Laurence
Smollett, Tobias George
Goldsmith, Oliver (30) (77)
Scott, Sir Walter (79)
Austen, Jane
Porter, Jane
Marryat, Frederick
Shelley, Mary G.
Lytton, Bulwer-Lytton, Lord
Gaskell, Elizabeth
Thackeray, Wm. M. (36) (43)
Dickens, Charles
Reade, Charles
Trollope, Anthony
Brontë, Charlotte
Eliot, George (77)
Kingsley, Charles (48)
Collins, Wilkie
Blackmore, Richard Doddridge
Meredith, George (77)
Butler, Samuel
De Morgan, W. F. (46)
Ramée, Louise de la
Hardy, Thomas
Stevenson, Robert Louis (36) (48)
Watson, John (95)
Ward, Mrs. Humphry
Caine, Hall (30)
Conrad, Joseph
Harris, Frank (13)
Haggard, Sir H. R. (49)
Doyle, Sir A. C. (72)
Barrie, Sir James M. (30) (48)
Gordon, C. W. (95)
Roberts, C. G.
Parker, Sir H. G.
Phillpotts, Eden
Hawkins, Anthony H.
Locke, William J.
Corelli, Marie
Hichens, Robert S.
Grand, Sarah
Hannay, J. O. (95)
Kipling, Rudyard (48) (77)
Oppenheim, E. P.
Wells, Herbert G. (41)
Bennett, A. (30) (36) (47)
Hobbes, John Oliver
Maugham, W. S.
Hutchinson, A. S.
Woolf, Virginia (25)
Joyce, James (77)
Walpole, Hugh
Lawrence, D. H.
Aldington, Richard (77)
Christie, Agatha
Sackville-West, V.
West, Rebecca
Sayers, Dorothy
Priestley, John B.
Graves, Robert
Jameson, Storm
Forester, Cecil S.
Waugh, Evelyn
Greene, Graham
DuMaurier, Daphne

WORLD

Æsop
Apuleius
Boccaccio, Giovanni
Rabelais, François
Cervantes
Bergerac, Cyrano de (30)
La Fontaine, Jean de (77)
Perrault, Charles (poet) (48)
Lesage, Alain R. (77)
Saint-Pierre, J. de (36)
Chateaubriand, Vicomte de (78)
Fouqué, F. H. (78)
Manzoni, Alessandro (77)
Almqvist, Karl Jonas (30) (36) (77)
Balzac, Honoré de
Bremer, Fredrika
Dumas the Elder (30)
Mérimée, Prosper (7) (41)
Sand, George
Sue, Eugène
Andersen, Hans C. (48) (77)
Gógol, Nikolai V.
Gautier, Théophile (36) (77)
Freytag, Gustav (30) (36)
Turgéniev, Ivan
Dostoiévsky, Fiódor
Flaubert, Gustave
Baudelaire, C. P. (77)
Erckmann-Chatrian (30)
Jókai, Maurus
Tolstóy, Liov (30) (91)
Verne, Jules
Ebner-Eschenbach, Marie (77)
Heyse, Paul (30) (77)
Björnson, B. (30) (77)
Halévy, L. (30)
Daudet, Alphonse
Zola, Emile
Suttner, Baroness von (91)
Sienkiewicz, Henryk
Huysmans, J. Karl
Franzos, Karl E. (36)
Maupassant, Guy de
Viaud, Louis Marie
Bourget, Paul (36) (77)
Pontoppidan, H.
Lagerlöf, S. (41)
Heidenstam, Verner von (78)
Chékov, Anton (30)
Hamsun, Knut
Rolland, R. (36)
Blasco Ibañez, V.
Gorky, Maxim
Reymont, W. S.
Bunin, Ivan
Proust, Marcel
Andréiev, L. K. (30)
Baroja, Pio
Mann, Thomas (25) (36)
Deledda, G.
Martin du Gard, R.
Undset, Sigrid
Kafka, Franz
Feuchtwanger, L.
Romains, Jules
Zweig, Arnold
Morand, Paul (36) (41)
Fallada, Hans
Remarque, Erich

(64) Orators:

AMERICAN

Adams, Samuel
Otis, James (22)
Henry P. (22) (49)
Adams, John Quincy
Randolph, John
Clay, Henry (78)
Calhoun, J. C. (78)
Webster, Dan. (78)
Hayne, Robert Y. (78)
Everett, Edward (78)
Choate, R. (87) (78)
Simpson, Matthew (95)
Phillips, Wendell (91)
Sumner, Charles (78)
Beecher, H. W. (95)
Davis, H. W. (49) (78)
Douglass, Frederick
Blaine, J. G. (78)
Choate, J. H. (49) (78)
Ingersoll, Robert G. (49)
Brooks, Phillips (95)
Watterson, Henry (47)
Grady, H. W. (47)
Cockran, W. B. (49) (78)
Graves, John T. (47)
Bryan, William Jennings (78)

WORLD

Isocrates
Æschines (33) (47)
Demosthenes (78)
Cicero (36) (78)
Antony, Mark (58) (87)
Athanasius, St. (12)
Chrysostom (12) (95)
Peter the Hermit (95)
Boussuet, J. B. (95)
Pitt, William (78)
Burke, Edmund (36) (78) (79)
Grattan, Henry (78)
Fox, C. J. (78)
Mirabeau, Count de (78)
Curran, J. P. (49) (78)
Erskine, Thomas (49)
Pitt, William (78)
Canning, George (78)
O'Connell, Daniel (78)
Kossuth, Louis (78)
Disraeli, B. (63) (78)
Favre, Jules C. (78)
Gladstone, W. (36) (47) (78)
Bright, John (78)
Castelar, E. (41) (78)
Gambetta, Léon (78)
Laurier, Sir Wilfrid (78)
Lloyd George, D. (78)

(65) Organists:

Bach, Johann Sebastian (23)
Gounoud, Charles Francois (23)
Franck, César A. (23)
Bruckner, Anton (23)
Saint-Saëns, Charles C. (23)
Foote, Arthur (23)
Parker, H. W. (23)
Schweitzer, Albert (70) (72) (95)

(66) Ornithologists:

Wilson, Alexander (47) (67)
Audubon, J. J. (60) (67)
Baird, Spencer F.
Hudson, W. H. (36) (60) (63)
Thomson, J. Arthur
Chapman, Frank M.

(67) Painters:

AMERICAN

Copley, John S.
West, Benjamin
Peale, Charles W.
Stuart, Gilbert
Trumbull, John
Sully, Thomas
Cole, Thomas
Inman, Henry
Cranch, C. (36)
Leutze, Emanuel
Kensett, John F.
Read, Thos. B. (77)
Gifford, Sandford R.
Hunt, William M.
Johnson, Eastman
Inness, George
Church, Frederick E.
Bierstadt, Albert
Whistler, J. M. (35)
La Farge, John
Homer, Winslow
Martin, Homer D.
Vedder, E. (35)
Wyant, Alexander H.
Moran, Thomas
Hovenden, Thomas
Millet, F. D.
Blakelock, R. A.
Blashfield, E. (53)
Harnett, William M.
Duveneck, Frank (56)
Tiffany, Louis C.
Chase, W. M.
Abbey, E. A. (53)
Weir, Julian (53)
Harrison, Thomas A.
Inness, George, Jr.
Brush, G. de F.
Alexander, J. W.
Cox, Kenyon (53)
Sargent, John S.
Daingerfield, E. (53)
Hassam, Childe (53)
Moses, "Grandma"
Nourse, Elizabeth
Platt, Charles A.
Benson, F. W. (53)
Beaux, Cecilia
Cox, Louise (35)
Henri, Robert
Fuertes, Louis Agassiz
Kent, Rockwell (44)
O'Keeffe, Georgia
Sheeler, Charles
Burchfield, Charles E.

WORLD

Parrhasius
Apelles
Zeuxis
Giotto (8)
Orcagna, A. (8) (77) (88)
Eyck, Hubert van
Eyck, John van
Angelico, Fra
Lippi, Fra Filippo
Bellini, Giovanni
Bellini, Gentile
Mantegna, A. (35)
Botticelli, Alessandro
Ghirlandajo, D.
Vinci, Leonardo da (8) (34) (88)
Carpaccio, Vittore
Dürer, Albrecht (35)
Cranach the Elder
Bartolommeo, Fra
Giorgione
Titian
Ghirlandajo, Ridolfo
Raphael
Sarto, Andrea del
Giulio Romano (8)
Correggio
Holbein, Hans (35)
Tintoretto
Brueghel, Pieter
Cagliari, P. V.
Carracci, Lodovico
Carracci, Agostino
Carracci, Annibale
Brueghel, Jan
Reni, Guido
Rubens (35)
Hals, Frans
Domenichino
Jordaens, Jakob
Zurbarán, F. de
Van Dyck, Sir A. (35)
Velásquez
Claude Lorraine
Rembrandt
Dou, Gerard
Murillo
Lebrun, Charles
Potter, Paul (35)
Ruysdael, Jacob (35)
Hobbema, Meindert
Huysmans, Cornelis
Watteau, Antoine
Hogarth, William (35)
Reynolds, Sir Joshua
Greuze, Jean Baptiste
Gainsborough, Thos.
Fragonard, Jean H.
Romney, George
Kauffmann, Angelica
Goya, Francisco de
David, Jacques L.
Vigée-Lebrun, Marie
Raeburn, Sir Henry
Hokusai
Crome, John

Lawrence, Sir Thos.
Gérard, Baron
Turner, J. M. (35)
Constable, John
Ingres, Jean Auguste
Cornelius, Peter von
Eastlake, Sir Charles
Corot, Jean Baptiste
Delaroche, Paul
Hiroshige, Ando
Delacroix, Ferdinand
Landseer, Sir E. H.
Decamps, Alexandre
Diaz de la Peña
Gallait, Louis
Dupré, Jules
Rousseau, Théodore
Millet, Jean F. (35)
Meissonier, Jean L.
Daubigny, C. F. (35)
Watts, G. F. (35) (88)
Courbet, Gustave
Frère, Pierre E.
Fromentin, Eugène
Brown, Ford Madox
Bonheur, Rosa
Gérôme, Jean Léon
Hofmann, H.
Israëls, Josef
Bouguereau, W. A.
Breton, Jules A.
Hunt, W. Holman
Millais, Sir John E.
Leighton, Lord
Manet, Édouard
Burne-Jones, Sir E.
Boughton, George H.
Degas, Hilaire
Alma-Tadema, Sir L.
Lenbach, Franz von
Fortuny, Mariano
Mauve, Anton
Cézanne, Paul
Monet, Claude
Cazin, Jean Charles
Renoir, Pierre Auguste
Munkácsy, Michael
Crofts, Ernest
Gauguin, Paul
Detaille, Jean B.
Harris, Robert
Van Gogh, Vincent
Dicksee, Margaret I.
Walker, Horatio
Zorn, Anders L.
Sorolla y Bastida
Toulouse-Lautrec, Monfa
Bakst, Leon
Brangwyn, F.
Matisse, Henri de
Zuloaga, Ignacio
Bone, Sir M.
Picasso, Pablo
Braque, Georges
Modigliani, Amadeo
Rivera, Diego
Chagall, Marc
Chirico, Giorgio di
Dali, Salvador

(68) Philanthropists:

Atticus Herodes
Faneuil, Peter (53)
Epee, Abbe de l' (21)
Howard, John (91)
Oberlin, Jean F. (95)
McGill, James (55)
Wilberforce, Wm. (78)
Girard, Stephen (15)
Fry, Elizabeth (91)
Jeejeebhoy, Sir J. (53)
Lawrence, Abbott (53)
Vassar, Matthew (53)
Peabody, G. (55)
Howe, S. G. (91)
Shaftesbury, Earl of (78)
Nightingale, Florence
Barton, Clara (33)
Dunant, Jean H.
Carnegie, A. (45)
Field, Marshall (55)
Hearst, Phebe
Straus, Nathan (15)
Candler, Asa G. (15)
Rosenwald, Julius (55)
Berry, Martha M. (33)
Shepard, H. M. Gould
Harkness, Edward S.

(69) Philologists:

Webster, Noah (33)
Grimm, Jacob Ludwig Karl (48)
Littre, Maximilian Paul Emile (70)
Freund, Wilhelm (33)
Blackie, J. S. (33)
Müller, F. Max (20)
Furnivall, F. J.
Murray, Sir James A. H.
Harper, William R. (20) (33)
Smith, Benjamin Eli (47)
Zamenhof, Louis (72)
Putnam, Herbert
Vizetelly, F. H. (32)

(70) Philosophers and Ethical Writers:

Thales (9) (54)
Pythagoras (54)
Xenophanes
Empedocles
Parmenides
Anaxagoras
Zeno of Elea
Socrates (33)
Democritus
Plato (31) (33) (79)
Aristippus
Diogenes
Aristotle (14) (31) (33) (36) (74)
Mencius
Theophrastus (14)
Epicurus (33)
Zeno (33)
Seneca (30)
Epictetus
Aurelius, Marcus (87)
Plotinus
Hypatia
Erigena (33) (95)
Anselm, Saint (33)
Abelard, P. (95)
Bacon, Roger (18) (73) (95)
Aquinas, Saint Thomas (33) (95)
Occam, W. of (33) (95)
Pletho, G. (33)
Bruno, Giordano
Bacon, Francis (36) (41)
Campanella, T. (77)
Hobbes, T. (31)
Gassendi, P. (54) (73)
Descartes, Rene (54)
Browne, Sir T. (72)
La Rochefoucald
Locke, John
Spinoza, Baruch
Leibnitz, G. von (54)
Bayle, Pierce (36)
Berkeley, George (95)
Voltaire (30) (36) (41) (63)
Hume, David
Diderot, Dennis
Condillac, Etienne de
Kant, Immanuel (33)
Paine, Thomas (47)
Bentham, Jeremy (49) (52)
Fichte, Johann
Schleiermacher, F. (95)
Hegel, Georg W.
Schelling, F. von
Hamilton, Sir W. (33)
Schopenhauer, Arthur
Cousin, Victor
Comte, Auguste
Martineau, James
Mill, J. S. (31) (91)
Kierkegaard, S. A.
Lotze, Rudolph H.
Lewes, G. H. (13) (25) (74)
Spencer, Herbert (33)
Fischer, E. K.
Harris, W. T. (33)
Green, T. H.
Hartmann, Karl von
James, Wm. (82)
Nietzsche, F.
Eucken, R.
Nordau, Max Simon
Adler, Felix (33)
Haldane, Viscount (78)
Royce, Josiah (33) (36)
Bergson, Henri
Dewey, John (33) (82)
Hibben, J. G. (33) (36)
Whitehead, Alfred (36) (54)
Santayana, George (33) (36)
Schiller, F. C. S.
Croce, Benedetto (41)
Russell, B. A. (54) (91)
Schweitzer, Albert (65) (72) (95)
Keyserling, H. A.
Spengler, Oswald
Maritain, Jacques (36) (95)
Sartre, Jean Paul (30) (36)

(71) Photographers:

Brady, M. B.
Pathé, Charles
Steichen, Edward (27)
Bourke-White, M. (47)
Karsh, Yousuf

(72) Physicians and Surgeons:

AMERICAN

Bache, F. (18) (73)
Jackson, Charles T.
Flint, Austin (33) (74)
Long, Crawford W.
Wells, Horace
Morton, William T. G.
Blackwell, Elizabeth
Still, Andrew T.
Mitchell, Silas Weir (63) (74) (77)
Jacobi, Abraham (33)
McBurney, Charles
Palmer, D. D.
Reed, Walter
Gorgas, William C.
Murphy, John B.
Kelly, Howard A.
Mayo, William J.
Crile, Geo. W.
Mayo, Charles Horace
Jelliffe, Smith Ely
Cushing, Harvey W.
Carrel, A. (74)
Baker, S. Josephine
Hinkle, Beatrice
Greene, Jas. S.
Dick, George F. (33)
White, Paul Dudley
Salk, Jonas E.

WORLD

Hippocrates
Erasistratus (74)
Dioscorides
Galen
Avicenna (70)
Linacre, T. (20) (33)
Paracelsus
Graf, Regnier de
Boerhaave, H. (18)
Auenbrugger von A., Leopold
Hunter, John (74)
Jenner, Edward
Hahnemann, S. C.
Gall, F. C. (74)
Cooper, Sir A. P.
Bright, Richard (74)
Simpson, Sir J. Y. (74)
Zenker, F. A. von (74)
Lister, Joseph, Baron
Kocher, E. T
Osler, Sir William (33)
Behring, E. A. von (74)
Ehrlich, Paul (18) (74)
Ross, Sir R. (74)
Finsen, Niels (46) (74)
Wright, Sir A. E. (74)
Schweitzer, Albert (65) (70) (95)

(73) Physicists:

Gilbert, William (72)
Galileo (9) (46)
Mariotte, Edmé
Guericke, Otto von
Torricelli, E. (54)
Boyle, Robert (18)
Huygens, C. (9) (46)
Newton, Sir Isaac (54)
Fahrenheit, Gabriel Daniel (46)
Coulomb, Charles A.
Galvani, Luigi (72)
Volta, Alessandro
Rumford, Benjamin Thompson, Count (78)
Biot, Jean B. (9)
Ampère, André Marie (46) (54)
Oersted, Hans C.
Brewster, Sir David
Arago, Dominique
Fraunhofer, J. von
Ohm, Georg Simon
Becquerel, Antoine C.
Fresnel, Augustin J.
Faraday, Michael (18)
Haidinger, W. von (39)
Carnot, N. L. S.
Henry, Joseph (33)
De la Rive, Auguste A.
Weber, Wilhelm E.
Jolly, Philipp von
Mayer, Julius R. von
Zeiss, Carl
Joule, James P.
Foucault, Jean B. L.
Becquerel, A. E.
Tyndall, John
Helmholtz, H. von
Clausius, Rudolf J. E.
Hittorf, Johann W.
Kelvin, Lord (54)
Maxwell, James C.
Gibbs, Josiah Willard
Kundt, August
Dewar, Sir James (46)
Rayleigh, Baron
Lippmann, G.
Roentgen, Wilhelm Konrad
Rowland, Henry A.
Braun, Ferdinand
Lodge, Sir O. J. (33)
Becquerel, A. H.
Michelson, A. A.
Lorentz, H. A.
Onnes, Heike K.
Thomson, Sir J. J.
Hertz, Heinrich
Planck, Max
Pupin, M. I. (46)
Guillaume, C. E.
Gullstrand, A.
Millikan, R. A. (33)
Rutherford, E. (18)
Coolidge, William D.
Broglie, Duc de
Broglie, L. V. de
Aston, F. W.
Einstein, Albert (54)
Richardson, O. W.
Davisson, C. J.
Franck, J.
Bohr, N. H. D.
Compton, Karl Taylor (33) (78)
Stern, Otto
Bragg, W. L.
Bush, Vannevar (33)
Compton, A. H. (33)
Rabi, I. I.
Smyth, H. De Wolfe (33)
Zwicky, Fritz
Lawrence, E. O.
Oppenheimer, J. R. (33)
Anderson, Carl D. (33)
McMillan, Edwin M.

(74) Physiologists:

Erisistratus
Eustachio, B.
Vesalius, A. (72)
Fallopius, G. (72)
Fabricius, H. (72)
Harvey, William (72)
Malpighi, Marcello
Haller, A. von (14) (77)
Hunter, John
Brillat-Savarin, Anthelme
Gall, F. C.
Bright, Richard (72)
Weber, Ernst H.
Owen, Sir Richard
Simpson, Sir J. Y. (72)
Pasteur, Louis (18)
Zenker, F. A. von
Gegenbauer, Karl
Mitchell, S. W. (63) (72)
Flint, Austin (72)
Szent-Györgyi, Albert
Koch, R. (72)
Golgi, Camillo
Laveran, C. L. (72)
Pavlov, Ivan P.
Behring, E. A. von (72)
Ehrlich, Paul (72)
Ross, Sir R. (72)
Finsen, Niels R. (72)
Loeffler, Friedrich
Wright, Sir A. E.
Nicolle, C. J. H.
Landsteiner, Karl
Sabin, Florence
Carrel, A. (72)
MacLeod, J. J. R.
Whipple, George H.
Fleming, Alex (72)
Dam, Henrik
Harvey, E. N.
Gasser, H. S.
Bunting, Fred G.
Murphy, W. P.
Doisy, Edward A.

(75) Pianists:

Czerny, Karl (23)
Chopin, Frederic (23)
Liszt, Franz (23)
Gottschalk, L. (23) (24)
Saint-Saëns, Charles C. (23) (65)
Sinding, Christian (23)
Paderewski, Ignace Jan (23) (78)
Chaminade, Cecile (23)
Mac Dowell, E. (23) (24)
Debussy, Claude A. (23)
Godowski, Leopold (33)
Rachmaninov, S. V. (23)
Hofmann, Josef
Grainger, Percy (23)
Gershwin, George (23)

(76) Pioneers and Plainsmen:

Boone, Daniel
Zane, Ebenezer (34)
Chapman, John
Pike, Zebulon (58)
Crockett, David
Houston, Sam (58)
Carson, Christopher (58)
Fremont, John C. (58) (78)
Cody, Wm. F. (58)

(77) Poets:

AMERICAN

Hopkinson, Francis (78)
Freneau, Philip
Barlow, Joel (78)
Key, Francis Scott
Halleck, Fitz-Greene
Payne, John Howard (30)
Bryant, William C. (47)
Emerson, Ralph W. (36) (70)
Simms, W. G. (63)
Longfellow, Henry Wadsworth (33)
Whittier, John (91)
Holmes, Oliver W. (36) (74)
Poe, Edgar Allan (36) (73)
Lowell, James R. (36) (28)
Whitman, Walt
Cary, Alice
Crosby, Fanny
Read, Thomas B. (67)
Cary, Phœbe
Taylor, Bayard (47)
Timrod, Henry
Dickinson, Emily
Hayne, Paul Hamilton
Aldrich, Thomas Bailey (30) (32) (63)
Thaxter, Celia (48)
Ryan, Abram Joseph
Miller, Joaquin (47)
Lanier, Sidney (33)
Field, Eugene (47) (48)
Markham, Edwin
Riley, James Whitcomb
Stanton, Frank L.
Bates, Katharine Lee (33) (36)
Masters, Edgar Lee
Robinson, Edwin Arlington
Dunbar, Paul L.
Lowell, Amy (13) (36)
Frost, Robert
Sandburg, Carl (13)
Lindsay, Nicholas Vachel
Stevens, Wallace
Neihardt, John G.
Williams, William C.
Untermeyer, Louis
Fletcher, John G.
Kilmer, Joyce
Jeffers, Robinson
Moore, Marianne Craig
Eliot, Thomas Stearns (30)
Seeger, Alan
Aiken, Conrad Potter
Cummings, E. E.
MacLeish, Archibald
Millay, Edna St. Vincent
Benét, Stephen V.
Hughes, Langston
Nash, Ogden

ENGLISH

Cædmon
Barbour, John (41)
Langland, William
Chaucer, Geoffrey (78)
Spenser, Edmund
Chapman, George (96)
Shakespeare, Wm. (30)
Herrick, Robert
Milton, John (36)
Cowley, Abraham
Dryden, John (30) (36) (43)
Cibber, Colley (1) (30) (94)
Watts, Isaac (95)
Gay, John
Pope, Alexander (43)
Wesley, Charles
Gray, Thomas
Akenside, Mark
Cowper, William
Darwin, Erasmus (72)
Beattie, James (70)
Crabbe, George
Blake, W. (35) (67)
Burns, Robert
Baillie, Joanna (30)
Wordsworth, William
Cary, H. F. (95)
Coleridge, Samuel T. (25) (36)
Southey, Robert (13) (41)
Landor, W. S. (36)
Campbell, Thomas
Moore, Thomas
Heber, R. (95)
Byron, Lord
Keble, John (95)
Shelley, Percy B.
Hemans, Felicia D.
Keats, John
Hood, Thomas (43)
Browning, Elizabeth Barrett
Fitzgerald, Edward
Tennyson, Alfred
Browning, Robert
Faber, F. W.
Ingelow, Jean (63)
Arnold, Matthew (36)
Rossetti, Dante G. (67)
Rossetti, Christina G.
Lytton, Bulwer-Lytton, Earl of (78)
Morris, William (67)
Austin, Alfred (36)
Swinburne, Algernon (30)
Bridges, Robert
Hopkins, Gerard Manley
Henley, William E. (30)
Drummond, W. H.
Housman, A. E. (20)
Carman, Bliss (36)
Tagore, R.
Scott, Duncan C.
Yeats, William Butler (30)
McCrae, John D. (72)
Service, Robert (63)
Masefield, John (30)
Noyes, Alfred
Brooke, Rupert
Sitwell, Sir Osbert
Auden, Wystan
Spender, Stephen
Thomas, Dylan

WORLD

Homer
Hesiod
Alcæus
Sappho
Anacreon
Pindar
Menander (30) (43)
Apollonius Rhodius
Theocritus
Ennius, Quintus
Lucretius
Catullus
Virgil
Horace
Ovid
Juvenal
Ausonius, Decimus
Boethius (70)
Firdousi
Omar Khayyam (9)
Bernard of Cluny (95)
Dante
Hafiz
Petrarch
Villon, Francois
Ariosto, Ludovico
Colonna, Vittoria
Vega, G. de la (58)
Camoëns, Luiz Vaz de
Ferreira, Antonio
Tasso, Torquato
Alarcón y Mendoza
Perrault, Charles (36) (48)
Holberg, Baron (30) (41)
Klopstock, Friedrich
Wieland, C. (36)
Bellman, Karl Mikael
Derzhavin, Gavril (78)
Herder, J. von (36)
Goethe, Johann von (13) (30) (36) (63) (94)
Rouget de Lisle
Franzén, F. M. (95)
Oehlenschläger, Adam Gottlob (30)
Béranger, Pierre de
Chamisso, A.
Körner, Karl Theodor
Bretón de los Herreros
Heine, Heinrich
Púshkin, Alexander
Vigny, Comte de (63)
Cremazie, Octave
Mistral, Frédéric
Carducci, G. (78)
Sully-Prudhomme, René
Rimbaud, Arthur
Verhaeren, Emile
Rouault, Georges
Rillke, Rainer Maria
Cammaerts, Emile
Cocteau, Jean
Jimenez, Juan Ramon
Nerudo, Pablo

(78) Political Leaders:

AMERICAN

Franklin, Benjamin (13) (22) (28) (36) (46) (47) (73) (78)
Washington, George (22) (34) (58) (78)
Morris, Robert (15)
Adams, John (15)
Carroll, Charles
Clinton, George (58)
Jefferson, Thomas
Gerry, Elbridge
Pinckney, C. C.
Muhlenberg, F. (95)
Madison, James
Morris, Gouverneur
King, Rufus
Burr, Aaron
Hamilton, A.
Monroe, James
Gallatin, Albert (15) (28)
Adams, J. Q.
Jackson, A. (58) (64)
Clinton, DeWitt
Quincy, Josiah
Harrison, W. H. (58)
Clay, Henry (64)
Johnson, R. M.
Benton, Thomas H.
Calhoun, John C. (64)
Cass, Lewis
VanBuren, Martin
Webster, Dan. (64)
Taylor, Zachary (58)
Marcy, Wm. Learned
Tyler, John
Buchanan, James
Hayne, R. Y. (64)
Stevens, Thaddeus
Everett, Edward (64)
Polk, James Knox
Clayton, John M.
Johnson, Reverdy (49)
Weed, Thurlow (47)
Fillmore, Millard
Seward, William H.
Pierce, Franklin
Dorr, Thomas Wilson
Fessenden, Wm. Pitt
Adams, C. F. (31)
Davis, Jefferson (58)
Fish, Hamilton
Johnson, Andrew
Hamlin, Hannibal
Lincoln, Abraham (64)
Morrill, Justin S.
Sumner, Chas. (3) (64)
Stephens, A. H.
Douglas, Stephen (64)
Stanton, Edwin McM.
Tilden, Samuel J.
Davis, H. W. (51) (64)
Butler, B. F. (58)
Breckinridge, J. C.
Hayes, R. B. (58)
Sherman, John
Morgan, John T. (58)
Edmunds, G. F. (49)
Conkling, Roscoe
Schurz, C. (58) (64)
Arthur, Chester Alan
Blaine, James G. (64)
Frye, William Pierce
Garfield, J. A. (58)
Harrison, Benj. (51)

Olney, Richard (51)
Cannon, J. G. (51)
Cleveland, Grover (49)
Hanna, M. A. (18) (55) (85)
Reed, T. B. (49)
Croker, Richard
McKinley, William
Nelson, Knute (48)
Root, Elihu (49) (51) (79)
Jones, Samuel Milton
Clark, Champ (49)
Lodge, H. C. (79)
Knox, P. C. (49)
LaFollette, R. M. (51)
Morgenthau, H.
Wilson, Woodrow (33) (41)
Taft, W. H. (49) (51)
Glass, Carter
House, E. M.
Roosevelt, Theodore (37) (41) (58)
Curtis, Charles
Bryan, W. J. (64)
Volstead, A. J.
Kahn, Julius
Norris, George W.
Beveridge, A. J. (13) (32)
Daniels, Josephus (32)
Smoot, Reed
Jones, Wesley L. (51)
McAdoo, Wm. G. (51) (85)
Lane, Franklin K.
Borah, W. E. (51)
Dawes, C. G. (15)
Harding, W. G.
Johnson, H. W. (51)
Gerard, J. W. (51)
Stimson, H. L.
Garner, John N.
Cox, James M.
Baker, N. D. (51)
Hull, Cordell (28)
Coolidge, Calvin
Smith, Alfred E.
Jones, Jesse H. (15)
Knox, Frank (83)
Hoover, Herbert C.
McCormick, J. M.
Wagner, Robert F.
Barkley, Alben W.
Lehman, Herbert H.
Byrnes, J. F. (49) (51)
Roosevelt, Franklin D.
Perkins, Frances (91)
La Guardia, Fiorello
Eastman, J. B.
Rayburn, Samuel
Vandenberg, Arthur H.
Martin, Jos. W., Jr.
Truman, Harry S.
Collier, John
Roosevelt, Theodore
Farley, James A.
Nelson, Donald (53)
Taft, Robert A.
Madden, J. W. (51)
McCormick, John W.
Morgenthau, Henry, Jr.
McNutt, Paul V.
Jackson, Robt. H. (51)
Forrestal, James
Willkie, Wendell L.
Murphy, Frank (51)
Bricker, John W.
Folsom, Marion
La Follette, R. M., Jr.
Lausche, Frank J.
Hoover, J. Edgar (51)
Henderson, Leon (31)
Herter, Christian (28)
Clay, Lucius D. (58)
Adams, Sherman
Summerfield, Arthur
Lilienthal, D. E. (51)
Stevenson, Adlai E.
Dewey, Thomas E. (51)
Lodge, Henry C. Jr.
Mitchell, James P.
Kefauver, Estes
Fulbright, J. W.
Stassen, Harold E. (33)
Knowland, William
Wagner, Robt. F., Jr.
Leader, George M.

ENGLISH

Wolsey, Thomas (80)
More, Sir T. (20) (79)
Cromwell, Thomas
Cecil, William, Lord Burleigh
Bodley, Sir T. (20)
Hampden, J. (58)
Cromwell, Oliver (58)
Oxford, R. Harley, Earl of
Walpole, Sir Robert
Bolingbroke, Viscount
Pitt, William (51) (64)
Burke, E. (64) (79)
Hastings, Warren
North, Frederick, Lord
Francis, Sir Philip
Grattan, Henry (64)
Fox, Charles J. (64)
Curran, J. P. (64)
Pitt, William (64)
Wilberforce, Wm. (91)
Grey, Charles, Earl
Castlereagh, Viscount
Canning, George (64)
Ashburton, Lord (28)
O'Connell, Daniel (64)
Elphinstone, M. (41)
Palmerston, Viscount
Peel, Sir Robert
Derby, Earl of
Bulwer, Sir W. H. (41)
Disraeli, Benj. (63)
Howe, Joseph
Gladstone, W. (32) (64)
Bright, John (64)
Elgin, Earl of
Macdonald, Sir J. A.
Tupper, Sir Charles
Mackenzie, Alexander
Salisbury, Marquis of
Fawcett, Henry
Chamberlain, Joseph
Bryce, James, Viscount (28) (41)
Cremer, W. (79)
Cromer, Earl (28)
Laurier, Sir Wilfrid
Alverstone, Viscount
Davitt, Michael (36)
Parnell, Charles S.
Balfour, A. J. (70)
O'Connor, T. P. (36) (47)
Dillon, John
Grey, A. H. G., Earl
Asquith, Herbert H.
Hughes, Sir Samuel
Jameson, Sir L. (58) (72)
Rhodes, Cecil J. (15)
Borden, R. L. (51)
Deakin, Alfred
Haldane, Viscount (70)
Hardie, James Keir
Burns, John
Law, A. Bonar
Curzon, Earl
Grey, Edw., Viscount
Lloyd George (64) (93)
Henderson, Arthur
Chamberlain, J. Austen
Cecil, Lord E.
Hughes, W. M.
Willingdon, Viscount
MacDonald, J. R. (50)
Baldwin, Stanley
Devonshire, Duke of
Chamberlain, Neville
Gandhi, M. K.
Smuts, Jan C. (58)
Bennett, R. B.
Bondfield, M. G.
Athlone, Earl of
Churchill, W. L. S. (41) (64)
King, W. L. M.
Meighen, Arthur
Tweedsmuir, Baron (63)
Geddes, Sir Auckland
Cosgrave, W. T.
Bessborough, Earl of
Halifax, Viscount
DeValera, Eamonn
Bevin, Ernest (50)
Bruce, Stanley M.
Attlee, Clement R. (50)
Curtin, John (50)
Morrison, Herbert (50)
Cripps, Sir Stafford
Collins, Michael (58)
Menzies, Robt. G. (28)
Eden, Anthony
Hepburn, Mitchell
Gaitskell, Hugh

WORLD

Aristides
Pericles (87)
Cato, Marcus
Catiline
Cato the Younger
Antony, Mark
Brutus, Marcus Junius
Agrippa, Marcus
Agricola
Machiavelli, N. (41) (79)
Borgia, Cesare
Barneveldt, John
Grotius, H. (51) (79)
Richelieu (80)
Mazarin, Jules (80)
Colbert, Jean B. (15)
DeWitt, Jan
Mirabeau, G. (64)
Hardenberg, Prince
Cambacérès, J. J. (51)
Carnot, Lazare N. (54)
Robespierre, M.
Danton, Georges (64)
Desmoulins, Camille
Fouché, Joseph
Esterházy, Prince (58)
Metternich, Prince
Emmett, Robert
Thiers, L. A. (41)
Kossuth, Louis (64)
Deák, Ferencz
Mazzini, Giuseppe
Tocqueville, A. de (79)
Juárez, Benito
Grévy, F. P. J.
Favre, J. C. G. (64)
Cavour, Count
Bismarck, Prince
Crispi, Francesco
Kruger, S. J. P.
Gómez y Báez, M. (58)
Castelar, Emilio (41) (64)
Palma, Tomás E.
Asser, T. (52)
Gambetta, Léon
Clemenceau, G. (36)
Fallières, Clément A.
Ito, Prince
Katsura, Prince
Saionji, Prince
Witte, Count
Masaryk, T. G.
Fukushima, Baron
Jusserand, J. A. (28) (36) (41)
Bethmann-Hollweg
Millerand, A.
Orlando, Vittorio
Poincaré, Raymond
Briand, Aristide
Doumergue, Gaston
Venizelos, Eleutherios
Sun Yat Sen
Pilsudski, J.
Mannerheim, Carl (58)
Horthy de N., Nicholas
Alessandri, A.
Metaxas, John
Lebrun, Albert
Lenin, Nicolai
Herriot, Edouard
Blum, Léon
Sforza, Carlo
Adenauer, Konrad (51)
Litvinov, Maxim
Calles, P. E.
Quezon, Manuel Luis
Osmeña, Sergeo
Reynaud, Paul
Trotzky, Leon
Stalin, Joseph
Saud, Abdul Ibn
Saavedra, Lamas C.
Matsuoka, Y.
DeGasperi, Alcide
Vargas, Getulio
Laval, Pierre
Vishinsky, Andrei (51) (52) (64)
Mussolini, Benito
Benes, Edward
Inonu, Ismet (58)
Chiang Kai-shek (58)
Koo, V. K. W.
Schuman, Robert
Hitler, Adolf
Nehru, Jawaharial Pandit (93)
Salazar, Antonio de Oliveira
Molotov, V. M. (28)
Segni, Antonio
Ley, Robert
Tito, Marshal
Göring, Hermann W.
Mao Tse-Tung (58)
Khrushchev, Nikita
Bulganin, Nikolai
Grandi, D., Count
Peron, Juan Domingo (58)
Cardenas, Lazaro
Goebbels, Josef (47)
Bidault, Georges
Himmler, Heinrich
Hammarskjöld, Dag
Nasser, Gamal

(79) Political Scientists:

Machiavelli, N. (41) (78)
Bodin, Jean (31)
Grotius, Hugo (49) (78)
Hobbes, T. (70)
Locke, John (70)
Montesquieu, M. de (70)
Tocqueville, A. de (78)
Smith, Goldwin (41)
Foster, J. W. (78)
Bryce, J. (28) (41)
Hill, David Jayne
Low, Seth (33)
Jordan, D. S. (33) (100)
Bourgeois, L. V. (78)
La Fontaine, H.
Hart, A. B. (33) (41)
Jenks, J. W. (33)
Lowell, A. W. (33)
Moore, John B. (28) (33)
Butler, N. M. (33)
Lange, Christian
Barrows, D. P. (33)
Fosdick, R. B. (6) (33)

(80) Popes and Cardinals:

Gregory I (78) (86) (95)
Gregory VII (12) (95)
Adrian IV
Innocent III (49) (95)
Julius II (58)
Bembo, P. (20) (41)
Wolsey, Thomas (78)
Sixtus V
Richelieu, Duc de (78)
Mazarin, Jules (78)
Pius IX
Newman, J. H. (36) (95)
Manning, H. E. (95)
Leo XIII
McClosky, John
Gibbons, James
Pius X
Farley, John Murphy
Mercier, D. J.
Benedict XV
Pius XI
O'Connell, Wm. H.
Glennon, Joseph
Dougherty, Dennis

Merry del Val (28) (78)
Hayes, Patrick J.
Pius XII
Mooney, Edward
Stritch, S. A.
McIntyre, J. F.
Spellman, F. J.

(81) Printers:

Fust, Johann
Caxton, William
Manutius, Aldus (83)
Ged, William (46)
Devinne, Theodore L.
Morris, Robert (77)

(82) Psychologists:

Fechner, G. T. (73)
Wundt, W. Max (74)
James, William (70)
Hall, G. Stanley (33)
Binet, Alfred (33)
Cattell, J. McK. (32) (33)
Baldwin, James
Jastrow, Joseph (33)
Münsterberg, H. (33)
Meyer, Adolf (74)
Titchener, E. (33)
Angell, J. R. (33)
Adler, Alfred
Judd, Charles H. (33)
Thorndike, E. L. (33)
Jung, Carl G.
Yerkes, Robert M. (33)
Watson, John B.
Gesell, Arnold (33) (72)

(83) Publishers:

Manutius, Aldus (81)
Brockhaus, F. A.
Knight, C. (32) (41)
Chambers, W. (32)
Baedeker, Karl
Childs, G. W. (91)
Ginn, Edwin (91)
Funk, I. K. (32) (91) (95)
Curtis, Cyrus H. K.
Munsey, F. A. (32)
Ochs, Adolph S.
Hearst, W. R. (15) (47)
Capper, A. (32) (47) (78)
Northcliffe, Baron (32) (78)
Beaverbrook, Wm. (78)
McCormick, R. R. (47)
Ingersoll, Ralph (32)

(84) Radio Executives:

Sarnoff, David

(85) Railway Managers and Ship Owners:

Cunard, Sir S. (34) (53)
Vanderbilt, C. (15)
Fargo, William
Field, C. W. (15)
Strathcona, Baron (91)
Stanford, L. (15) (91)
Depew, C. (51) (64) (78)
Hill, James J. (15)
Harriman, E. H. (15)
Mackenzie, Sir W.
Huntington, H. E. (15)
Shaughnessy, Baron
McAdoo, Wm. G. (78)
Thornton, Sir H.
Harriman, A. (15) (78)

(86) Religious Leaders:

Zoroaster
Lao-Tzu
Confucius
Buddha
Ulfilas
Mohammed
Wiclif, John (95)
Jerome of Prague
Huss, John (21)
Savonarola (95)
Luther, Martin (95)
Zwingli, Ulrich
Melanchthon, Philip (20) (33)
Ridley, Nicholas
Knox, John (95)
Calvin, John (95)
Hutchinson, Anne
Eliot, John
Williams, Roger (22)
Fox, George
Hennepin, Louis (29)
Swedenborg, E. (74)
Zinzendorf, Ct. von (95)
Wesley, John (95)
Serra, Junipero
Hicks, Elias (95)
Judson, Adoniram
Young, Brigham
Smith, Joseph
Noyes, John H.
Huc, Evariste R. (37)
Livingstone, D. (37)
Holyoake, George J.
Eddy, Mary B. G.
Williams, Sir George
Booth, William (91)
Jackson, Sheldon (33)
Moody, Dwight L.
Damien, Joseph
Dowie, John A.
Clark, Francis E. (95)
Sunday, William A. (21)
Grenfell, Wilfrid T. (72)
Booth, Evangeline C.
McNicholas, J. T. (95)
Buchman, Frank
Merton, Thomas
Graham, Billy

(87) Rulers:

ANCIENT

Cheops
Hammurabi
Rameses
Arbaces
Draco (49) (52)
Nebuchadnezzar
Necho
Crœsus
Pisistratus
Cyrus the Great
Cambyses
Leonidas I
Darius I
Gelon
Xerxes I
Agesilaus
Dionysius the Elder (30) (58) (77)
Cyrus the Younger
Philip II
Artemisia
Darius III
Alexander the Great (58)
Ptolemy I
Ptolemy II
Asoka
Antiochus III
Cleopatra
Augustus
Claudius I
Vespasian
Caligula
Nero
Trajan
Hadrian
Antoninus Pius
Aurelius, Marcus (70)
Caracalla
Alexander Severus
Diocletian
Zenobia
Constantine the Great
Julian
Alaric I
Theodosius (58)
Attila
Genseric

MEDIEVAL

Theodoric (58)
Clovis I
Justinian the Great
Brunhilde
Ethelbert *England*
Heraclius
Omar, Abu-Hafsa
Al-Mansur
Pepin the Short
Charlemagne (58)
Irene
Haroun-al-Raschid
Alfred the Great
Otho I
Brian Boroihme
Hugh Capet
Vladimir the Great
Edmund *England*
Canute *England*
Olaf, St. *Norway* (12)
Ferdinand I, the Great
Edward the Confessor
Alexius I Comnenus
Henry IV *Germany*
Henry I *England*
Frederick I, Barbarossa
Henry II *England*
Philip II *France*
John *England*
Henry III *England*
Louis IX (saint) (12)
Rudolf I *Germany*
Alfonso X (9) (70)
Edward I *England*
Edward II *England*
Edward III *England*
Henry IV *England*
Henry V *England*
Constantine XIII
Henry the Navigator
Charles VII *France*
Charles the Bold
Ivan III *Russia*
Edward IV *England*
Medici, Lorenzo de'

MODERN

Isabella, *Sp.*
Ferdinand V, *Sp.*
Henry VII, *Eng.*
Louis XII, *Fr.*
Emanuel I, *Port.*
Atahualpa, *Peru*
James IV, *Scot.*
Baber, *Ind.*
Henry VIII, *Eng.*
Margaret of Angoulême
Francis I, *Fr.*
Gustavus I Vasa, *Sw.* (58)
Solyman II, *Turk.*
Charles V, *Ger.*
Ferdinand I, *Ger.*
Mary, *Eng.*
Catherine de Medici, *It.*
Philip II, *Sp.*
Ivan IV, *Russ.*
Elizabeth, *Eng.*
William the Silent, *Hol.* (58)
Akbar, *Ind.*
Mary Queen of Scots
Charles IX, *Fr.*
Henry III, *Fr.*
Henry IV, *Fr.*
James I, *Eng.*
Christian IV, *Denmark*
Ferdinand II, *Ger.*
Shah Jehan, *Ind.*
Gustavus II Adolphus, *Sw.*
Cromwell, Oliver, *Eng.* (58) (61)
Louis XIII, *Fr.*
Charles I, *Eng.*
Frederick William, *Pruss.* (58)
Charles X Gustavus, *Sw.*
Christina, *Sw.*
Charles II, *Eng.*
James II, *Eng.*
Louis XIV, *Fr.*
William III, *Eng.*
George I, *Eng.*
Anne, *Eng.*
Peter the Great, *Russ.*
Charles XII, *Sw.*
George II, *Eng.*
Frederick William I, *Pruss.* (58)
Louis XV, *Fr.*
Maria Theresa, *Aust.*
Catherine II, *Russ.*
George III, *Eng.*
Joseph II, *Ger.*
Gustavus III, *Sw.*
Louis XVI, *Fr.*
Barras, Count Paul, *Fr.*
Louis XVIII, *Fr.*
George IV, *Eng.*
Charles XIV, John, *Sw.*
William IV, *Eng.*
Christophe, Henri, *Haiti*
Bonaparte, Joseph, *Sp.*
Francis II, *Aust.*
Frederick VI, *Denmark*
Napoleon Bonaparte, *Fr.*
Louis Philipe, *Fr.*
Louise, *Pruss.*
Alexander I, *Russ.*
Bonaparte, Louis, *Holland*
Bonaparte, Jerome (58)
William I, *Ger.*
Pedro I, *Brazil*
Napoleon III, *Fr.*
Alexander II, *Russ.*
Victoria, *Eng.*
Victor Emmanuel II, *It.*
Pedro II, *Brazil*
Oscar II, *Sw.*
Diaz, Porfirio, *Mex.* (58)
Francis Joseph, *Aust.*
Ismail Pasha, *Egypt*
Maximilian Ferdinand, *Mex.*
Kalakaua, David, *Hawaii*
Edward VII, *Eng.*
Mutsuhito, *Japan*
Gustavus V, *Sw.*
Carranza, V., *Mex.*
William II, *Ger.* (58)
George V, *Eng.*
Constantine I, *Ger.*
Nicholas II, *Russ.*
Victor Emmanuel III, *It.* (58)
Christian X, *Denmark*
Ebert, Friedrich, *Ger.*
Haakon VII, *Nor.*
Albert I, *Belg.*
Mustapha Kemal, *Turk.*
Obregon, Alvaro, *Mex.* (58)
Wilhelmina, *Neth.*
Alfonso XIII, *Sp.*
Hitler, Adolf, *Ger.*
Haile Selassie, *Ethiopia*
Edward VIII, *Eng.*
George VI, *Eng.*
Hirohito, *Japan*
Leopold III, *Belg.*
Elizabeth II, *Eng.*

(88) Sculptors:

AMERICAN

Greenough, Horatio
Powers, Hiram
Brown, Henry K. (67)
Crawford, Thomas
Rinehart, William H.
Hosmer, Harriet
Ward, J. Q. A.
Hoxie, Vinnie Ream
Saint-Gaudens, Augustus
French, Daniel C.
Kelly, James Edward
Niehaus, Charles H.
Adams, Herbert
Taft, Lorado
Dallin, Cyrus Edwin
Partridge, William O.
Grafly, Charles
Barnard, George G.
MacMonnies, F.
Akeley, Carl E. (60)
Bartlett, Paul W.
Flanagan, John
MacNeil, H. A.

Bitter, Karl
Borglum, G. (35) (67)
Borglum, Solon H.
Scudder, Janet
Walker, Nellie Verne
Fraser, James E.
Hyatt, Anna Vaughn
Aitken, Robert I.
Epstein, Jacob
Manship, Paul
Hoffman, Malvina (36)
Calder, Alexander
Moore, Henry

WORLD

Phidias
Praxiteles
Ghiberti, Lorenzo
Donatello
Robbia, Lucca della
Michelangelo (8) (67)
Bandinelli, Baccio
Cellini, Benvenuto (13)
Goujon, Jean (8)
Bernini, G. (8) (67)
Algardi, Alessandro
Gibbons, Grinling
Houdon, Jean A.
Flaxman, John
Canova, Antonio
Dannecker, J. von
Thorvaldsen, Bertel
David, Pierre Jean
Barye, Antoine Louis
Foley, John Henry
Frémiet, Emmanuel
Meunier, C. (67)
Bartholdi, Frédéric
Dalou, Jules
Rodin, Auguste
Hébert, Louis P.
Allward, Walter S.
Milles, Carl
Mestrovic, Ivan

(89) Singers:

AMERICAN

Nordica, Lillian
Schumann-Heink, E.
Fremstad, Olive
Homer, Louise
Garden, Mary
Martin, Riccardo
Farrar, Geraldine
Werrenrath, R.
Gluck, Alma
Hayes, Roland
Tibbett, Lawrence M.
Ponselle, Rosa
Swarthout, Gladys
Anderson, Marian
Traubel, Helen
Pons, Lily
MacDonald, Jeanette
Stevens, Rise
Munsel, Patrice

WORLD

Garcia, Manuel del P.
Malibran, Maria F.
Lind, Jenny
Melba, Nellie
Calve, Emma
Lauder, Sir Harry
Caruso, Enrico
Chaliapin, Fyodor
Tetrazzini, Luisa
McCormack, John
Martinelli, G.
Bori, Lucrezia
Galli-Curci, Amelita
Flagstad, Kirsten

(90) Social Reformers:

Saint-Simon
Owen, Robert (78)
Fourier, Francois
Cabet, Etienne
Hill, Sir Rowland
Brown, John
Garrison, W. L. (32)
Burritt, E. (32) (69)
Phillips, Wendell (64)
Douglass, F. (64)
Marx, Karl (31)
Howe, Julia (95)
Lassalle, Ferdinand
Bradlaugh, Chas.
Lombroso, Cesare (82)
Willard, Frances (33)
Hyndman, H.
Kropotkin, Prince
Bellamy, Edw. (47) (63)
Debs, Eugene V.
Lathrop, Julia C.
Webb, Sidney
Jaures, A. M. J. J. (78)
Addams, Jane
Berger, V. L. (32) (78)
Branting, H.
Snowden, P. (78)
Wald, Lilian D.
Lindsey, B. B. (49)
Hillquit, Morris
Beers, Clifford W.
Stopes, Marie (14)
Thomas, Norman (21)

(91) Sociologists:

Bakunin, M. (78)
Ely, Richard T. (90)
Veblen, T. (90)
Ellis, Henry H.

(92) Sportsmen and Sports Authorities:

Lipton, Sir T. J. (53)
Camp, Walter (47)
Rice, Grantland
Moody, Helen Wills
Zaharias, Mildred D.
Owens, Jesse

(93) Statesmen:

Lycurgus
Draco
Solon
Grotius (49) (79)
Richelieu (78) (80)
Pitt, William (64) (78)
Burke, Edmund (36) (64) (91)
Washington, George (34) (58) (78)
Jefferson, Thomas (78)
Hamilton, Alex. (78)
Metternich, Prince (28)
Clay, Henry (64) (78)
Webster, Daniel (64) (78)
Peel, Sir Robert (78)
Disraeli, Benj. (63) (64) (78)
Lincoln, Abraham (51) (64) (78)
Cavour, Count (78)
Bright, John (64) (78)
Bismarck, Prince (78)
Laurier, Sir Wilfrid (78)
Balfour, A. J. (28) (70)
Masaryk, T. G. (78)
Wilson, Woodrow (33) (41) (78)
Lloyd-George, D. (64) (78)
Smuts, Jan C. (58) (78)
Baruch, Bernard (15)
Churchill, W. L. S. (41) (64) (78)
Rhee, Syngman
George, Walter F.
Roosevelt, F. D. (64) (78)
Benes, Edward (78)
Byrd, Harry Flood
Ben-Gurion, David
Nehru, J. (78)
Costello, John Aloysius
Macmillan, Harold
Menzies, Robert G.
Lloyd, Selwyn
Magsaysay, Ramon
Mendes-France, Pierre
Eisenhower, Dwight D. (58)
Kennedy, John F.
Edinburgh, Duke of

(94) Theatrical Producers:

Cibber, Colley (1) (13) (30)
Garrick, David (1)
Goethe, J. W. von (13) (25) (30) (63) (77)
Sheridan, R. B. (30) (64) (78)
Kemble, John Philip (1)
Barrett, Lawrence (1) (13)
Irving, Sir H. (1)
Herne, James A. (1) (30)
Belasco, David (30)
Mansfield, Richard (1)
Thomas, A. (1) (30)
Hyde, Douglas (1)
Arliss, George (1)
Cochran, Charles Blake
De Mille, Cecil B.
Goldwyn, Samuel
Hardwicke, Sir C. (1)
Laughton, Charles (1)
Massey, Raymond (1)
Hitchcock, Alfred
Selznick, David O.
Sullivan, Edward V.
Balanchine, George

(95) Theologians, Religious Writers, and Church Historians:

Hillel
Tertullian
Arius
Eusebius
Athanasius, St. (12)
Chrysostom (12)
Augustine, St. (12)
Nestorius
Justin (12)
Bede
Lanfranc
Aquinas, St. Thomas (12) (33)
Duns, Scotus (33) (70)
Kempis, Thomas a
Luther, Martin (86)
Cranmer, Thomas
Calvin, John (86)
Arminius, Jacob
Ussher, James
Jansen, Cornelis
Taylor, Jeremy
Biddle, John
Pascal, Blaise (54)
Bossuet, Jacques (64)
Bourdaloue, Louis
Fleury, Claude
Collier, Jeremy (41)
Fenelon, Francois
Butler, Joseph
Paley, William
Merle d' Aubigne, Jean (33)
Lacordaire, Jean B.
Alzog, Johann B.
Tischendorf, L. von
Blavatsky, Helena
Farrar, F. W. (77)
Baring-Gould, S. (77)
Besant, Annie
Drummond, Henry (21)
Harnack, Adolf (33)
Inge, William R. (36)
Jacks, L. P. (36)
Jowett, John Henry (21)
Royden, A. Maude (90)
Maritain, Jacques (36) (70)
Sheen, Fulton J.

(96) Translators:

Tyndale, William (20)
Coverdale, Miles
Chapman, Geo. (30) (77)
Dryden, John (25) (30) (36) (43)
Pope, Alex. (43) (77)
Fitzgerald, Edward (77)
Rawlinson, Sir H. (20)
Jowett, Benjamin (20)
Taylor, Bayard (77) (97)
Norton, C. E. (33)
Rossetti, D. G. (67) (77)
Morris, Wm. (67) (77)
Murray, G. G. A. (20)
Goodspeed, Edgar J. (20)

(97) Travelers:

Polo, Marco (37)
Park, Mungo (37)
Taylor, Bayard (77) (96)
Muir, John (60)
Andrews, R. C. (37)
Thomas, L. (13) (41) (47)
Forbes, J. Rosita (47)
Halliburton, R. (47)

(98) Violinists:

Lully, Jean Baptiste
Arne, Thomas (23)
Paganini, Niccolo (23)
Bull, Ole
Godard, Benj.
Loeffler, C. M. (23)
Kreisler, Fritz (23)
Kubelik, Jan
Zimbalist, Efrem
Elman, Mischa
Heifetz, Jascha

(99) Woman Suffragists:

Stanton, Elizabeth (91)
Stone, Lucy (91)
Anthony, Susan B. (91)
Fawcett, M. (36) (41)
Key, Ellen (91)
Catt, Carrie Chapman
Decker, Sarah P. (91)
Gilman, Charlotte (47)
Astor, Lady Nancy (78)
Rankin, Jeannette (78)

(100) Zoologists:

Pliny the Elder (14)
Leeuwenhoek, A. van (73)
Reaumur, R. A. de (73)
Buffon, Count de
White, Gilbert (14) (60)
Banks, Sir J. (37)
Lamarck, J. B. de (14)
Huber, Francois
Wilson, A. (47) (67)
Cuvier, G. C. (74)
Brogniart, A. (39)
Geoffroy Saint-Hilaire, E. (74)
Audubon, J. J. (60) (67)
Baer, Karl Ernst von
Agassiz, Louis (60)
Darwin, Charles (14)
Gosse, Philip Henry (60)
Baird, Spencer F. (60)
Fabre, Jean Henri (36)
Wallace, Alfred R.
Bates, Henry W.
Huxley, T. H. (74)
Haeckel, Ernst H.
Coues, Elliott
Lankester, Sir E. R. (74)
Comstock, Anna B. (33) (44) (60)
Geddes, P. (14) (33)
Hornaday, W. T.
Hudson, W. H. (36) (60) (63)
Loeb, Jacques (74)
Seton, E. T. (60) (67)
Chapman, Frank M.
Morgan, T. H.
Ditmars, R. L. (36)
Beebe, William (36) (47)
Pearl, Raymond
Huxley, Julian S. (47)
Hogben, Lancelot
Perkins, R. Marlin
Carson, Rachel

HALL OF FAME:

Adams, John
Adams, J. Quincy
Agassiz, Louis
Anthony, Susan B.
Audubon, J. James
Bancroft, George
Beecher, Henry W.
Bell, Alexander Graham
Boone, Daniel
Booth, Edwin T.
Brooks, Phillips
Bryant, William C.
Channing, William E.
Choate, Rufus
Clay, Henry
Clemens, S. L.
Cleveland, G.
Cooper, James F.
Cooper, Peter
Cushman, Charlotte
Eads, James B.
Edwards, Jonathan
Emerson, Ralph W.
Farragut, D. G.
Foster, Stephen C.
Franklin, Benjamin
Fulton, Robert
Gibbs, Josiah W.
Gorgas, William C.
Grant, Ulysses S.
Gray, Asa
Hamilton, Alexander
Hawthorne, Nathaniel
Henry, Joseph
Henry, Patrick
Holmes, Oliver W.
Hopkins, Mark
Howe, Elias
Irving, Washington
Jackson, Andrew
Jackson, "Stonewall"
Jefferson, Thomas
Jones, John Paul
Kent, James
Lanier, Sidney
Lee, Robert Edward
Lincoln, Abraham
Longfellow, H. W.
Lowell, James R.
Lyon, Mary
Madison, James
Mann, Horace
Marshall, John
Maury, Matthew F.
Mitchell, Maria
Monroe, James
Morse, S. F. B.
Morton, W. T. G.
Motley, John L.
Newcomb, Simon
Paine, Thomas
Palmer, Alice F.
Parkman, Francis
Peabody, George
Penn, William
Poe, Edgar Allan
Reed, Walter
Roosevelt, Theodore
Saint-Gaudens, A.
Sherman, Wm. T.
Story, Joseph
Stowe, Harriet B.
Stuart, Gilbert
Washington, Booker
Washington, George
Webster, Daniel
Westinghouse, George
Whistler, James McN.
Whitman, Walt
Whitney, Eli
Whittier, John G.
Willard, Emma
Willard, Frances E.
Williams, Roger
Wilson, Woodrow
Wright, Wilbur

AMERICAN ACADEMY OF ARTS AND LETTERS, 1956

Anderson, Maxwell
Auden, W. H.
Bagnold, Enid
Berenson, Bernard
Bloch, Ernest
Brooks, Van Wyck
Brown, Arthur, Jr.
Buck, Pearl S.
Ciardi, John
Clarke, Gilmore D.
Copland, Aaron
Cummings, E. E.
Delano, William Adams
Dos Passos, John
Ellison, Ralph
Faulkner, Barry
Faulkner, William
Frost, Robert
Hersey, John
Hopkinson, Charles
Hopper, Edward
Howe, M. A. DeWolfe
Huntington, Anna Hyatt
Jeffers, Robinson
Kroll, Leon
Krutch, Joseph Wood
Lawrie, Lee
Lippmann, Walter
MacLeish, Archibald
Manship, Paul
Meštrović, Ivan
Moore, Douglas
Moore, Marianne
Mumford, Lewis
Nevins, Allan
Olmsted, Frederick Law
Piston, Walter
Redfield, Edward W.
Sandburg, Carl
Sessions, Roger
Shepley, Henry H.
Speicher, Eugene
Steinbeck, John E.
Taylor, Deems
Tinker, Chauncey B.
Van Doren, Mark
Wilder, Thornton
Wright, Frank Lloyd
Wyeth, Andrew
Young, Mahonri

NOBEL PRIZE WINNERS

Year	Name	Birth-Death Dates	Nationality	Representative Achievements
Chemistry				
1901	Van't Hoff, J. H.	1852-1911	Dutch	Founded science of stereochemistry; osmotic pressure.
1902	Fischer, Emil	1852-1919	Ger.	Synthetic production of sugar.
1903	Arrhenius, Svante A.	1859-1927	Swed.	Theory of ionization in electrolysis of liquids.
1904	Ramsay, William	1852-1916	Eng.	Discovery of neon and argon.
1905	Baeyer, J. Adolf von	1835-1917	Ger.	Analysis of indigo; preparation of synthetic dyes.
1906	Moissan, Henri	1852-1907	Fr.	Electric furnace; artificial diamond; isolation of fluorine.
1907	Buchner, Eduard	1860-1917	Ger.	Discovery of cell-less fermentation.
1908	Rutherford, Ernest	1871-1937	Eng.	Proof that atom consists of proton and electrons.
1909	Ostwald, Wilhelm	1853-1932	Ger.	Production of nitrogen explosives from ammonia.
1910	Wallach, Otto	1847-1931	Ger.	Synthesis of essential oils, perfumes, gums.
1911	Curie, Marie S.	1867-1934	Fr.	Discovery of polonium and radium.
1912	Grignard, Victor	1871-1935	Fr.	Synthesis of hydrocarbons, alcohols, aldehydes.
	Sabatier, Paul	1854-1941	Fr.	Hydrogenation by catalytic agents.
1913	Werner, Alfred	1866-1919	Swiss	Co-ordination theory of valency.
1914	Richards, Theodore	1868-1928	Amer.	Precise determination of atomic weights.
1915	Willstätter, R.	1872-1942	Ger.	Investigations on coloring substances of plants.
1918	Haber, Fritz	1868-1934	Ger.	Synthetic production of ammonia using nitrogen of air.
1920	Nernst, Walter	1864-1941	Ger.	Invention of electric lamp and reversible galvanic cells.
1921	Soddy, Frederick	1877-1956	Eng.	Formulated theory of isotopes.
1922	Aston, Francis W.	1877-1945	Eng.	Investigation of isotopes by mass spectrograph.
1923	Pregl, Fritz	1869-1930	Austr.	Micro-chemical analysis; antiseptic iodine solution.
1925	Zsigmondy, Richard	1865-1929	Ger.	Ultra-microscope; discovery thereby of nature of colloids.
1926	Svedberg, The	1884-	Swed.	Investigation of colloids.
1927	Wieland, Heinrich	1877-	Ger.	Study of fermentation in digestive processes.
1928	Windaus, Adolf	1876-	Ger.	Discovery of vitamin D; isolation of same.
1929	Harden, Arthur	1865-1940	Eng.	Investigation of enzyme action in sugar fermentation.
	Euler-Chelpin, H. von	1873-	Swed.	Investigation of enzyme action in sugar fermentation.
1930	Fischer, Hans	1881-1945	Ger.	Synthesis of hemin, blood constituent.
1931	Bergius, Friedrich	1884-1949	Ger.	Liquefaction of coal to produce gasoline.
	Bosch, Karl	1874-1940	Ger.	Commercial production of ammonia from nitrogen of air.
1932	Langmuir, Irving	1881-	Amer.	Gas-filled tungsten lamp; atomic hydrogen produced.
1934	Urey, Harold C.	1893-	Amer.	Discovery of heavy water.
1935	Joliot, Frédéric	1900-	Fr.	Method of transmuting elements by displacement or addition of component parts of atoms.
	Joliot, Irène Curie	1897-1956	Fr.	
1936	Debye, Peter J. W.	1884-	Dutch	Studies in atomic architecture of molecules.
1937	Haworth, Walter Norman	1883-1950	Eng.	Researches on vitamin C.
	Karrer, Paul	1889-	Swiss	Studies of vitamins A and G, and vegetable coloring.
1938	Kuhn, Richard*	1900-	Ger.	Isolation of vitamin G (lactoflavin).
1939	Butenandt, A.*	1903-	Ger.	Isolation of male sex hormone (androsterone).
	Ruzicka, L.	1897-	Swiss	Synthesis of androsterone from sheep-wool fat.
1943	Hevesy de Heves, Georg.	1885-	Hung.	Isotopes used as indicators in studying chemical processes.
1944	Hahn, Otto	1879-	Ger.	Work on splitting uranium atom.

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NOBEL PRIZE WINNERS—Con.

Year	Name	Birth-Death Dates	Nationality	Representative Achievements
Chemistry—Con.				
1945	Virtanen, A. I.	1895-	Finn.	Agricultural biochemistry.
1946	Sumner, James B.	1887-	Amer.	Enzyme research.
	Northrop, John H.	1891-	Amer.	Virus research.
	Stanley, Wendell M.	1904-	Amer.	Virus research.
1947	Robinson, Sir Robert	1886-	Eng.	Investigation of biologically important plant products.
1948	Tiselius, Arne	1902-	Swed.	Development of two methods for biochemical study of proteins, enzymes, and other substances.
1949	Giauque, William	1895-	Can.	Research in thermodynamics, especially on substances at low temperatures.
1950	Diels, Otto	1876-	Ger.	Discovery of dian synthesis, by which odors and complex chemical compounds can be reproduced artificially.
	Adler, Kurt	1901-	Ger.	
1951	Seaborg, Glenn T.	1912-	Amer.	Discovery of plutonium.
	McMillan, Edwin M.	1907-	Amer.	
1952	Martin, Archer	1910-	Eng.	Developing method of identifying and separating chemical elements by chromotographic analysis.
	Synge, Richard	1914-	Eng.	
1953	Standinger, Herman	1881-	Ger.	Research in giant molecules.
1954	Pauling, Louis T.	1901-	Amer.	Discoveries concerning forces which hold molecules together.
1955	Vigneaud, Vincent du	1901-	Amer.	Work on biochemically important compounds, especially for the first synthesis of a polypeptide hormone.
1956	Hinshelwood, Cyril N.	1897-	Eng.	Work on chemical reaction kinetics to improve the internal combustion engine and plastics.
	Semenov, Nikolai N.	1898-	Russ.	
Literature	*Italics* indicate titles of books.			
1901	Sully-Prudhomme, R.	1839-1907	Fr.	Poet; *La justice, Le bonheur.*
1902	Mommsen, Theodor	1817-1903	Ger.	Historian; *History of Rome.*
1903	Björnson, B.	1832-1910	Nor.	Novels, dramas, poems; *The Newly Married.*
1904	Mistral, Frédéric	1830-1914	Fr.	Poet of Provence; *Mirèio.*
	Echegaray, José	1832-1916	Span.	Dramatist; *The Great Galeota.*
1905	Sienkiewicz, H.	1846-1916	Pol.	Novelist; *Quo Vadis?*
1906	Carducci, Giosuè	1836-1907	Ital.	Poet; *Decennali, Odi barbare.*
1907	Kipling, Rudyard	1865-1936	Eng.	Poems, novels; *Puck of Pook's Hill.*
1908	Eucken, Rudolf	1846-1926	Ger.	Philosophical writer; *Religion and Life.*
1909	Lagerlöf, Selma	1858-1940	Swed.	Poems, novels; *Gösta Berling's Saga.*
1910	Heyse, Paul	1830-1914	Ger.	Short stories; *Book of Friendship.*
1911	Maeterlinck, M.	1862-1949	Belg.	Dramas, essays; *The Bluebird, The Life of the Bee.*
1912	Hauptmann, G.	1862-1946	Ger.	Dramatist; *The Sunken Bell.*
1913	Tagore, Rabindranath	1861-1941	Ind.	Poet; *Lover's Gift, The Fugitive.*
1915	Rolland, Romain	1866-1944	Fr.	Novelist; *Jean-Christophe.*
1916	Heidenstam, V. von	1859-1940	Swed.	Poet, novelist; *Charles XII and his Wars.*
1917	Gjellerup, Karl.	1857-1919	Dan.	Novelist; *The Pilgrim Carmenita.*
	Pontoppidan, Henrik	1857-1943	Dan.	Novelist; *The Promised Land.*
1919	Spitteler, Karl	1845-1924	Swiss	Poet, essayist; *Olympic Spring, Truths Spoken in Jest.*
1920	Hamsun, Knut	1859-1952	Nor.	Novelist; *Growth of the Soil.*
1921	France, Anatole	1844-1924	Fr.	Novelist; *The Human Tragedy.*
1922	Benavente, Jacinto	1866-1954	Span.	Dramatist; *La Malquerida.*
1923	Yeats, William B.	1865-1939	Irish	Poet, dramatist; *The Hourglass.*
1924	Reymont, Wladislaw	1868-1925	Pol.	Novelist; *The Peasants.*
1925	Shaw, G. Bernard	1856-1950	Eng.	Dramatist; *Man and Superman.*
1926	Deledda, Grazia	1875-1936	Ital.	Novels of Sardinian life; *The Mother, Ashes.*
1927	Bergson, Henri	1859-1941	Fr.	Philosophical works; *Creative Evolution.*
1928	Undset, Sigrid	1882-1949	Nor.	Novelist; *Kristin Lavransdätter.*
1929	Mann, Thomas	1875-1955	Ger.	Novelist; *Die Buddenbrooks.*
1930	Lewis, Sinclair	1885-1951	Amer.	Novelist; *Main Street, Babbitt, Arrowsmith.*
1931	Karlfeldt, Erik A.	1864-1931	Swed.	Poet; *Songs of the Wilderness and of Love.*
1932	Galsworthy, John	1867-1933	Eng.	Novelist, dramatist; *The Forsyte Saga, Strife.*
1933	Bunin, Ivan	1870-1953	Russ.	Novelist, short story writer; *The Village.*
1934	Pirandello, Luigi	1867-1936	Ital.	Novelist, dramatist; *As You Desire Me.*
1936	O'Neill, Eugene Gladstone	1888-1953	Amer.	Dramatist; *Strange Interlude, Anna Christie.*
1937	Martin du Gard, Roger	1881-	Fr.	Novelist; *Les Thibaults.*
1938	Buck, Pearl S.	1892-	Amer.	Novelist; *The Good Earth.*
1939	Sillanpaa, Emil	1888-	Finn.	Novelist; *The Maid Silja.*
1944	Jensen, Johannes V.	1873-1950	Dane	Poet, novelist; *The Long Journey.*
1945	Mistral, Gabriela (Lucila Goday Alcayaga)	1899-1957	Chilean	Poet; *Sonetos de La Muerte, Desolacion.*
1946	Hesse, Hermann	1877-	Swiss	Poet and novelist; *Unterm Rad.*
1947	Gide, André	1869-1951	Fr.	Critic and essayist; his whole literary work.
1948	Eliot, Thomas S.	1888-	Eng.	Poet; pioneer work in modern poetry.
1949	Faulkner, William	1897-	Amer.	Novelist, short story writer. *Sanctuary.*
1950	Russell, Bertrand	1872-	Eng.	Philosopher, writer. *Principia Mathematica.*
1951	Lagerkvist, Pär	1891-	Swed.	Poet, essayist, novelist, philosopher; *Barabbas.*
1952	Mauriac, François	1885-	Fr.	Novelist, poet, playwright, essayist.
1953	Churchill, Winston	1874-	Eng.	Statesman, orator, historian, biographer.

NOBEL PRIZE WINNERS—Con.

Year	Name	Birth-Death Dates	Nationality	Representative Achievements
Literature—Con.				
1954	Hemingway, Ernest . .	1899-	Amer.	Novelist; *A Farewell to Arms, For Whom the Bell Tolls, The Old Man and the Sea.*
1955	Laxness, Halldor Kiljan	1902-	Iceland	For his vivid epic power which has renewed the great narrative art of Iceland.
1956	Jimenez, Juan Ramon .	1882-	Span.	For his lyrical poetry.
Medicine and Physiology				
1901	Behring, Emil A. von .	1854-1917	Ger.	Discovered diphtheria antitoxin.
1902	Ross, Ronald	1857-1932	Eng.	Discovered life history of malaria parasite.
1903	Finsen, Niels R.	1860-1904	Dan.	Discovered curative effect of ultra-violet rays.
1904	Pavlov, Ivan P.	1849-1936	Russ.	Study of animal behavior—conditioned reflex.
1905	Koch, Robert	1843-1910	Ger.	Discovered bacilli of tuberculosis and cholera.
1906	Golgi, Camillo	1844-1926	Ital.	Discovered that nerves form interlacement, not network.
	Ramón y Cajal, S. . . .	1852-1934	Span.	Investigations into structure of brain and nerves.
1907	Laveran, Charles L. A. .	1845-1922	Fr.	Discovered blood parasite causing malaria.
1908	Ehrlich, Paul	1854-1915	Ger.	Discovered salvarsan, specific for syphilis.
	Mechnikov, Elie	1845-1916	Russ.	Study of immunity in infectious diseases.
1909	Kocher, E. Theodor . .	1841-1917	Swiss	Surgery of the thyroid gland.
1910	Kossel, Albrecht	1853-1927	Ger.	Elucidation of chemical composition of body cells.
1911	Gullstrand, Allvar . . .	1862-1930	Swed.	Investigations into the mechanism of vision.
1912	Carrel, Alexis	1873-1944	Amer.	Transplanting of living tissue.
1913	Richet, Charles	1850-1935	Fr.	Studies in anaphylaxis and serum therapy.
1914	Bárány, Robert	1876-1936	Austr.	Methods of diagnosis for disorders of inner ear.
1919	Bordet, Jules	1870-	Belg.	Elucidation of antitoxic action; serum for whooping cough.
1920	Krogh, August	1874-1949	Dan.	Discovered element regulating action of blood capillaries.
1922	Hill, Archibald V. . . .	1886-	Eng.	Study of heat produced by muscular activity.
	Meyerhof, Otto	1884-1951	Ger.	Study of chemical changes accompanying muscular contraction.
1923	Banting, Frederick G.. .	1891-1941	Can	Insulin method for treatment of diabetes.
	MacLeod, J. J. R. . . .	1876-1935	Can.	Insulin method for treatment of diabetes.
1924	Einthoven, Willem . . .	1860-1927	Dutch	Invented cardiometer for measuring action of heart.
1926	Fibiger, Johannes . . .	1867-1928	Dan.	Experimental production of cancer.
1927	Wagner-Jauregg, J. . .	1857-1940	Austr.	Malarial cure for general paralysis.
1928	Nicolle, Charles	1866-1936	Fr.	Discovered typhus vaccine.
1929	Eijkman, Christiaan . .	1858-1930	Dutch	Discovered vitamin B.
	Hopkins, Frederick G. .	1861-1947	Eng.	Discovered vitamin A.
1930	Landsteiner, Karl . . .	1868-1943	Amer.	Classification of individuals by blood groups.
1931	Warburg, Otto H. . . .	1883-	Ger.	Cancer research.
1932	Sherrington, Charles S. .	1857-1952	Eng.	Elucidation of process by which nervous system integrates bodily functions.
	Adrian, Edgar D. . . .	1889-	Eng.	Explanation of physiological basis of sensation.
1933	Morgan, Thomas H. . .	1866-1945	Amer.	Discovered gene, physiological unit of inheritance.
1934	Minot, George R. . . .	1885-1950	Amer.	Discovery of the liver treatment for the cure of pernicious anemia.
	Murphy, William P. . .	1892-	Amer.	
	Whipple, George H. . .	1878-	Amer.	
1935	Spemann, Hans	1869-1941	Ger.	Discoveries in connection with embryonic evolution.
1936	Dale, Henry H.	1875-	Eng.	Discovery and proof of chemical origin of nervous impulses.
	Loewi, Otto	1873-	Austr.	
1937	Szent-Györgi, Albert von	1893-	Hung.	Study of metabolism and effects of vitamins A and C.
1938	Heymans, Corneille. . .	1892-	Belg.	Showed neutral link between blood changes and breathing.
1939	Domagk, Gerhard* . . .	1895-	Ger.	Discovery of prontosil, forerunner of sulphanilimide.
1943	Dam, Henrik	1895-	Amer.	Discovery of vitamin K.
	Doisy, Edward A. . . .	1893-	Amer.	Discovery of the chemical nature of vitamin K.
1944	Erlanger, Joseph	1874-	Amer.	Discoveries concerning the highly differentiated functions of single nerve fibers.
	Gasser, Herbert S. . . .	1888-	Amer.	
1945	Fleming, Sir Alexander	1883-1955	Eng.	Discovery of penicillin.
	Florey, Sir Howard W.	1898-	Eng.	
	Chain, Ernest B.	1906-	Eng.	
1946	Muller, Hermann J. . .	1890-	Amer.	Genetics: influence of X-rays.
1947	Cori, Carl F.	1896-	Amer.	Disclosing the mechanism of enzymatic synthesis of glycogen or animal starch.
	Cori, Gerty T.	1896-	Amer.	
	Houssay, Bernardo Alfonso	1887-	Arg.	Discovery of the significance of the hormone produced by the frontal lobe of the hypophasis (pituitary gland).
1948	Müeller, Paul	1899-	Swiss	Development of insect-killing DDT.
1949	Hess, Walter Rudolph. .	1881-	Swiss	Discoveries in brain function.
	Moniz, Egas	1874-1955	Port.	Brain operations—prefrontal lobotomy.
1950	Kendall, Edward C. . .	1886-	Amer.	Research in hormones, including discovery of cortisone.
	Hench, Phillip S. . . .	1896-	Amer.	
	Reichstein, Tadeus . . .	1897-	Swiss	
1951	Theiler, Max	1899-	Amer.	Discovery of yellow fever vaccine.
1952	Waksman, Selman A. . .	1888-	Amer.	Work in discovery of streptomycin.
1953	Lippman, Fritz A. . . .	1899-	Amer.	Discoveries concerning living human cells.
	Krebs, Hans A.	1900-	Eng.	

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NOBEL PRIZE WINNERS—Con.

Year	Name	Birth-Death Dates	Nationality	Representative Achievements
Medicine and Physiology—Con.				
1954	Enders, John F.	1897-	Amer.	Discovery that poliomyelitis virus is capable of growing in cultures of different tissues.
	Weller, Thomas H.	1915-	Amer.	
	Robbins, Frederick C.	1916-	Amer.	
1955	Theorell, Hugo	1903-	Swed.	Discoveries concerning the nature and mode of action of oxidation enzymes.
1956	Richards, Jr., Dickinson W.	1895-	Amer.	In 1929 Forssmann worked a catheter into right ventricle of his heart through a vein in his right arm.
	Cournand, Andre F.	1895-	Amer.	Richards and Cournand applied the technique to test pressure in the circulatory system and abnormalities in heart functioning.
	Forssmann, Werner	1904-	Ger.	
Peace	*Italics* indicate titles of books.			
1901	Dunant, J. Henri	1828-1910	Swiss	Founded Red Cross society.
	Passy, Frédéric	1822-1912	Fr.	Founded first French peace society.
1902	Ducommon, Elie	1833-1906	Swiss	An organizer of International Bureau of Peace.
	Gobat, Charles A.	1843-1914	Swiss	Activities in International Bureau of Peace.
1903	Cremer, William R.	1838-1908	Eng.	Founded International Arbitration League.
1904	Inst. International Law	1873-	Belg.	Organized at Ghent, Belgium, 1873.
1905	Suttner, Bertha von	1843-1914	Austr.	Pacifist; *Lay Down Your Arms.*
1906	Roosevelt, Theodore	1858-1919	Amer.	Secured peace by mediation in Russo-Japanese war.
1907	Moneta, Ernesto	1833-1918	Ital.	Activities in Lombard League of Peace.
	Renault, Louis	1843-1918	Fr.	Judge on Hague Tribunal.
1908	Arnoldson, K. P.	1844-1916	Swed.	Pacifist lecturer and author.
	Bajer, Fredrik	1837-1922	Dan.	An organizer of International Bureau of Peace.
1909	Beernaert, A. M. F.	1829-1912	Belg.	Activities in international peace conferences.
	Estournelle de Constant	1852-1924	Fr.	Member of Hague Permanent Court of Arbitration.
1910	Intern'l Bur. of Peace	1891-	Swiss	Founded at Bern, Switzerland, in 1891.
1911	Asser, Tobias M.	1838-1913	Dutch	Studies in international law.
	Fried, Alfred H.	1864-1921	Ger.	Founded German Peace Society.
1912	Root, Elihu	1845-1937	Amer.	Promoted Pan-American unity; plan for World Court.
1913	La Fontaine, Henri	1854-1943	Belg.	Activities in International Bureau of Peace.
1917	Internat'l Red Cross	1863-	Swiss	Founded at Geneva, Switzerland, in 1863.
1919	Wilson, Woodrow	1856-1924	Amer.	Founder of League of Nations.
1920	Burgeois, Leon	1851-1925	Fr.	Activities in League of Nations.
1921	Branting, Hjalmar	1860-1925	Swed.	Peaceful separation of Norway and Sweden.
	Lange, Christian	1869-1938	Nor.	Activity in Inter-Parliamentary Union.
1922	Nansen, Fridtjof	1861-1930	Nor.	Pacifist; repatriation of World War prisoners.
1925	Chamberlain, Austen	1863-1937	Eng.	Negotiation of Locarno treaties.
	Dawes, Charles G.	1865-1951	Amer.	Dawes Plan for payment of German reparations.
1926	Briand, Aristide	1863-1932	Fr.	Negotiation of Locarno treaties.
	Stresemann, G.	1878-1929	Ger.	Negotiation of Locarno treaties.
1927	Buisson, Ferdinand	1841-1932	Fr.	Early advocate of a league of nations.
	Quidde, Ludwig	1858-1941	Ger.	Pacifist; attacked German imperialism; *Caligula.*
1929	Kellogg, Frank B.	1856-1937	Amer.	Negotiation of Paris Pact for outlawry of war.
1930	Soederblom, Lars Olaf J.	1866-1931	Swed.	Religious historian and peace advocate.
1931	Addams, Jane	1860-1935	Amer.	Pacifist lecturer; *Peace and Bread in Time of War.*
	Butler, N. M.	1862-1947	Amer.	Publicist; advocate of international understanding.
1933	Angell, Sir Norman	1874-	Eng.	Author, lecturer; *The Great Illusion.*
1934	Henderson, Arthur	1863-1935	Eng.	President of World Disarmament Conference.
1935	Ossietski, Carl von	1889-1938	Ger.	Journalist; fearless attacks on militarism.
1936	Saavedra Lamas, Carlos	1880-	Arg.	Exponent of Pan-American peace pacts.
1937	Cecil, Viscount of Chelwood	1864-	Eng.	Active in behalf of League of Nations.
1938	Nansen International Office for Refugees	1931-1938	Swiss	Organ of League of Nations; succeeded 1939 by High Commissioner for Refugees under Protection of League of Nations, London.
1944	Internat'l Red Cross	1863-	Swiss	Founded at Geneva, Switzerland, in 1863.
1945	Hull, Cordell	1871-1955	Amer.	Services in promoting United Nations.
1946	Mott, John R.	1865-1955	Amer.	Missionary activities.
	Balch, Emily G.	1867-	Amer.	Activities in peace societies.
1947	American Service Comm.	1917-	Amer.	Non-combatant services to soldiers and relief for civilians during and after the World Wars.
	Friends Service Council	1915-	Eng.	
1949	Boyd-Orr, Baron	1880-	Eng.	President World Federalist Congress; crusader against world food shortage.
1950	Bunche, Ralph J.	1904-	Amer.	Work as mediator in Palestine war.
1951	Jouhaux, Léon	1879-	Fr.	Anti-Communist labor leader.
1952	Schweitzer, Albert	1875-	Fr.	Philosopher, theologian, and medical missionary in Africa.
1953	Marshall, George C.	1880-	Amer.	Soldier and statesman.
1954	Office of the United Nations Commissioner for Refugees			
1955	Not awarded			
1956	Not awarded			
Physics				
1901	Roentgen, W. K.	1845-1923	Ger.	Discovery of X-rays.
1902	Lorentz, H. A.	1853-1928	Dutch	Investigated effects of magnetism on radiation.
	Zeeman, Pieter	1865-1943	Dutch	Displacement of spectrum lines by magnetic field.

NOBEL PRIZE WINNERS—Con.

Year	Name	Birth-Death Dates	Nationality	Representative Achievements
Physics—Con.				
1903	Becquerel, Antoine Henri	1852-1908	Fr.	Discovery of radioactivity.
	Curie, Marie S.	1867-1934	Fr.	Research in radioactivity.
	Curie, Pierre	1859-1906	Fr.	Research in radioactivity.
1904	Rayleigh, Lord	1842-1919	Eng.	Discovery of argon.
1905	Lenard, Philipp	1862-1947	Hung.	Discovered penetrating power of cathode rays.
1906	Thomson, Joseph J.	1856-1940	Eng.	Investigation of electrical properties of gases.
1907	Michelson, Albert A.	1852-1931	Amer.	Determination of the velocity of light.
1908	Lippman, Gabriel	1845-1921	Fr.	Method for color photography; capillary electrometer.
1909	Marconi, Guglielmo.	1874-1937	Ital.	Invention of radiotelegraphy.
	Braun, Ferdinand	1850-1918	Ger.	Improvements in radio transmission.
1910	Waals, J. van der	1837-1923	Dutch	Law of continuity of liquid and gaseous states.
1911	Wien, Wilhelm	1864-1928	Ger.	Study of black body radiation.
1912	Dalen, N. Gustav	1869-1937	Swed.	Invention of automatic regulator for gas lamps.
1913	Onnes, Heike K.	1853-1926	Dutch	Liquefaction of helium at temp. near absolute zero.
1914	Laue, Max von	1879-	Ger.	Proof of regular arrangement of atoms in crystals.
1915	Bragg, William H.	1862-1942	Eng.	Elucidation of atomic structure of crystals.
	Bragg, William L.	1890-	Eng.	Elucidation of atomic structure of crystals.
1917	Barkla, Charles G.	1877-1944	Eng.	Discovery of characteristic radiations of elements.
1918	Planck, Max	1858-1947	Ger.	Formulation of quantum theory.
1919	Stark, Johannes	1874-	Ger.	Decomposition of spectrum lines by electric field.
1920	Guillaume, C. E.	1861-1938	Swiss	Production of invar, alloy showing minimum expansion by heat.
1921	Einstein, Albert	1879-1955	Ger.	Theory of relativity; discovered law of photoelectric effect.
1922	Bohr, Niels H. D.	1885-	Dane	Theory of atomic structure—electrons moving in orbits.
1923	Millikan, Robert A.	1868-1953	Amer.	Proof of electrical nature of electrons.
1924	Siegbahn, K. M. G.	1886-	Swed.	Established unit for measuring short-wave radiations.
1925	Franck, James	1882-	Ger.	Laws governing impact of electron upon atom.
	Hertz, Gustav	1887-	Ger.	Laws governing impact of electron upon atom.
1926	Perrin, Jean	1870-1942	Fr.	Explained Brownian movement in liquids.
1927	Compton, Arthur H.	1892-	Amer.	Proof of wave-length alteration in X-rays striking object.
	Wilson, Charles T. R.	1869-	Eng.	"Cloud chamber," for showing path of ionized atoms.
1928	Richardson, O. W.	1879-	Eng.	Study of emission of electricity from hot bodies.
1929	Broglie, Louis Victor de	1892-	Fr.	Proof that matter consists of waves as well as corpuscles.
1930	Raman, C. V.	1888-	Ind.	Study of infra-red absorption bands of transparent substances.
1932	Heisenberg, Werner.	1901-	Ger.	Set forth principle of uncertainty for electrons.
1933	Schroedinger, Erwin	1887-	Ger.	Established belief that the atom is a positive nucleus surrounded by a field of negative electricity.
	Dirac, P. A. M.	1902-	Eng.	Theory that there is only one kind of fundamental particle in nature.
1935	Chadwick, James	1891-	Eng.	Discovery of neutron, sub-atomic particle without electric charge.
1936	Anderson, Carl D.	1905-	Amer.	Discovery of positive electron, or positron.
	Hess, Victor F.	1883-	Austr.	Study on origin of cosmic radiation.
1937	Davisson, Clinton J.	1881-	Amer.	Interference in electronic bombardment of crystals.
	Thomson, George P.	1892-	Eng.	Studies in nature of thin metallic surfaces.
1938	Fermi, Enrico	1902-	Ital.	Transmutation of atoms by adding neutrons to nucleus.
1939	Lawrence, Ernest O.	1901-	Amer.	Discovery of cyclotron.
1943	Stern, Otto	1888-	Amer.	Contributions to atomic ray method and discovery of magnetic moment of the proton.
1944	Rabi, Isidor I.	1898-	Amer.	For resonance method of recording the magnetic properties of atomic nuclei.
1945	Pauli, Wolfgang	1900-	Amer.	Atomic research; "Pauli's exclusion principle."
1946	Bridgman, Percy W.	1882-	Amer.	Research in atmospheric pressure.
1947	Appleton, Sir Edward V.	1892-	Eng.	Researches in the physics of the atmosphere—discovery of the Appleton layer, reflecting radio short waves.
1948	Blackett, Patrick M. S.	1897-	Eng.	Development of Wilson method of studying courses of radioactive particles, and discoveries in cosmic radiation.
1949	Yukawa, Hideki	1907-	Jap.	Mathematical prediction of the meson 14 years ago.
1950	Powell, Cecil F.	1905-	Eng.	Work on cosmic rays.
1951	Cockcroft, John D.	1897-	Eng.	Pioneer work on transmutation of atomic nuclei by artificially accelerated atomic particles.
	Walton, E. T. S.	1903-	Irish	
1952	Block, Felix	1905-	Amer.	Development of new method of measuring magnetic fields in atomic nuclei.
	Purcell, Edward Mills	1912-	Amer.	
1953	Zenike, Fritz	1888-	Dutch	Development of special microscope, especially valuable in cancer research.
1954	Born, Max	1882-	Ger.	Studies in connection with foundation of modern nuclear physics.
	Bothe, Walter	1891-1957	Ger.	
1955	Lamb, Willis E.	1913-	Amer.	Discoveries concerning the fine structure of the hydrogen spectrum.
	Kusch, Polykarp	1911-	Amer.	Precision determination of the magnetic moment of the electron.
1956	Bardeen, John	1908-	Amer.	Work on an electric transistor.
	Brattain, Walter H.	1902-	Amer.	
	Shockley, William B.	1910-	Amer.	

TEST QUESTIONS

In the following section, where the names of the persons are given in any question, the precise passage containing the answer is easily found from the given page number because of the alphabetic arrangement of the names on each page of text. Where no name is mentioned in the question, however, the reader is referred to the exact quarter page. This is done by means of the letters a, b, c, and d. The upper and lower halves of the first column are designated by a and b and the corresponding halves of the second column are indicated by c and d.

It will be noted that most of the questions found on page 2030 involve the use of the Study and Reference Groups. Although they usually lead to an investigation of individual biographies, they also call attention to the period and activities of a number of persons who are associated together because they all won distinction in a particular field. To answer these questions necessitates a rapid survey of each classification and invites a review of many biographical sketches that are presented alphabetically in the text.

Name a scholastic philosopher whose romance has become one of the great love stories of the world . . . . . 1701 a-b

What architect has prepared a "master plan" for rebuilding London? . . . . . 1701 b

Who was the second president of the United States? the founder of Hull House, Chicago? 1702a,d

Who is known as "the father of tragedy"? Why? . . . . . 1703 a-b

Why did Alexander the Great marry a Persian princess? 1705

Tell three accomplishments for which Alfred the Great is remembered 1706

For what is the Duke of Alva notorious? . . 1708

What is Amundsen's chief title to fame? What Greek philosopher is known for teaching that mind rules the universe? . . . . 1708 c, d

Name an American college president and former editor who has used the "Great Books" approach to education . . . . 1722 a

Who produced the famous statue of Liberty in New York harbor? . . . . . 1722 d

Name the only opera Beethoven composed . 1726

Where was Edward Bok buried? 1734

Tell the chief exploit of John Brown; the manner of Giordano Bruno's death. Why has the idea of sin little place in Buddhism? . 1742–1745

Give some facts concerning the United Nations mediator who brought about a settlement of the dispute between Israeli and the Arabs in 1949 . . . . . 1746 b

How did each of the following enter into the life of Julius Cæsar: Cornelia, Pompey, Gaul, Cleopatra, the calendar, the Ides of March? 1749

Why are the names Calvin and Geneva associated? 1751

What did Charlemagne do for the pope? How did Cicero save Rome? 1759, 1763

What were the acknowledged motives of Columbus in undertaking his voyages of discovery? 1768

In what way did Copernicus revolutionize the world's knowledge of the earth and the sun? 1771

With what notable contribution to science is each of the following names associated: Georges Cuvier, John Dalton, Charles Darwin? 1778–1781

Name the earliest work and the most celebrated work of Dante 1780

What books did Defoe write besides *Robinson Crusoe?* 1784

In what respect was Demosthenes a self-made orator? What was Descartes' chief contribution to mathematics? 1785, 1786

Who directed the "office of strategic services" in World War II? . . . . . 1789 d

Name the leading Negro poet of America . 1793 a

What American-born British subject became a Nobel prize-winning poet and later a dramatist? . . . . . 1797 d

What important scientific discovery was made by Benjamin Franklin? 1811

What theory brought Galileo into conflict with the authorities of the Church? 1817

Name the founder of modern eugenics . . 1818 c

With what economic doctrine is the name of Henry George associated? 1822

Name an educator who has used his knowledge as a physician and psychologist as a basis for his studies in child development 1823 c

Who designed the Woolworth building, New York? . . . . . 1824 d

Who invented the first air pump? the staff used in musical notation? . . . . . 1835 a-b

Who killed Alexander Hamilton? . . . . 1840 a

What battle left Rome at the mercy of Hannibal? Who first described Niagara falls? 1841–1849 b

In what way was Anne Boleyn the cause of having Henry VIII made head of the Church of England? 1850

Who first called Herodotus "the father of history"? 1851

Give a cogent reason for believing that Homer existed 1857

Who invented the sewing machine? . . . . 1861 a

What fate overtook the discoverer of Hudson Bay? John Huss, the Bohemian reformer? Anne Hutchinson? Hypatia? . . . 1862 b–1866

Why did Henrik Ibsen forsake his native land? 1866

What battle "made" Andrew Jackson? . . . 1869

Who originated vaccination? . . . . . 1872 d

What term of reproach did John Knox apply to Mary Queen of Scots? 1884

How long did Abraham Lincoln attend school? 1896

Name a well-known scientist who devoted much of his attention to proving the existence of a life after death . . . . . 1900 a

Who founded the Society of Jesus? In what century did he live? . . . . . 1903 b

What Roman poet is said to have died a victim of his wife's love? . . . . . 1903 c

How did Malthus propose that the over-population of the earth should be forestalled? . 1909

How old was Marie Antoinette when she was guillotined? 1911

Who wrote *Spoon River Anthology*? . . . 1914 a

Name an Austrian priest who made a discovery that remained unnoticed throughout his life but made him famous in the 20th century . . . . . 1917 a

What was the nationality of each of the following painters: J. E. Millais, F. D. Millet, and J. F. Millet? 1919–1920

Name three poems by John Milton 1920

Quote the sentence which sums up the Mohammedan confession of faith? . . . 1922 a

How did Friedrich Nietzsche classify Christian morality? 1933

In what manner did the donor of the Nobel prizes obtain his money? . . . . . 1933 b

Who first put the Mother Goose stories into literary form? Whose preaching inspired the first Crusade? Name Petrarch's ladylove. Which of the seven wonders of the ancient world was created by Phidias? 1944 a, 1945 b, 1945

What famous school was founded by Plato? . 1948

Whom did Pocahontas marry? With what physical disability was the author of *The Conquest of Peru* afflicted? . . . 1949–1951 d

Who was the discoverer of X-rays? . . . 1960 b

Name a work of sculpture by Augustus Saint-Gaudens. Who was the most gifted poetess of Greece? . . . . . 1965–1967 b

Who conquered Hannibal? . . . . . 1968 c-d

Who commanded Seneca to commit suicide? By what evidence are the dates of Shakespeare's plays inferred? 1970–1971

Where is the "Book of Mormon" said to have originated? . . . . . 1975 a

Name a man who commanded an army fighting against Great Britain and later commanded a British army. What is meant by the term Socratic irony? . . . . . 1975 b, d

Of the two English writers, Edmund Spenser and Herbert Spencer, which was philosopher and which was poet? 1977

To what speed did George Stephenson's locomotive, "Rocket," attain? 1979

Who predicted the eclipse of the sun that occurred on May 28, 585 B.C.? . . . . 1986 a

Why was Virgil highly regarded by early Christian writers? Why did Wagner spend part of his life as an exile? 1994, 1996

Name the estate which George Washington owned and in which he was buried 1998

Who was the chief founder of the League of Nations? . . . . . 2006 a

Among actors noted for interpretative Shakesperean roles, who were some contemporaries and immediate successors of Edwin Booth? Which one wrote Booth's biography? . . . 2011

Name some American and some foreign actors who have been theatrical producers . . . 2011

Which pioneers in aircraft design are associated with lighter-than-air machines? bombers? helicopters? pursuit planes? 2011

Who is credited with founding the science of anthropology? What later scientist in this field devised measurements for police identification? Which one has recently studied fossil man in South Africa? 2011

Cite some American and some European architects who have contributed to the development of modern style in the design and placing of buildings 2012

Who were the predecessors of Copernicus? How did his astronomical theories differ from theirs? 2012

Who was the first biographer, and what did he write? 2012

What family of financiers was honored by a patent of nobility from the Austrian government? 2012

Name a famous chemist who has also been a political leader in the newly formed state of Palestine 2012

What classical and oriental scholars have also been noted as translators? 2013

Which American colonial leaders were distinguished orators? 2013

Name three composers whose music is classified as "modern" in style and spirit . . . 2013

What American and foreign diplomats have been prominently connected with international affairs since the close of World War II? 2013

Of the dramatists born later than George Bernard Shaw, name three belonging to each of the following groups: American, British, French, Irish, German 2014

It is said that the age of personal journalism in America can be summed up in the names of half a dozen outstanding editors. Which names would you suggest for this list? . . 2014

To what period does Thomas Arnold belong? Johann Pestalozzi? What did each contribute to education? 2014

What engineers were active in the following fields: bridge building; canal construction; efficiency, or scientific management? . . . 2014

Name four recent or contemporary explorers. For what is each noted? 2015

What historians have been noted for their work as biographers? 2015

List six American illustrators. With what works are they associated? Who is best known as the illustrator of Dickens? Of Dante's *Divine Comedy*? 2015

Name one or more inventors who are associated with each of the following: the steamboat, the reaper, the printing press, small arms, radio 2015

What jurist served as the first chief justice of the United States supreme court? 2016

Where does Samuel Gompers belong in the American labor movement? 2016

Name some manufacturers who were also inventors. Some mathematicians who were also astronomers 2016

Cite two French military leaders who were contemporaries of Napoleon 2016

In World War II, who were the principal generals each of these countries: United States, Great Britain, Germany, Russia? 2017

Name three prominent naval commanders of World War I. Of World War II 2017

In point of time, what novelists are most closely associated with Charles Dickens? With Arnold Bennett? With Sinclair Lewis? 2018

What American novelist was an engineer and a painter? 2018

To what period of American history does Gilbert Stuart belong? What is his most famous portrait? 2018

What is the period, the country, and the principal work of each of the following artists: Raphael, Rembrandt, Gainsborough, Corot, Menzel, Picasso, Rivera? 2018

Name six recent or contemporary philosophers and state the chief contribution made by each 2019

When did each of these physicians live, and for what is each noted: Hippocrates, Galen, Bright, Gorgas, Lister, Schick? 2019

What physicists are remembered in connection with the following: the law of gravitation, the thermometer; X-rays, the theory of relativity? 2019

Cite some electrical terms that are derived from the names of physicists 2019

What physiologists are recent Nobel prize winners? 2020

Name some contemporaries of the poet Edwin Markham. What is his most famous poem? 2020

What English poets of the middle nineteenth century were also painters? 2020

Name a present-day political leader in each of these countries: France, Portugal, Argentina, China, Yugoslavia, Russia, Italy . . 2020

What labor leaders have been prominent recently in British politics? 2021

What religious leaders were also explorers? . 2022

Who was the last emperor of Russia? The last king of Spain? 2022

Name some American women who have been sculptors 2022

What social reformer was also a novelist? What work of fiction did he write? 2023

Who were the outstanding statesmen of ancient Greece? For what was each noted? . . 2023

What contemporary French religious writer is also an essayist and a philosopher? 2023

What zoologists were also painters? Botanists? 2023

Glancing rapidly through the lists, what names do you find that indicate unusual versatility? 2011–2024

BIBLIOGRAPHY

The following list of carefully selected biographical works, while by no means exhaustive, contains a substantial number of the great biographical works which are easily available in English. Some of them have recently come from the press; others have stood the test of enduring popularity.

In addition to biographies will be found the best standard biographical reference works. By consulting these the reader may find information regarding thousands of persons who are known only for certain special reasons and may also obtain additional details concerning the smaller number who have become more universally famous. A selection from the more celebrated autobiographies is given in a separate group. The biographies proper may be either the greatest works of their class or the best available works on the greatest men. The list contains also a liberal proportion of works on famous women and on members of the American hall of fame.

GENERAL WORKS

Abbott, Lyman—Silhouettes of My Contemporaries. . . . . *Doubleday*
Bradford, Gamaliel—American Portraits. *Houghton Mifflin*
—Portraits of American Women. *Houghton Mifflin*
Britt, Albert—The Great Biographers. *Whittlesey*
Burr, Anna Robeson—The Autobiography. *Houghton Mifflin*
Darrow, F. L.—Masters of Science and Invention. *Harcourt Brace*
Gardiner, A. G.—Portraits and Portents. . *Harper*
Gibson, C. R.—Heroes of the Scientific World. *Seeley, Service & Co., Ltd.*
Iles, George—Leading American Inventors. . *Holt*
Johnston, R. M.—Leading American Soldiers. . *Holt*
Laut, Agnes C.—Pathfinders of the West. *Macmillan*
Oliphant, M.—Makers of Florence. . . *Macmillan*
Plutarch—Lives. . . . . *Dutton*
Quiller-Couch, A. T.—The Roll Call of Honor. *Nelson*
Thayer, W. R.—The Art of Biography. . *Scribner*

DICTIONARIES

Cyclopedia of American Biography . . *Appleton*
Cyclopedia of Names . . . . . *Appleton*
Dictionary of American Biography . . . *Scribner*
Dictionary of National Biography (British) *Oxford*
Who's Who (Chiefly British) . . . . . *Black*
Who's Who in America . . . . . *Marquis*
Webster's Biographical Dictionary . . . *Merriam*
Wier, A. E.—Thesaurus of the Arts. . . *Putnam*

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Adams, Henry—The Education of Henry Adams. *Houghton Mifflin*
Augustine, Saint—Confessions (tr. of E. B. Pusey). *Dutton*
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Bispham, David—A Quaker Singer's Recollections. *Macmillan*
Burroughs, John—My Boyhood. . . *Doubleday*
Carnegie, Andrew—Autobiography. . *Doubleday*
Cellini, Benvenuto—Autobiography. . . *Brentano*
Clark, Francis E.—Memories of Many Men in Many Lands. *United Society of Christian Endeavor*
Cody, W. F.—Autobiography of Buffalo Bill. *Wiley*
Crockett, David—Autobiography. . . . *Scribner*
Damrosch, Walter—My Musical Life. . *Scribner*
Drew, John—My Years on the Stage. . . *Dutton*
Ellis, Havelock—My Life. . . *Houghton Mifflin*
Ford, Henry—My Life and Work. . . *Doubleday*
Francis of Assisi, Saint—Little Flowers. . *Dutton*
Franklin, Benjamin—Autobiography. *Houghton Mifflin*
Gandhi, M. K.—The Story of My Experiments with Truth. . . . . *Public Affairs Press*
Garland, Hamlin—A Son of the Middle Border. *Macmillan*
Goethe—Truth and Poetry (Selections). . . . *Holt*
Gorky, Maxim—My Childhood. . . , *Garden City*
—My University Days. *Boni & Liveright*
Grenfell, W. T.—A Labrador Doctor. *Houghton Mifflin*
Hall, G. Stanley—Life and Confessions of a Psychologist. . . . . *Appleton*
Hudson, W. H.—Far Away and Long Ago. *Dutton*
Johnston, Sir Harry—The Story of My Life. *Chatto & Windus*
McCarthy, Justin—Reminiscences. . . . *Harper*
McClure, S. S.—My Autobiography. . . . *Stokes*
Modjeska, Helena—Memories and Impressions. *Macmillan*
Morley, John—Recollections. . . . . *Macmillan*
Newman, J. H. (Cardinal)—Apologia pro Vita Sua. *Dutton*
Parkhurst, C. H.—My Forty Years in New York. *Macmillan*
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Riis, Jacob—The Making of an American. *Macmillan*
Roosevelt, Theodore—Autobiography. *Macmillan*
Rousseau, Jean Jacques—Confessions. *Dent, Dutton*
Saint-Gaudens, Augustus—Reminiscences. *Century*
Steffans, Lincoln—Autobiography. *Harcourt Brace*
Steiner, E. A.—From Alien to Citizen. . . *Revell*
Tagore, Rabindranath—My Reminiscences. *Macmillan*
Thomas, Augustus—The Print of My Remembrances. . . . . *Scribner*
Washington, Booker T.—Up from Slavery. *Garden City*
Watterson, H. W.—Marse Henry—An Autobiography. . . . . *Doran*
Weizmann, Chaim—Trial and Error. *Jewish Publication Society*
Yeats, William Butler—Reveries over Childhood and Youth. . . . . *Macmillan*

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Adams, John	Morse, J. T., Jr.	*Houghton Mifflin*
Adams, Samuel	Hosmer, James K.	*Houghton Mifflin*
Alcott, Louisa M.	Meigs, Cornelia	*Little Brown*
Aldrich, Thomas B.	Greenslet, Ferris	*Riverside Press*
Alexander the Great	Cummings, L. V.	*Houghton Mifflin*
Alfred, King	Besant, Sir Walter	*Appleton*
Audubon, J. J.	Rourke, Constance N.	*Harcourt Brace*
Austen, Jane	Firkins, O. W.	*Holt*
Balzac, Honore de	Zweig, Stefan	*Viking*
Barnum, P. T.	Werner, M. R.	*Harcourt Brace*
Barton, Clara	Epler, P. H.	*Macmillan*
Beecher, Henry Ward	Abbott, Lyman	*Am. Pub. Co.*
Beethoven	Ludwig, Emil	*Putnam*
Bernhardt, Sarah	Verneuil, Louis.	*Harper*
Boone, Daniel	Bakeless, John E.	*Morrow*
Bronte, Charlotte	Benson, E. F.	*Longmans Green*
Bronte, Charlotte	Gaskell, Mrs. E. S.	*Harper*
Brooks, Phillips	Allen, A. G. V.	*Dutton*
Brown, John	Villard, Oswald G.	*Houghton Mifflin*
Browning, Elizabeth Barrett	Clarke, Isabel	*Hutchinson, Ltd.*
Browning, Robert	Dowden, Edward	*Dutton*
Bryant, William Cullen	Bigelow, John	*Houghton Mifflin*
Burke, Edmund	Morley, John	*Harper*
Burns, Robert	Lockhart, J. G.	*Dutton*
Caesar, Julius	Buchan, John	*Nelson*
Calhoun, John C.	Hunt, Gaillard	*Jacobs*
Calvin, John	Harkness, Georgia	*Holt*
Carlyle, Thomas	Froude, James A.	*Scribner*
Carver, George W.	Holt, Rackham	*Doubleday*

Subject	Author	Publisher
Cavour, Count	Thayer, W. R.	*Houghton Mifflin*
Cervantes	Ybarra, T. R.	*Boni*
Charlemagne	Bulfinch, Thomas	*Dutton*
Churchill, Winston	Kraus, R.	*Lippincott*
Clay, Henry	Schurz, Carl	*Houghton Mifflin*
Clemens, Samuel (See Twain, Mark)		
Cleveland, Grover	Nevins, Allan	*Dodd Mead*
Cook, Captain	Besant, Sir Walter	*Macmillan*
Cooper, J. Fenimore	Boynton, H. C.	*Century*
Cromwell, Oliver	Roosevelt, Theodore	*Scribner*
Dante Alighieri	Fletcher, J. B.	*Holt*
Darwin, Charles	Darwin, Francis	*Appleton*
Davis, Jefferson	Cutting, E.	*Dodd Mead*
Decatur, Stephen	Anthony, Irvin	*Scribner*
Dickens, Charles	Kitton, F. G.	*T. C. & E. C. Jack*
Disraeli, Benjamin	Meynell, W.	*Appleton*
Douglas, Stephen A.	Brown, W. G.	*Houghton Mifflin*
Eads, James B.	How, Louis	*Houghton Mifflin*
Edison, Thomas	Miller, F. T.	*Winston*
Edwards, Jonathan	Winslow, Ola E.	*Macmillan*
Eisenhower, Dwight	Davis, Kenneth S.	*Doubleday*
Eliot, George	May, J. Lewis	*Bobbs-Merrill*
Elizabeth, Queen	Neale, J. E.	*Harcourt Brace*
Emerson, Ralph Waldo	Firkins, O. W.	*Houghton Mifflin*
Ericcson, John	Church, W. C.	*Scribner*
Farragut, Admiral David G.	Mahan, A. T.	*Appleton*
Fawcett, Henry	Holt, Winifred	*Houghton Mifflin*
Foch, Marshal F.	Aston, Sir George	*Macmillan*
Francis of Assisi, Saint	Egan, M. F.	*Dutton*
Franklin, Benjamin	Van Doren, Carl	*Viking*
Fremont, John C.	Nevins, Allan	*Harper*
Gibbons, Cardinal	Will, A. S.	*Dutton*
Gladstone, W. E.	Morley, John	*Macmillan*
Grant, Ulysses S.	Green, Horace	*Scribner*
Hale, Nathan	Stuart, I. W.	*Appleton*
Hamilton, Alexander	Lodge, H. C.	*Houghton Mifflin*
Hannibal	Baker, G. P.	*Dodd Mead*
Harte, Bret	Merwin, H. C.	*Houghton Mifflin*
Hawthorne, Nathaniel	Woodberry, G. E.	*Houghton Mifflin*
Hay, John	Thayer, W. R.	*Houghton Mifflin*
Hearn, Lafcadio	McWilliams, Vera	*Houghton Mifflin*
Henry, O.	Smith, C. A.	*Doubleday*
Henry, Patrick	Axelrad, Jacob	*Random House*
Higginson, H. L.	Perry, Bliss	*Atlantic Mon. Press*
Howe, Joseph	Longley, J. W.	*Oxford*
Howe, Julia Ward	Tharp, Louise H.	*McBride*
Hugo, Victor	Josephson, Matthew	*Doubleday*
Huxley, T. H.	Peterson, Houston	*Longmans*
Ibsen, Henrik	Koht, Halvan	*Norton*
Inness, George	Inness, George, Jr.	*Century*
Jackson, Andrew	Bassett, J. S.	*Doubleday*
Jackson, Stonewall	Tate, Allen	*Minton, Balch & Co.*
Jefferson, Thomas	Morse, J. T.	*Houghton Mifflin*
Joan of Arc (See Maid of France)		
Johnson, Samuel	Boswell, James	*Dutton*
Jones, John Paul	Thomson, V.	*Liveright*
Lafayette	Sedgwick, H. D.	*Bobbs-Merrill*
Laurier, Sir Wilfrid	Skelton, O. D.	*Century*
Lee, Robert E.	Freeman, D. S.	*Scribner*
Lincoln, Abraham	Charnwood, Lord	*Holt*
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Livingstone, David	Horne, C. S.	*Macmillan*
London, Jack	Stone, Irving	*Houghton Mifflin*
Longfellow, H. W.	Higginson, T. W.	*Houghton Mifflin*
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Loyola, Ignatius	Sedgwick, H. D.	*Macmillan*
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Lyon, Mary	Gilchrist, B. B.	*Houghton Mifflin*
Macauley, T. B.	Trevelyan, G. O.	*Harper*
MacDonald, Sir John A.	Parkin, G. R.	*Oxford*
Machiavelli, N.	Villari, Pasquale	*Unwin*
Madison, James	Gay, S. H.	*Houghton Mifflin*
Mahomet	Draycott, G. M.	*Dodd Mead*
Maid of France	Lang, Andrew	*Longmans*
Mann, Horace	Hubbell, G. A.	*Fell*
Mansfield, Richard	Wilstach, P.	*Scribner*
Marquette, Pere	Repplier, Agnes	*Doubleday*
Marx, Karl	Spargo, John	*Huebsch*
Mazzini, G.	Barr, Stringfellow	*Holt*
Mercier, Cardinal	Gade, J. A.	*Scribner*
Michelangelo	Symonds, J. A.	*Nimmo*
Milton, John	Pattison, Mark	*Macmillan*
Moliere, J. B.	Matthews, Brander	*Scribner*
Monroe, James	Gilman, D. C.	*Houghton Mifflin*
Montaigne	Dowden, Edward	*Lippincott*
Morse, S. F. B.	Mabee, Carleton	*Knopf*
Mozart	Davenport, Marcia	*Scribner*
Napoleon I	Fournier, August	*Holt*
Nelson, Lord	Mahan, A. T.	*Little Brown*
Nightingale, Florence	Cook, E. T.	*Macmillan*
Osler, Sir William	Cushing, Harvey	*Oxford*
Page, Walter H.	Hendrick, Burton	*Doubleday*
Palmer, Alice Freeman	Palmer, G. H.	*Houghton Mifflin*
Pasteur, Louis	Vallery-Radot, R.	*Doubleday*
Paul, Saint	Farrar, F. W.	*Dutton*
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Pershing, John J.	Farrell, C. H.	*Rand*
Peter the Great	Graham, S.	*Simon and Schuster*
Poe, Edgar A.	Woodberry, G. E.	*Houghton Mifflin*
Raleigh, Sir Walter	Ober, F. A.	*Harper*
Raphael	Ady, Mrs. J. C.	*Duckworth*
Rhodes, Cecil	Millin, Sarah G.	*Harper*
Rodin, A.	Cladel, Judith	*Century*
Roosevelt, Franklin D.	Perkins, Frances	*Viking*
Roosevelt, Theodore	Thayer, W. R.	*Houghton Mifflin*
Rossetti, Dante G.	Benson, A. C.	*Macmillan*
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Ruskin, John	Quennell, Peter	*Viking*
Savonarola	Villari, Pasquale	*Scribner*
Scott, Sir Walter	Lockhart, J. G.	*Dutton*
Selous, F. C.	Millais, J. G.	*Longmans*
Seward, W. H.	Bancroft, F.	*Harper*
Shakspeare, Wm.	Adams, Jos.	*Houghton Mifflin*
Shaw, G. B.	Henderson, Archibald	*Appleton*
Sheridan, Philip H.	Davies, H. E.	*Appleton*
Sherman, John	Burton, T. E.	*Houghton Mifflin*
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Smuts, Jan	Crafford, F.	*Doubleday*
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Stalin, Joseph	Deutscher, Isaac	*Oxford*
Stevenson, R. L.	Balfour, Graham	*Scribner*
Stowe, Harriet B.	Gilbertson, Mrs. Catherine	*Appleton-Century*
Taylor, Frederick W.	Copley, F. B.	*Harper*
Tennyson, Alfred	Fausset, H.	*Selwyn & Blount*
Thackeray, W. M.	Stevenson, Lionel	*Scribner*
Thoreau, H. D.	Canby, H. S.	*Houghton Mifflin*
Tolstoy, Leo	Simmons, Ernest	*Little Brown*
Twain, Mark	Paine, Albert B.	*Harper*
Victoria, Queen	Strachey, L.	*Harcourt Brace*
Vinci, Leonardo da	Taylor, Rachel A.	*Harper*
Voltaire	Maurois, Andre	*Appleton*
Wagner, Richard	Finck, H. T.	*Scribner*
Walker, Francis Amasa	Munroe, J. P.	*Holt*
Ward, Mrs. Humphrey	Trevelyan, Janet	*Constable*
Washington, George	Lodge, H. C.	*Houghton Mifflin*
Washington, George	Thayer, W. R.	*Houghton Mifflin*
Webster, Noah	Warfel, Harry R.	*Macmillan*
Wesley, John	Tyerman, Luke	*Harper*
Whistler, James McNeill	Pennell, Mrs. E. R. and Pennell, Joseph	*Lippincott*
Whitman, Walt	Perry, Bliss	*Houghton Mifflin*
Willard, Emma	Lutz, Alma	*Houghton Mifflin*
Willard, Frances	Earhart, M.	*Univ. of Chicago Press*
William the Conqueror	Freeman, E. A.	*Macmillan*
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Miscellany

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Medal of Honor
Navy

Medal of Honor
Army

Distinguished
Service Cross

Navy Cross

Distinguished
Service Medal
Army

Brevet Medal
Marine Corps

Legion of Merit

Distinguished
Flying Cross

Distinguished
Service Medal
Navy

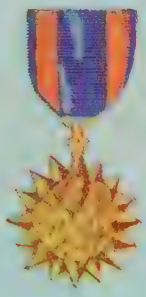
Purple Heart

Soldier's Medal

Principal DECORATIONS of the U. S. Armed Forces World War II

Navy - Marine Corps
Medal

Bronze Star
Medal



Air Medal

Distinguished
Service Medal
Merchant Marine

Silver Star

Mariner's Medal

MISCELLANY

INTRODUCTORY

This department bears the title Miscellany primarily because it comprises groups of information that are more or less unrelated to each other. Moreover, each group contains material which, in its entirety, cannot properly be classified under any particular one of the preceding departments.

In no sense, however, is this department a mere medley of odds and ends. On the contrary, each group contains some of the most carefully arranged, informing, and useful material in the work. This material has been placed here, not because it could not be readily distributed elsewhere in the volume, but because its arrangement in these specially constituted groups greatly enhances its reference value.

The advantages of this plan may be seen in the section on Heroic Deeds, in which the various stories inspire far greater human interest than would the same material scattered through the departments of History, Geography, Useful Arts, and Biography. Again, the combined historic, romantic, artistic, and spiritual suggestiveness of the section on California Missions would be all but lost should this material be separated into its component parts and the fragments placed under History, Geography, Biography, and Fine Arts.

A second important advantage gained by bringing things of the same kind together in the manner adopted for these miscellaneous groups is the ease of reference thereby secured. Instead of finding it necessary to turn to two or more widely separated departments and then to combine the information obtained, the user will discover that this task has been performed for him in advance. The marked saving of time and effort effected by this arrangement is clearly shown in the numerous groupings, which include Sobriquets and Nicknames, Popular Names of States and Peoples, State Mottoes, State Emblems, State Flowers, and various other somewhat similar assemblages of interesting information.

Parliamentary Law. To an ever increasing extent this is an age of organization, of association, and of co-operation. We act more and more in groups and less and less solely as individuals. Every progressive community, as a rule, contains several active organizations. In the country there are farmers' clubs and co-operative associations in great variety. In villages and in towns there are men's clubs, women's clubs, and numerous other organizations. In the larger cities there are organizations in connection with practically every activity in which the citizens engage—commercial, social, civic, political, musical, literary, educational, or religious. Moreover, in many schools, formal organization has become part of the regular procedure of the institution.

From time to time it is necessary for such bodies to transact business and to act upon various matters presented for consideration. It is highly desirable that such transactions should be made in accordance with correct parliamentary procedure. This is extremely important whenever financial considerations are involved. In such cases parliamentary proceedings have a legal significance and may affect the title to valuable property or the disposition of large sums of money.

In the section devoted to this subject, the essentials of a complete manual have been brought together within the compass of 12 pages. Great care in preparation has been exercised in order to secure a simple and effective arrangement combined with absolute clearness of presentation. By studying this material, the user of this volume will be enabled to acquaint himself very quickly with the parliamentary rules in conformity with which organizations of all types should conduct their deliberations.

Societies and Organizations. It has been stated above that the present age is pre-eminently one of organization and co-operation. The total number of organizations, in fact, has become so enormous that a mere catalogue of their names would fill volumes.

With a view to furnishing the reader with helpful information concerning some of the larger and more distinguished of these, concise articles treating some 70 orders, societies, and various other organizations are presented in an ensuing section. Here will be found authoritative facts regarding the history, scope, and purpose of the most notable organizations in the United States and in other countries.

California Missions. Among the recollections which remain most sharply etched in the minds of travelers upon the Pacific coast are the impressions produced by visits to the old California missions. Most persons dwelling in other parts of the continent have a very imperfect knowledge of these historic institutions or of the influence which they exerted in many ways upon the later development of California.

In the section devoted to this subject will be found an array of facts of unusual interest concerning the long chain of missions founded among the Indians of the Pacific coast more than 150 years ago by heroic Franciscan padres from Mexico. Authentic information is presented in regard to the origin, history, former prosperity, and later decline of these celebrated missions. Of especial value are the descriptions of their modern remains and the exact information given in regard to their location and their accessibility to the traveler.

Heroic Deeds. Courage is a virtue of the most universal appeal. The American Indians used to take steps which they believed would secure for themselves the heroism of their most daring enemies. No less marked is the homage which the children of a civilized age pay to those who show themselves intrepid in the face of danger. A thrill of admiration and pride passed through millions of hearts when they read of the numerous acts of quiet heroism performed when the *Titanic* or the *Lusitania* was sinking in mid-ocean.

The division reserved for the description of notable deeds of heroism recounts those of many different types. Heroes of science will be found treated, as well as heroes of the sea. There are exploits of women, of children, of priests and warriors, of explorers, workmen, and kings. The human interest of these stories is increased by the fact that, except for one or two which depend on tradition, they are authentic accounts of actual occurrences.

Sobriquets and Nicknames. Often a person or a place bears a distinctive name that has long been applied by general consent. It may not for the time seem appropriate. It may appear as meaningless as a word of an unknown tongue. Yet those names frequently carry interesting stories for the one who can interpret them.

The origin and the meaning of a large number of such names are explained in the section under the above caption. There one may find answers to such questions as Who was called the mill boy of the slashes? How did Uncle Sam come to symbolize the United States? Who was the weeping philosopher? By finding the answers to these and many similar questions, the reader will travel far over the field of human history and will bring back with him many interesting items of information which it will long be a pleasure to remember.

National Symbols and Flags. In every land the sentiments of millions of human beings are centered about certain objects usually insignificant in themselves—a piece of colored cloth or an arbitrarily chosen flower or animal. An insult to these enshrined symbols is instantly resented as an indignity to the people who have chosen them. Fealty to its symbols is interpreted as a sign of friendship to the people.

The reader may see in the following pages an account of the flowers and the animals which have been made emblematic of various countries of the world as well as of each state of the Union. In the past two decades of wars and revolutions, the flags of many countries have been altered, in some cases several times. For this reason, the older sources of information regarding national flags are sure to be misleading. In this department the present flags of the chief countries of the world will be found clearly described.

Festivals and Holidays. This section brings together for reference and comparison a fund of instructive information, a large part of which is not readily accessible to the average reader. While fairly clear ideas prevail as to the origin and meaning of patriotic holidays, such as July Fourth, Memorial Day, and Flag Day, and also concerning religious holidays, such as Christmas and Easter, most persons find themselves at a loss to explain the significance of various other festivals and holidays observed in their own country, not to mention those celebrated in other lands.

The section devoted to this subject gives the history and meaning of Saint Valentine's Day, April Fool's Day, May Day, and Halloween. It likewise enlightens the reader concerning some of the more important local festivals which have become established in the United States, including the Mardi Gras, the Rose Festival, the Tournament of Roses, Labor Day, Arbor Day, and Mother's Day.

Popular Superstitions. It will be a matter of astonishment to many people to read in a following section that many of the common superstitions playfully discussed nowadays were once elements of magic accepted in dead earnest by people hundreds of years ago. Familiar as they are, they often bear an age-long antiquity. Such are those connected with charms, like the lucky horseshoe, and with customs, like shoe throwing at weddings.

The reader will find also the scientific explanation of many of the common errors which have passed current for many generations. These include the belief that toads or frogs fall in rain and that horsehairs turn to snakes if left for a certain length of time in water.

Great Disasters. The customary security in which we live tends to make us forget that we have no guarantee against catastrophe. Nature pursues her regular course regardless of human life. Cataclysmic earthquakes occur alike in unpeopled tracts and in the most populous lands. Volcanoes may break forth not merely in Alaska but also above great cities, such as Naples. It makes no difference to the seething waters of a flood whether they carry away broken trees or human habitations.

Particularly at the time of such unhappy occurrences, people's minds revert to earlier catastrophes. They desire to learn how many perished in this or that former disaster. A clear and concise presentation of such information is given in this department, which records the most notable modern disasters.

Discoveries and First Uses. From the earliest times people have shown a lively curiosity in regard to the origin of the various objects with which they meet. It is such curiosity regarding the origin of the world that accounts for the myths of creation invented by nearly all early peoples. Their customs, their arts, and even the geographical features of their countries are frequently explained by stories which make their surroundings seem more understandable to primitive people.

In the present age, which is distinguished from all others by the multitude of newly invented arts and sciences which it possesses, a knowledge of the origins of these various innovations is especially interesting. For the first time in history, careful records make it possible to give the true answers to such queries as When did the first locomotive run? Who made the first dynamo? What was the first newspaper published in America?

The interesting list of discoveries and first uses given in the following section will be found to include dates for the discovery of bacteria, the establishment of the first free public bath in America, the first manufacture of artificial ice, the determination of the velocity of light, the construction of the first suspension bridge, and numerous other events which were the first of their kind.

Drawing and Design. Within the past decade or two has occurred a widespread popular awakening of interest in applied art. Not only have advertisements in magazines become veritable picture galleries, but large numbers of people are becoming aware of the fact that, by desirable combinations of color and lines, it is possible greatly to enhance the beauty of their houses, their gardens, and their costumes. It is a commonplace among psychologists that to have pleasing and restful surroundings conserves the nervous energy. It does more—it enriches life.

Up to the present the possibilities lying in the application of artistic principles in everyday life have scarcely begun to be realized. Without the expenditure of a single additional dollar, the charm of nearly every house might be vastly increased by the application of certain simple rules. The section on drawing and design, besides containing much else of great value, explains these principles and gives many useful hints for household decoration.

Furniture. This instructive section gives a brief outline of the history of furniture and an account of the chief types of period furniture. It characterizes the ornamentations found on the chairs and couches made in ancient times and enables one to recognize by their qualities the articles which copy the furniture of Louis XIV, Queen Anne, or the American Colonial days.

Games and Sports. It is a curious fact that many of our familiar games date from a remote antiquity. Cards and chess, for example, were known among the ancient Egyptians. Lacrosse is a game which originated among certain North American Indians. The phenomenal popularity of tennis and baseball, however, is of more recent date. Interesting articles on the character and the history of these and many other well-known games will be found in the section entitled Games and Sports.

General Miscellany. The material which will be found arranged alphabetically in General Miscellany includes some of the most useful and interesting information in this volume. The reader may there be made acquainted with the once important "science" of alchemy and the seven wonders of the world, famous since ancient times. He may learn much about patents, ways of reckoning time, the significance of various flowers as emblems, the Nobel prizes, the history of the America Cup races, ways of making fire, notable communistic societies, and a large number of other engrossing subjects.

PARLIAMENTARY LAW

THE term "parliamentary law" was applied originally to the customs and rules under which business was conducted in the English Parliament. As these usages of Parliament became fixed for that body, they gradually came to be recognized outside of Parliament, not only as authoritative in the governing of deliberative assemblies, but also as forming part of the unwritten law of the land. From England, the usages of Parliament spread to America as well as to other countries, and, with modifications to suit the needs of individual bodies, these usages have formed the basis for rules and regulations governing all of our deliberative assemblies, including legislative bodies and legal corporations. Parliamentary law in America has very generally conformed to the usages of Congress. These, of course, differ somewhat in the two houses of Congress, and are changed and revised from time to time.

Definition. Parliamentary law is, therefore, a set of customs and rules used by organized bodies in the conduct of their meetings, defining what may or may not be fairly or properly done at such meetings.

While no organized body need be bound by any set parliamentary rules, it is quite impossible, without such rules, to conduct a meeting with fairness and alacrity. Most organizations, therefore, not only follow general parliamentary rules, but adopt some particular work on parliamentary law as a guide for the conduct of their meetings.

A typical work on parliamentary law should describe methods of organizing societies and of conducting meetings, and should outline the duties of officers. It should give also the names of motions, with comment upon each motion. This comment should cover the following points: the object and effect of the motion; whether it can be amended or debated; if debatable, the extent to which it opens the main question to debate; the circumstances under which the motion may be made; and what other motions may be made while it is pending. The purpose of this section is to present to the reader, in a brief, concise form, as much of parliamentary law as one needs to know in order to be an alert, intelligent citizen, competent to participate in public discussions and organizations.

TEMPORARY ORGANIZATION

When a number of persons who previously have agreed to meet for the purpose of organization are assembled, anyone present may rise and say, "I move that Mr. A act as chairman." Anyone else present, either seated or standing, may say, "I second the motion." The maker of the motion, standing, should then say: "It has been moved and seconded that Mr. A act as chairman. All in favor say *aye*. All opposed say *no*." If the maker of the motion is satisfied that a majority have voted aye, he says: "The motion is carried. Will Mr. A please take the chair." If he is satisfied that a majority have voted no, he says: "The motion is lost. I will receive the nomination of some one else." If, at this time, more than one person is nominated, the maker of the first motion puts before the assembly the name that he first hears, and so on until a choice is made.

Alternative Method. Instead of some one's rising and himself nominating a chairman, any person may rise and say, "Will the meeting please come to order. I will receive nominations for chairman." Thereupon he becomes a kind of temporary chairman, and continues to receive and to put nominations for chairman until some one is elected in the manner explained above.

The Temporary Chairman. The person elected should immediately take the chair, when he may speak very briefly of the honor conferred upon him or on the purpose of the organization or on both subjects. He may call for the nomination of a secretary, tellers, and other officers, to be elected in the same manner as the chairman, by saying, for example, "Nominations for secretary are in order," or "I will receive nominations for secretary"; or he may simply say, "What is your further pleasure?" and await the action of some member. To expedite matters, the newly elected chairman may say, "If there are no objections, I will appoint a secretary and tellers." Hearing no objections, he immediately appoints a secretary and at least two tellers, and proceeds with the organization.

PERMANENT ORGANIZATION

First Meeting. If a permanent organization is contemplated, after the election of the chairman and the election or appointment of the secretary and tellers, either the chairman, or some one previously agreed upon, at the call of the chairman, sets forth, somewhat in detail, the purpose of the meeting. This person usually concludes his remarks by offering a resolution, previously prepared. This resolution is usually passed to and read by the secretary, although it may be read by the person offering it. A motion to adopt the resolution is then in order and, when made and seconded, may be freely debated by anyone present. Such a resolution might read, "Resolved, That it is the sense of this meeting that a society or club shall be formed in this city for the purpose of the improvement of the city."

If the resolution as read or as amended is adopted, some one makes a motion that the chairman appoint a committee (specifying the number to be on the committee) to draft a constitution and by-laws for such an organization as has been agreed upon by the passing of the resolution. Usually, if this motion is carried, the chairman appoints a committee or announces his intention of doing so later. A motion to adjourn to some definite time or place, or both, may now be made. Such a motion is debatable. Or a motion to adjourn, or to adjourn subject to the call of the chairman, may be made. Neither of these two motions is debatable. If any motion for adjournment is carried, the chairman states the effect of the action, using the words of the motion; as, for example, "We stand adjourned subject to the call of the chair."

Second Meeting. At the next meeting, the officers of the former meeting are in charge until superseded by permanent officers.

The chairman calls the meeting to order and asks the secretary to read the minutes of the preceding meeting. The chairman then says: "You have heard the minutes; are there any corrections or additions?" If no one replies, he then says: "If there are no corrections or additions to the minutes as read, they stand approved." (Pause) "Hearing none, I declare them approved." If corrections or additions are made by anyone and the assembly seems to agree, the chairman says, "The minutes as corrected (or enlarged) stand approved."

Adopting Constitution and By-Laws. The chairman then says, "The next order of business is the report of the committee on constitution and by-laws." The chairman of this committee rises, addresses the chair, and, when recognized, either reads the proposed constitution or passes it to the secretary to be read. When the reading has been concluded, the chairman of the meeting says: "You have heard the report of this committee. What is your pleasure concerning it?" Anyone present may rise and say, "I move the adoption of the constitution and by-laws as read." If the motion is seconded, the chairman puts it, and, if it is carried, the constitution and by-laws as read become the fundamental law of the society or club.

Instead of the assembly's voting on the constitution and by-laws as a whole, any person present may move that the constitution and by-laws be

considered (or acted upon) article by article. If this motion is adopted, the secretary of the meeting, or the chairman of the committee, reads the first article.

The chairman of the meeting then says, "Are there any amendments or additions to this article?" If there are amendments or additions, he must entertain motions to that effect until the first article is amended or enlarged to the satisfaction of a majority of those present, when he will proceed in like manner with the second and subsequent articles. If, after a short pause following the reading of the first article, no amendments or additions are suggested, the chairman says, "There being no amendments or additions to this article, we will pass to the reading of the second article." Each succeeding article should be taken up in like manner.

After each article has been so considered, separately, the chairman says, "You have passed upon the constitution and by-laws by sections (or articles); will you adopt them as a whole?" Any person present may offer further amendments or additions to the constitution and by-laws as a whole, or may move their adoption as read (or as amended or enlarged) and as a whole.

If no motion of any kind is offered concerning the whole, the chairman says, "There being no further amendments or additions, all who are in favor of adopting the constitution and by-laws as read (or as amended or enlarged) and as a whole, manifest it by saying *aye*." After considering the apparent number of favorable votes carefully, he says, "Those opposed manifest it by saying *no*." He then announces the result by saying, "The constitution and by-laws as read (or as amended or enlarged) have been adopted (or have not been adopted)." At this juncture it is customary to have an intermission, when those who wish to become members of the newly organized society or club sign the constitution and by-laws, if these have been adopted.

ELECTION OF OFFICERS

After the intermission, the chairman says, "The next order of business is the election of officers in accordance with our constitution." Officers are usually elected in one of two ways.

(1) COMMITTEE ON NOMINATIONS

A committee on nominations may be provided for and appointed. When the committee has made its report, the chair asks if there are any other nominations. At this time any member present is at liberty to nominate a candidate from the floor in the same way as he could if no nominating committee had been appointed. If no member nominates a candidate from the floor or if all nominations seem to have been made, the presiding officer proceeds to the election according to the by-laws of the organization, or according to any acceptable method of voting if the by-laws do not prescribe a method. See *Voting*: *Ballot*; also (2) below.

Accepting the Committee's Report. Instead of procedure according to the above plan, it frequently happens, when no nominations are made from the floor, that some member moves that the report of the nominating committee be accepted and that the candidates be declared elected. The acceptance of the report of the nominating committee is thus considered to be the election. Although this plan is commonly practiced and quite generally accepted, it has no authority either in parliamentary rules or in law. The acceptance of the report of the nominating committee means that the assembly regards the persons whose names are reported by the committee as candidates for the respective offices. It means nothing more; an election is still necessary. If one or more candidates are nominated from the floor, the presiding officer properly treats the nominee of the nominating committee in exactly the same way as those nominated from the floor, and proceeds with the election as indicated under (2) below.

(2) NOMINATIONS FROM THE FLOOR

According to the second plan, the chairman says, "Nominations for president (or whatever the presiding officer's title is) are in order." Any member present, upon being recognized by the chair, may nominate a candidate. A nomination does not require to be seconded. Sometimes, however, a nomination is seconded in a brief speech.

When the chairman is satisfied that sufficient time has been given for nominations for any office, he says, "Are there any further nominations?" Hearing no response, he says: "If there are no further nominations for (president), I declare the nominations closed. You may prepare your ballots for (president)." At this point, the chairman either reads the list of nominations or asks the secretary to do so. If tellers have not previously been appointed, the chairman, with the consent of the assembly, now appoints them, usually three or more.

The Election. The tellers should distribute and collect the ballots. Before they begin to count the ballots, the presiding officer says, "Have all voted who wish?" Hearing no response, he says, "If so, I declare the ballot closed." The tellers count the ballots, sometimes in the presence of the assembly and sometimes in a separate room. They should tabulate the vote in writing and announce the result to the chairman, who should announce it to the members, as follows: "Whole number of votes cast, 39. Necessary for a choice, 20. Mr. A received 21; Mr. B, 12; Mr. C, 5; and Mr. D, 1. Mr. A having received a majority, I declare him duly elected (president)." If no one receives a majority, the chairman, after announcing the count, says, "No one having received a majority, you may prepare your ballots for (president)." The same procedure is continued until some one receives a majority. After the first or any subsequent ballot, if no one has received a majority, a candidate may withdraw his name.

Only One Nomination. If only one nomination is made, it is, in some organizations, customary for the chairman to say, "There being but one nomination for (president), I declare Mr. A elected." Sometimes a member, having addressed the chair, says, "There being but one nomination for (president), I move that the secretary cast one ballot for Mr. A for (president)." If the motion is seconded and carried, the secretary writes the ballot and formally announces that the ballot has been cast, and the chairman announces the member duly elected. These two methods of electing officers are regarded as bad practices and are usually held to be illegal and unparliamentary. Neither is ever allowable when the constitution or a law or a rule of the organization specifies that the officers shall be elected by ballot. If but one member is nominated, exactly the same procedure is followed as if two or more were nominated. This gives any member a right to vote in secret for some one else if he chooses.

Nomination by Informal Ballot. Instead of having nominations made from the floor, it is sometimes decided beforehand, either by common consent or by formal vote, that nominations shall be made by "informal ballot." According to this method, each member present writes the name of his choice on a piece of paper. The papers are collected by the tellers, counted, and the result reported to the assembly in the same manner as are votes in a regular ballot. The names of those receiving one or more votes are then declared by the chairman to be nominees, and the election proceeds as though the members had been nominated from the floor. This is the most democratic way of making nominations.

Time of Taking Office. It is customary, in many organizations, for the chairman to vacate his seat when a new presiding officer has been chosen, and for the newly elected official to take his place and conduct the election of the other officers.

The new presiding officer begins by calling for nominations for the office next in importance. The same procedure is followed in the election of all officers, each taking his seat as soon as elected. The election of officers completes the permanent organization.

Installation of Officers. Instead of the officers immediately taking office as indicated above, it is customary in some organizations for the officers to be "installed" at a later meeting. Such "installation of officers" is accompanied by more or less ceremony and may be made very solemn and impressive. The time when officers shall assume their duties is usually specified in the constitution.

CONSTITUTION AND BY-LAWS

A constitution is the fundamental, organic law or principles of government of a nation, a society, or the like, whether embodied in writing or not. By-laws are detailed regulations for working out the objects of the organized body and the purposes of the constitution. The constitution may be so complete that few, if any, by-laws are necessary. On the contrary, the by-laws may so completely cover the field that a constitution is hardly needed.

Constitution. A constitution should be brief, and should contain only important essentials. In general, it should include the following topics: (1) The name of the organization. (2) The object of the organization. (3) Requirements for membership. (4) The officers: their terms of office; when they shall assume office; the manner of their election; and their duties, if these differ from those of similar officers in other organizations. (5) Committees. (6) Time and place of meeting. (7) How the constitution can be amended. The process of amendment should be made difficult. It should require a two-thirds vote and action in at least two meetings.

By-Laws. The by-laws should cover all details of procedure not included in the constitution. They may include the following: (1) How many shall constitute a quorum. (2) Rights and duties of members. (3) Punishment of members. (4) Fees or dues. (5) Authority for settling disputed points. (6) How by-laws may be amended. It should be possible to amend by-laws more easily than the constitution. The general rule is that amendments to the by-laws be proposed at one meeting and voted on at the next. Usually a majority vote is held to be sufficient for such action. (7) Order of business. A special provision should be made for setting aside the order of business in case of emergency.

TYPICAL CONSTITUTION AND BY-LAWS

CONSTITUTION

Article I—Name

The name of this organization shall be the Booster Club of the city of Oswego.

Article II—Object

The Booster Club shall have for its object the improvement and entertainment of its members; and the moral, social, and business improvement of the city of Oswego.

Article III—Members

Members of the Booster Club shall consist of two classes, active and honorary. Any adult resident of the city of Oswego may become an active member of this club by making written application to the secretary, paying a fee of one dollar, and signing the constitution. Any former adult resident of the city of Oswego may become an honorary member of this club by signing an application blank and paying a fee of five dollars.

Article IV—Officers

The officers of the Booster Club shall be a president, a vice president, a recording secretary, a corresponding secretary, and a treasurer, elected by ballot from the active members of the club at the first regular meeting in January of each year. The officers shall assume office at the first regular meeting following their election and shall serve for a period of one year or until their successors are elected. A vacancy in any office may be filled at any regular meeting, for the balance of the term.

Article V—Committees

There shall be the following standing committees, of five members each, and as many other committees as from time to time may seem necessary: membership, entertainment, municipal, and welfare. Members of these committees shall be appointed by the president, at the second regular meeting in January, and shall serve for one year or until their successors are elected.

It shall be the duty of the membership committee to attempt to secure desirable members for the club. The entertainment committee shall provide some entertainment for each regular meeting and for any special meeting, when so directed by the club. The municipal committee shall co-operate with the city officials in enforcing all laws; and with progressive citizens in an attempt to secure better local, state, and national laws relating to the city. The welfare committee shall co-operate, with any organized or unorganized group of citizens, in an effort to aid the weak or unfortunate in the city.

Special committees, with specified duties, may be appointed from time to time as necessity arises. Unless otherwise provided for in the resolutions creating them, all special committees shall be appointed by the president.

Article VI—Meetings

There shall be a regular meeting at 12:30 P. M., at some place designated by the entertainment committee, on each Thursday during the year, except during the months of July and August. Special meetings may be called by the president, with the consent of the entertainment committee, at such times and places as seem advisable to the members authorized to call such meetings.

Article VII—Amendments

Proposed amendments to this constitution must be presented in writing at a regular meeting, read by the secretary at such meeting, and left on the table until the next regular meeting, when a vote on such amendment or amendments shall be taken. If two-thirds of the members present at the regular meeting, following the meeting when the amendment or amendments were proposed, vote in favor of such amendment or amendments, this constitution shall be so amended.

BY-LAWS

Article I—Quorum

Three-fifths of all the active members constitute a quorum.

Article II—Rights and Duties of Members

Active members shall have all the rights and be subject to all the duties customary in parliamentary bodies. Honorary members shall have all the rights of active members except the right to vote. An honorary member cannot be required to serve on a committee.

Article III—Punishment of Members

Each active member shall pay a fine of twenty-five cents for nonattendance at any regular meeting. Any active member who refuses or neglects to act on any committee to which he or she has been appointed shall be fined one dollar. When the unpaid fines of any active member amount to two dollars, written notice shall be sent to him or her by the secretary. Refusal or neglect to pay such fines, within thirty days, shall constitute just cause for dismissal from the club.

Article IV—Fees and Dues

The dues of active members shall be five dollars annually, payable semiannually, in advance. The dues of honorary members shall be ten dollars annually, payable, in advance, in January of each year. Special fees or dues may be levied on active members by a two-thirds vote at a regular meeting.

Article V—Authority in Disputes

The final authority in the settlement of disputes shall be *Robert's Rules of Order Revised.*

Article VI—Amendments

Proposed amendments to these by-laws must be presented in writing at a regular meeting, read by the secretary at such meeting, and left on the table until the next regular meeting, when a vote on such amendments shall be taken. If a majority of the members present at the meeting following the meeting when the amendments were proposed vote in favor of such amendments, these by-laws shall be so amended.

Article VII—Order of Business

At every regular meeting, the following order of business shall be followed:

I. Roll Call.
II. Reading Minutes of Preceding Meeting.
III. Receipt of Communications, Bills, etc.
IV. Report of Standing Committees.
V. Report of Special Committees.
VI. Unfinished Business.
VII. New Business.
VIII. Lunch or Dinner.
IX. Speeches, Stories, Songs, etc.
X. Adjournment.

By a two-thirds vote, at any regular meeting, the order of business may be set aside for that meeting.

GENERAL POWERS AND DUTIES OF THE PRESIDING OFFICER

Not only the success of an individual meeting, but the success of a year's work, frequently depends on the skill of the presiding officer. Consequently, great care should be exercised in selecting a person for this position. Not only is executive ability necessary, but the knack of getting along affably with people and of inducing people to work congenially with each other is equally important. Under no consideration should anyone be elected presiding officer of an organization for social or political reasons or because of long and faithful service. The ability to preside and to direct the affairs of the organization should be the determining factors, in the selection of a presiding officer.

Duties. The presiding officer calls the meeting to order, announces the business to be transacted according to regular or special order, preserves quiet, decides all questions of order unless an appeal is made to the members, states and puts all questions. In speaking, in stating and putting questions, and in announcing the results of votes, the presiding officer should always stand. Under no circumstances should he allow anyone to speak to the members without "addressing the chair." When a member rises and addresses the presiding officer, the latter should recognize him by saying, "Mr. A"; or, if two or more rise and address the chair at about the same time, he should first decide which is entitled to the floor and then say, "Mr. B has the floor."

Putting Motions. When a motion has been regularly made and seconded, the presiding officer should say, "The motion has been made and seconded," or "It has been moved and seconded that (here give the exact words as stated by the maker)." If he cannot remember the exact words, he may call on the secretary to read the motion or on the maker to state it again. If the motion is debatable, he should then say, "Are there any remarks?" When the discussion lags, he may say: "Are there any further remarks? If not, are you ready for the question?" If there is no response, or if one or more members call out "Question," he should say: "The motion has been made and seconded," or "It has been moved and seconded that (the exact words of the motion). All those in favor manifest it by saying *aye* (or whatever expression the customary manner of voting calls for). Those opposed, by saying *no*." Or, in calling for the negative vote, he may say, "Contrary, the same sign."

When both favorable and unfavorable votes have been taken, the chair announces, "The motion is carried," or "The motion is lost." If the vote was upon a motion that had been amended, he should say, "The motion, as amended, is carried." Sometimes, in political and other organizations, the presiding officer, instead of simply saying, "It has been moved and seconded," says, in putting a motion, "It has been moved by Mr. B and seconded by Mr. K that, etc."

Putting Resolutions. In presenting a resolution, the presiding officer says, "It has been moved and seconded that the resolution that you have just heard read (by the secretary) be adopted." If no one offers to discuss the resolution, the presiding officer may say, "Does anyone wish to discuss the resolution that is before us or to have some part of it reread or explained?" If there is no response or if the discussion lags, he may say, "Are you ready for the question?" Hearing no response, or upon call for the "question," he may say: "The question is on the adoption of the resolution you have heard read; as many as are in favor of its adoption say *aye*. As many as are opposed say *no*." He then announces the result by saying, "The resolution has been adopted," or "The resolution has been lost." As in the case of a motion, if the resolution has been amended, he says, "The resolution, as amended, has been adopted."

Approving Minutes. After the reading of the minutes of the preceding meeting or meetings, the presiding officer may expedite matters by not waiting for a formal motion to adopt the minutes. He may say: "If there are no corrections or additions to the minutes as read, they stand approved." (Pause) "Hearing none, I declare them approved." Any member may, upon being recognized, correct an error in the minutes or add something which the secretary overlooked. In such a case, the presiding officer proceeds as above, saying, instead of "minutes," "minutes as corrected," or "as enlarged," or "with additions."

General Conduct of the Meeting. The presiding officer should never interrupt a speaker when the latter is in order. If the speaker is not in order, the presiding officer should use the gavel in calling him to order, and, if requested, should explain why he rules that the speaker is not in order. Except on questions of order and in performing the necessary routine of his office, the presiding officer should never discuss any question nor address the members from the chair. If he wishes to discuss any question that is before the house or to bring some question before the house, he should ask the vice president or some other member to take the chair, whereupon he should take his seat with the members and speak only when recognized by the chair.

When speaking of himself, the presiding officer should always use his title, as, "the chair." In a firm but affable manner, he should insist on good order. He should be strictly nonpartisan on all questions while presiding. The dignity of the meeting depends almost entirely on the dignity and skill of the presiding officer. If the chairman will carefully plan the details of each meeting and will speak in a clear, deliberate tone, he will add greatly to the decorum of the meeting.

VICE PRESIDENT

While the office of vice president is usually regarded as unimportant, great care should be taken in selecting this officer, as he is likely to succeed to the office of president or to be called upon at any time to preside.

Responsibility. A person elected to the vice presidency of any organization should immediately acquaint himself with the powers and duties of a presiding officer, and should make himself familiar with the ordinary forms of parliamentary law. If he neglects to do this, he is likely to embarrass greatly both the organization and himself, if he be called upon unexpectedly to preside.

RECORDING SECRETARY

The recording secretary should be careful to take down every motion that is made, whether it be seconded or not, as only in this way can an accurate record of the motions passed be available for the permanent record. If the recording secretary be in doubt as to the wording of a motion, he should ask the maker to repeat it or to put it in writing. The rough notes taken down as the meeting progresses should show, in full, the exact wording of every motion, resolution, or petition (including the names of the maker and seconder) which was stated by the chair, and what disposition was made of each by the assembly. Motions lost, as well as motions passed, should be recorded.

Contents of Minutes. Either as the meeting proceeds or soon after adjournment, the recording secretary should transcribe his rough notes to a permanent book, in ink. Motions made but not seconded need not be transcribed to the permanent record. The minutes should give an accurate account of the entire proceedings of the meeting, showing in detail the things done rather than the things said. Especial care should be taken to record accurately motions authorizing the expenditure of

money. The record should show the amount to be paid, to whom, and for what.

Besides an accurate record of every motion stated by the chair, as indicated above, the minutes should show also the following: the kind of meeting,—whether regular or special, adjourned regular, or adjourned special; the name of the organization; date and place of meeting, if not always the same; the fact of the presence or the absence of the regular presiding officer and the secretary,—in case of their absence, the names of their substitutes; disposition of minutes of preceding meeting; the hours of meeting and adjournment. Brief extracts from speeches, if important, may be recorded, but no comment of any kind, either favorable or unfavorable, should be made. Every important communication received by the organization should be recorded in the minutes, either in its entirety or in substance, as well as what disposition was made of it by the organization. This rule applies to reports of committees as well as to communications from nonmembers. When an important matter is before the organization, and the yeas and nays are called for, the list of the names of those voting, with the side upon which each voted, should be recorded.

Reading of Minutes. When regular meetings are held weekly, monthly, or quarterly, it is customary to read the minutes of the preceding meeting at the opening of each meeting. Corrections are made, if necessary, and the minutes as read or as corrected and read are approved. If meetings are held several days in succession, with recesses during the day, the minutes are read at the opening of business each day. If the next meeting is not to be held for a period of many weeks or months or for a year, the minutes that have not been read previously should be read and approved before final adjournment. When minutes have been approved, they should be marked "Approved,"—with date of approval, if approved at an irregular time,—and signed by the secretary. If minutes are to be published, they should be marked "Approved" and signed by both the president and the secretary.

Custodial Duties. It is the duty of the recording secretary to keep a register, or roll, of the members and to call the roll when it is requested by the presiding officer. All bills rendered to the organization should be kept on file, where they may be consulted by any member. When bills are paid, the recording secretary should see to it that they are receipted and permanently filed. The recording secretary should carefully preserve the constitution and by-laws, together with amendments thereto. It is especially important that the constitution and by-laws and a permanent record of the proceedings of all previous meetings be available at every meeting. Consequently, the recording secretary, if unable to be present at any meeting, should see to it that these records are at the place of meeting, and especially that the report of the last meeting is properly transcribed, so that it may be read and acted upon.

When the Recording Secretary Presides. When both the president and the vice president are absent, the recording secretary should call the meeting to order and act as presiding officer until some one regularly succeeds him. At other times, a motion that refers especially to the presiding officer should be stated and put to a vote by the recording secretary.

Other Duties. Unless otherwise specified in the by-laws, it is the duty of the recording secretary to notify officers, committees, and delegates of their election or appointment, to furnish committees with all papers referred to them, and to supply delegates with credentials; also to sign with the president all orders on the treasurer which have been authorized by the organization. When the word "secretary" is used, it always refers to the "recording secretary," other secretaries being designated by specific titles.

CORRESPONDING SECRETARY

It is the duty of the corresponding secretary to send out proper notices of all called meetings, and of other meetings when necessary, and to conduct the correspondence of the organization, unless it is otherwise provided for.

SECRETARY'S TYPICAL REPORT OF A MEETING

A regular meeting of the Booster Club was held in the dining room of the Pontiac, on Thursday, June 21, 1923. The president was in the chair. In the absence of the secretary, E. J. Nearbin acted for him. Following the roll call, the minutes of the preceding meeting were read and approved. A communication was received from the Salvation Army requesting aid in providing suitable bathing facilities for the poor children of the city. On motion of Mr. A, seconded by Mr. B, the communication was referred to the welfare committee for immediate and favorable action. A bill was received from The Wells Clothing Co. for two suits of clothes ordered by the welfare committee, at $14 each.

On motion of Mr. D, seconded by Mr. F, it was ordered paid. The membership committee reported the names of Mr. M and Mr. N for active membership. The secretary was instructed, by the chair, to add their names to the list of active members. The special committee on an "Evening Meeting" reported in favor of such a meeting at the Country Club on Thursday, June 28, 1923 at 6:30 P. M.

On motion of Mr. G, seconded by Mr. K, it was voted to accept the recommendation of the special committee on "Evening Meeting" and to hold such meeting as recommended. On motion of Mr. H, seconded by Mr. K, it was resolved that the municipal committee be requested to confer with the commissioner of public works in regard to having the weeds and grass, along the water front, cut.

A delicious luncheon was then served by the Pontiac staff. This was followed by several original songs by the Booster quartet and stories by Messrs. P, Q, and R. Mr. William R. Benjamin, editor of the *Boston Star*, spoke at some length on "Co-operation between the Community and the Press." The meeting adjourned at 1:45 P. M.

E. J. Nearbin, Secretary. Pro. Tem.

TREASURER

The treasurer should keep in a permanent book, with ink, an accurate record of all moneys received and paid out. This record should show from whom or from what sources all moneys were received and to whom and for what they were paid out. A receipt should be given by the treasurer to every person from whom he receives money. The treasurer should insist on a receipt from every person or firm to whom he pays money.

Orders for Payment. Under no circumstances should the treasurer pay out money except upon written orders signed by the proper officers. The treasurer should preserve these orders as evidence of his authority to pay out such sums. The treasurer should refuse to pay out money on orders properly signed unless he knows the persons who signed them were authorized to do so in accordance with the rules of the organization. It is customary in most organizations to pay out no money except after the payment has been authorized by a majority vote at a legal meeting.

Care of Money, Forms. It is usually best to deposit all moneys belonging to the organization in some bank in the name of the organization and to pay all bills by checks. Before paying any bills, the treasurer should insist on some written forms of order and receipt, similar to the following:

FORM OF ORDER

$68.00 Oswego, N. Y., June 7, 1949.

To John Simmons, Treasurer of the Booster Club

Pay to the order of Frank Beal

Sixty-eight.....Dollars

For two suits of clothes.

Thomas Broad,
Secretary of the Booster Club.

FORM OF RECEIPT

$5.00 Oswego, N. Y., Jan. 11, 1949.

Received from Stephen A. Soule

Five and no/100.....Dollars.

For annual dues to the Booster Club from Jan. 1, 1949 to Jan. 1, 1950.

John Simmons,
Treasurer of the Booster Club.

Reports. The treasurer should be prepared at every meeting to tell definitely how much money there is in the treasury, and he should from time to time make detailed reports to the organization of all receipts and disbursements since the last report. Copies of these reports should be carefully made, with ink, and should be open to the members of the organization at all times.

COMMITTEES

To expedite the transaction of business, it is customary, in all organized bodies, to refer to committees nearly all matters that come before the assembly. The object of this procedure is to have the committee make a more detailed study of conditions than it is possible for the whole assembly to make. When the report of a committee on any question is favorable, it frequently happens that the assembly adopts their report with little or no discussion. An unfavorable report often results in "dropping the question," that is, in giving it no further consideration.

Committee of the Whole. When the main body of an organization has to consider a subject, the statement of which is not in proper form for definite action, or when it is deemed advisable to consider the subject without all the formalities and restrictions attending the conduct of the main body, and yet it is not desired to refer the matter to a small committee, the freedom of an ordinary committee can be secured by referring the question to the committee of the whole, that is to say, to a committee consisting of the entire membership. This committee may consider anything the organization may desire. The committee of the whole is useful where the subject to be considered contains many items and relates to divers subjects. One great advantage of this committee is that it tends to prevent the organization from rushing precipitately to a conclusion on a question before the subject has been thoroughly considered, discussed, and matured.

The committee of the whole is usually formed in pursuance of a motion similar to the following: "I make a motion (or I move) that the assembly do now resolve itself into a committee of the whole, to take under consideration (whatever the subject may be)." If this motion is carried, the presiding officer names a member to act as chairman of the committee; or the committee of the whole may demand that it elect its own chairman. The latter action is unusual and by some authorities is considered "contrary to sound parliamentary sense." The secretary of the organization is usually secretary of the committee of the whole.

Procedure in the committee of the whole differs from that in other committees in the following respects: The previous question cannot be moved; a motion to postpone to a certain day or to postpone indefinitely cannot be made; nor can a motion to lie on the table or to adjourn to some other time or place be made; the committee cannot order the yeas and nays; it cannot refer anything to a subcommittee; every member may speak as often as he pleases, provided he can obtain the floor. The only motions in order in the committee of the whole are to amend, to adopt, and that the committee rise and report.

When the committee has finished the consideration of the subject, or when it desires to adjourn or to have the main body limit debate, a motion is made that the committee rise, and that the chairman (or some other member) report its proceedings to the assembly. The motion having been carried, the chairman resumes his place on the floor, and the presiding officer takes his chair. Then the person designated to make the report rises and informs the presiding officer that he is ready to make the report. He then awaits the pleasure of the assembly.

Authority of Committees. The person who makes a motion that a committee be appointed should specify the purpose for which the committee is to be appointed, the number to serve upon the committee, and who should appoint them, unless the constitution provides how all committees are to be formed. A committee has no authority except that which is granted to it by the constitution and by-laws or by a vote of the organization. A committee authorized to investigate in regard to the expense and desirability of a certain thing has no right, even if it finds the thing very desirable, to incur any debt or to involve the organization in any way. Instead, it should report its findings and await further authority from the organization.

Committee Procedure. Unless the position is otherwise provided for, the person first named on a committee is its chairman and should preside at its meetings. The chairman should call the committee together; but, if he neglects to do so, a majority of the committee may agree on a time and place of meeting and may notify all members to that effect. The majority of a committee constitutes a quorum, whether the chairman be one of the number or not, provided the committee has been regularly called together.

When a committee has been regularly appointed or elected, it should be definitely understood that under no consideration should one or more members go ahead with the business of the committee without action by the committee as a whole. Before any action is taken by any member, the committee should be regularly called together as explained above. No action should ever be taken and no report should be made except that agreed upon at a meeting regularly called. If emergency makes it necessary, action may be taken in accordance with the wish of the majority, provided all members of the committee have been consulted in regard to, or notified of, the intended action.

Committee Reports. The chairman of a committee is expected to report for the whole committee. He may begin his report as follows: "The committee appointed to investigate the desirability of having a municipal garbage plant wishes to submit the following report." (Here the member may read the report or give it orally.) Written reports sometimes end with the following: "All of which is respectfully submitted." This form, however, is wholly unnecessary. If the members of a committee are unable to agree as to the report to be made, there may be a "majority" and a "minority" report.

In making such reports, the person reporting should say, "The majority of the committee appointed, . . . ," or "The minority of the committee appointed, ..." Both reports are entitled to a reading, but only the report of the majority may be considered, unless a motion is passed to substitute the minority report for the majority report. In the latter case, the minority, and not the majority, report is considered. If the organization votes to adopt or to accept the report of the committee, all the recommendations of the committee become binding on the organization.

Care should be taken not to confuse the word "receive" with the word "adopt" or "accept." If the assembly votes to "receive" the report of a committee, the vote means simply that the body will take the report under consideration. If it votes to "adopt" or to "accept" the report of the committee, all the recommendations of the committee become binding on the assembly.

When a committee has performed the duties for which it was appointed, it goes out of existence without any action on the part of the body authorizing it.

MOTIONS

A motion is the usual form of bringing before an organization a question for consideration or a proposal of action. Though most of the motions presented to organizations are oral, the presiding officer may refuse to receive or to put a motion unless it be in writing. When a motion is reduced to writing, it

may be read by the mover and then passed to the secretary, or it may be handed to the secretary, who should read it, when so requested by the presiding officer. The rule requiring that motions be in writing applies only to principal motions.

PRINCIPAL MOTIONS

A principal motion is a motion which brings a particular subject before an assembly for consideration. When a member of an organization wishes to bring any matter before the body for its consideration, he rises, addresses the chair, and, when recognized, states his motion; as, for example, "I move that a committee of three be appointed by the chair to inquire into the possibility of securing the Robinson Auditorium for a public meeting."

The mover should be very careful to word his motion so that it may not be misinterpreted. Custom requires that a motion be seconded, although it may be put and legally passed without a second. In seconding a motion, strict parliamentary rules require that the member wishing to second it shall rise, address the chair, and, when recognized, say, "I second the motion," or "I second Mr. A's motion." However, if there is but one motion pending, in many organizations it is customary for any member, without rising or addressing the chair, to call out, "I second the motion." Thereupon the presiding officer assumes that the assembly wishes to vote on the motion, and regularly puts it before the body. In routine business the presiding officer sometimes seconds the motion himself.

Resolutions. When the motion is lengthy, it should always be in writing. In this case it is known as a resolution. Such motions usually begin with the word "Resolved." The member wishing to put a resolution before an organization should carefully write out the resolution in advance. When the proper time arrives for the consideration of such business, he should address the chair, and, when recognized, say, "I move the adoption of the following resolution." (Here he reads the resolution and passes it to the chairman.) The resolution may now be seconded and acted upon in the same way as any other motion. Any member who is in doubt as to the wording or the meaning of some part of the resolution may request that a part or all of it be read again. Upon request of the presiding officer, the secretary should then read part or all of the resolution.

Petitions. A petition to be presented to an organization should be carefully worded and should be signed by the person who wrote it. It is customary to have a petition presented by some member other than the one who wrote it. The member presenting the petition should be thoroughly familiar with it and know that the language of the paper contains nothing disrespectful to the assembly or to any of its members.

Upon addressing the chair and being recognized, the presenter, with petition in hand, should briefly inform the members as to the substance of the petition and move that it be received. If his motion is seconded and carried, he takes the petition to the desk of the secretary, who, when formally requested by the chair, reads the document. It is then regularly before the organization and may be disposed of by immediate consideration, or by a motion to assign some future time for its consideration, to refer it to a committee, or to lay it on the table, etc. If there be no objection, the presiding officer may receive a petition and order it read without the formality of a motion to receive it. However, the formal motion is preferable.

Withdrawal. A motion which has been made and seconded may be withdrawn by the maker at any time before it is stated by the chair, but not after.

Rescinding. At any time after a motion has been passed, it may be annulled by passing a motion or resolution to rescind or repeal it. If notice of such proposed action is not given at a previous meeting, a two-thirds majority of those present or a majority of all the membership is required to rescind. The motion to rescind is a main motion without any privilege, and can be introduced only when there is nothing else before the assembly. The effect of a motion to rescind is to revoke or set aside a previous act.

SUBSIDIARY MOTIONS

When a principal motion has been made and seconded and has been stated by the chair, the assembly is not at liberty to consider any other business. A motion bearing on any other subject would be out of order and could not be considered. However, certain motions are always in order and may have precedence over others. Such motions are known as subsidiary motions.

Amend. When it is desired to change a motion which is regularly before an assembly, by unanimous consent, the maker may change it, the seconder giving his consent. Instead, however, any member, on being recognized, may propose an amendment to the motion. The amendment, if seconded, is debatable and should be voted on in the same way as any other motion. If carried, it becomes part of the original motion. The original motion as amended should then be considered as a whole and disposed of. While the amendment is pending, any member, when recognized, may propose an amendment to the amendment, which, if seconded, should be voted on, and which, if carried, becomes a part of the amendment. The amendment, as amended, is then put to a vote, and, if carried, it becomes part of the original motion. The original motion, as amended, should then be put to a vote.

Adjourn. A motion to adjourn is always in order except when a speaker has the floor, when a vote is being taken, or when the assembly is in the midst of some business that cannot be abruptly stopped. If the motion is simply to adjourn, it is not debatable and, if voted down, may be renewed any number of times during a session, but not immediately after being voted down. If the motion is to adjourn to some definite time or place, or both, it is debatable, and, if voted down, may be reconsidered.

Commit or Refer to a Committee. If a motion becomes involved through amendments, or in any other way, or is unexpectedly introduced and not well understood by the members, a motion may be passed referring it to a committee for further consideration. The motion to commit is intended to take the subject from the main body and transfer it to the consideration of a smaller number, or to the whole number acting under broader privileges than those of the formal body. See *Committees*.

The form of the motion is as follows: "I move that the (matter, motion, or whatever the proposition may be) be referred to a committee" (indicating the character of the committee). The motion to commit may be made as soon as the matter is introduced or after there has been discussion or amendment, or when any other stage in the consideration has been reached. This motion may be made while an amendment is pending, and it is debatable. It is amendable only as to the membership of the committee, its place of meeting, or other similar details. If more than one kind of committee is suggested, then the vote will be, first, on the committee of the whole; second, on a standing committee; and, third, on a special (or select) committee. The effect of the adoption of the motion to commit is to end the consideration of the matter in the body, and to pass it over to the designated committee.

Recommit. The motion to recommit is the same as to commit, except that it refers to a matter which has already been reported by a committee.

Lie on the Table. If at any time an assembly does not wish to consider further a motion which is before it, or wishes to dispose of the question permanently without allowing it to come to a vote, a

motion may be introduced that the question lie on the table. The motion is neither debatable nor amendable, and permanently disposes of the question until a majority see fit to take it up again.

Postpone to a Certain Time. A motion to postpone the question before the house to some definite future time is in order, except when a speaker has the floor. It is debatable as to the question of postponement only.

Reconsider. A member who voted with the majority on a motion may, on the same day or at the same session in which the motion was disposed of, make a motion to reconsider the previous motion. Such a motion can be made in the midst of debate and when another member has the floor, but cannot be considered while another motion is pending. However, when it is taken up, it has precedence over every other motion except a motion to adjourn. If the original question was debatable, the motion to reconsider is debatable, but not otherwise. If the motion is carried, the original question is before the assembly for consideration. If a motion to reconsider is entered on the minutes, it need not be acted upon at that session, but it must be acted upon at the session following or it is lost.

Take from the Table. A motion to take from the table a question which lies there may be made at any time under the head of unfinished business. If adopted, it cannot be reconsidered; if lost, it can be reconsidered. It cannot be amended, is not debatable, and does not open the main question to debate.

Withdraw. A motion can be made to withdraw a motion which is before the house. Such a motion is undebatable, cannot be amended, and does not open the main question to debate.

Previous Question. If debate on any question becomes tiresome or is long drawn out, any member may rise and, when recognized, say, "I move the previous question." If this motion is seconded, the presiding officer says, "Shall the main question be now put? All those in favor manifest it by (usual sign). Opposed, by the same sign." If the vote on the previous question is in the affirmative, a vote on the main question shall follow immediately. If the vote on the previous question is in the negative, the discussion continues as if the motion on the previous question had not been made. The previous question takes precedence of all subsidiary motions except the motion to lie on the table. It is neither debatable nor amendable, and requires a two-thirds vote for adoption.

To Limit Debate. A motion to limit debate to a certain number of minutes for each person on each side may be made, if there is a tendency to prolong debate unnecessarily.

STANDING RULES

Standing rules are resolutions of a more or less permanent nature, which are binding until they are modified or rescinded.

PARLIAMENTARY INQUIRIES

Parliamentary inquiries are questions addressed to the presiding officer in order to ascertain the status of the business, the effect of a proposition, or the proper procedure at a particular time. Both the inquiry and the response of the chair are usually informal and no appeal can be taken from the "response of the chair."

READING PAPERS

When papers are laid before a formal body for action, every member has a right to have them once read before he votes on them. When a call is made for the reading of a paper on a question before the assembly, the presiding officer directs it to be read. Papers not on a question before the house can only be read with the consent of the assembly. Motions for the reading of papers cannot be debated.

FILLING BLANKS

Propositions are often introduced with blanks purposely left to be filled in by the meeting. These can be filled by suggestions without the formality of a motion if the assembly consents. If there is objection, action on these may be taken as on any amendment.

UNANIMOUS CONSENT

The decisions of a parliamentary body are usually ascertained by voting, but the judgment of the body may be ascertained in two ways: first by vote; second, by "unanimous consent," the latter method being employed particularly in matters of routine or on questions of little moment. In matters of ordinary routine, the presiding officer may say, "If there is no objection, (a certain thing) will be considered the action of the meeting," or "If there is no objection, I will (do a certain thing or appoint a committee, etc.)." If any member objects, the matter must be decided by a vote.

POINT OF ORDER

While the presiding officer should insist on conducting the affairs of an organization according to parliamentary rules, it frequently happens that he fails to do so. If the violation of order is a flagrant one or if, when continued, it would result in a procedure different from that which would result if the affairs were conducted according to rule, some member should rise to a point of order.

Regardless of who has the floor, any member may rise and, without waiting to be recognized, say, "Mr. President (or Mr. Chairman), I rise to a point of order." Hereupon, whoever is speaking should stop, and the presiding officer should say, "Please state your point of order." The member, in a calm, deliberate manner, should explain as briefly as possible why he regards the speaker as out of order or the procedure as not parliamentary. If the presiding officer agrees with the member, he says, "The point of order (or the contention) is sustained. The speaker will please yield the floor," or he will say whatever is necessary to halt the unparliamentary procedure. If the chair disagrees with the member and thinks the procedure in order, he says, "The point of order (or the contention) is denied. The speaker may continue," or he will say whatever is necessary to continue the procedure.

At this point the member who arose to a point of order, or any other member, may rise, and, without waiting to be recognized, say, "Mr. President (or Mr. Chairman), I appeal from the decision of the chair." Whereupon the presiding officer says, "Shall the decision of the chair stand as the decision of the assembly?" The question is now open for debate and may be discussed freely by any members. The presiding officer is at liberty to discuss this question without leaving the chair. At the conclusion of the debate a vote is taken in the same manner as on other questions. If the presiding officer is sustained, his decision stands. Otherwise, he yields to the wish of the majority and proceeds accordingly.

PRIVILEGED QUESTIONS

A privileged question, or motion, is one which, by reason of its importance when raised, demands immediate attention and decision, excluding for the time being any other business that may be before the house.

Types. There are five privileged questions: 1. To adjourn. 2. To fix the time to which the body shall adjourn. 3. To take a recess. 4. To call for the orders of the day. 5. To raise a question of privilege.

General Conditions. Privileged questions do not modify nor bear upon the main question, though they may be presented while the principal motion or other motions are being considered. They may be introduced at any time, and must be considered before any other subject or proposition that may be before the house.

Orders of the Day. Orders of the day are matters the consideration of which has been fixed for some particular day or time. This is done by a motion that the subject be made "the order of the day" for such a time, and the matter so assigned becomes the subject for consideration on that day or at that time. If several subjects are assigned for the same day they are called "orders of the day."

Questions of Privilege. Questions of privilege should not be confused with privileged questions in general. A question of privilege is a privileged question, but not all privileged questions are questions of privilege. Questions of privilege relate to the rights and privileges of the body, or of any of its members, and are of many kinds. Such, for example, are questions arising when charges are made against the official character of a member, when the proceedings are disturbed by members or strangers, or when an open window endangers the health or comfort of a member. Questions of privilege supersede all other questions, excepting the motions to fix the time to which to adjourn and to adjourn. If the question requires immediate action, a member who has the floor can be interrupted. A member rises, addresses the chair, and says, "I rise to a question of privilege." The procedure which follows is virtually the same as that outlined above under *Point of Order*.

ADDRESSING THE CHAIR

The term "chair" is a parliamentary form used in speaking of the person who presides at a formal meeting, and refers to the one who occupies the presiding officer's chair.

If a man occupies the chair, it is customary to say, "Mr. President (or Mr. Chairman)." If the chair is occupied by a woman, either married or single, it is customary to say, "Madam President (or Madam Chairman)." Similarly, whatever title the presiding officer bears may be used.

Having the Floor. A member is said to "have the floor" when he has been granted by the presiding officer the privilege of speaking to the members.

A MEMBER SPEAKS BUT ONCE

Except to clear a matter of fact or to explain himself in some material part of his speech, a member can speak but once on any motion or question before an organization. When all have spoken who wish to do so, a member may speak a second time if permitted by a majority vote of the assembly.

MEMBERS MUST VOTE

It is customary for every member who is in the room at the time the question is stated to vote, and for those not in the room at that time not to vote. It sometimes happens that, for special reasons, a member, by a majority vote of the others present, is excused from voting.

REQUIRED ATTENDANCE

Most legislative bodies have rules requiring attendance at important meetings. When a vote on some important measure is to be taken in either house of Congress, the party "whip" puts forth every effort to secure the attendance of all members of his party. Failing in this, he may appeal to the speaker who may send sergeants-at-arms to "arrest" the members and bring them to the meeting. Many organizations secure attendance through fines for absence or by dismissal after a certain number of absences.

MENTION OF NAMES IN DEBATE

In speaking before an assembly, no one is expected to mention by name a member then present. Instead, a member is identified by the location of his seat, or as the member who last spoke or last but one, or as one's opponent, if the occasion be a formal debate.

PAYING OUT MONEYS

No member of an organization has a right to spend money belonging to the organization or to contract debts against it unless he has been authorized to do so by some by-law or by a majority vote of the members. Organizations frequently, by a majority vote, authorize a member or a committee to expend money not to exceed a certain amount for some specified thing (possibly flowers).

Under no circumstances should accounts against an organization be paid unless a written bill is presented. These bills when paid should be receipted and kept as part of the secretary's or treasurer's permanent record. In most organizations the treasurer pays accounts only when he receives written orders to do so, signed by the secretary or by the president and the secretary. Before such orders can be drawn by the secretary or signed by the president, a majority vote of the members is necessary. Such vote usually takes the following form: A member rises and, when recognized by the chair, says, "I move that the secretary draw an order on the treasurer for seven dollars and sixteen cents in favor of Fisher and Co. for badges furnished (or in payment of bill rendered) June 22, 1923." See *Treasurer, Recording Secretary*.

DECORUM

Probably the most serious defect in most organizations is the lack of reasonable decorum. If business is to be transacted or a program is to be carried out, it is necessary that good order be maintained. While whispering need not be prohibited, it should be absolutely avoided while anyone is speaking from the floor. Common courtesy demands observance of this rule. From the time the gavel drops to call the meeting to order until it falls again, dismissing the assembly, loud talking and indiscriminate laughing should not be indulged in by any member. Such conduct interferes greatly with the progress of the meeting and conveys the impression of ill-breeding on the part of the offending member.

Permission to Withdraw from Meeting. No member of an organization should leave during the progress of a meeting unless he is formally excused by the presiding officer. Courtesy demands that any member wishing to leave should rise, address the chair, and, when recognized, courteously ask to be excused; or he should rise and say, "I rise to a question of personal privilege." In the latter case, the presiding officer says, "The member (or gentleman) will state his question of privilege." The member then courteously asks to be excused and may give briefly his reason. If the request seems reasonable, the presiding officer says: "The question of privilege is sustained. The member is excused."

If the absence of the member would reduce the number in the assembly to less than a quorum or would interfere with the progress of the meeting, the presiding officer should say, "The question of privilege is denied." In case of sickness, the member should, of course, be excused, and the assembly may if necessary take a recess or even adjourn. Where circumstances seem to demand it, in cases other than sickness, the member should be excused, even if such action forces an adjournment. Any member may appeal from the decision of the chair to the assembly, in which case the method of procedure is the same as appealing from the decision of the chair upon a point of order.

Recess. When the business under discussion at a meeting seems to demand an informal treatment, it is often wise to take a recess for a short time to allow members to move about and talk informally.

Manner of Speaking. In speaking from the floor, members should be very careful to maintain a calm attitude and a deliberate tone of voice, even though inwardly they may feel neither calm nor deliberate. Nothing so mars the dignity of a meeting as a retort from some member in a harsh or loud, angry voice. The deliberate speech is much more effective, and lends dignity to the meeting and respect to the speaker.

MEETINGS

Regular. Regular meetings are those fixed by the constitution or the by-laws or by the rules of the body.

Special. Special meetings are called in the interim between regular meetings. Due notice of such meetings, including the times and places, and the specific purposes for which such meetings are called, must be given to every member. The business of any special meeting is limited to the specific matters mentioned in the call.

Adjourned. When circumstances demand it, a regular or a special meeting may adjourn to some later time. In such a case the second meeting is known as an "adjourned meeting." An adjourned meeting has all the powers of the original meeting which was adjourned, and is a continuation of it, as though there had been no adjournment.

Quorum. A quorum is such a number of members of an assembly as must be present in order that business can be legally transacted. See *Constitution and By-Laws*.

Counting a Quorum. When the roll is called to ascertain whether a quorum is present, it sometimes happens that members refuse or neglect to respond to their names, when called, and the presiding officer doubts the accuracy of the record, if it shows less than a quorum present. In such cases, he may direct the clerk or secretary to count the members present. This procedure is called "counting a quorum."

VOTING

Various forms of voting are in use. The simplest and most common is the voice vote, in which those in favor say *aye* and those opposed say *no*. The chairman determines the result from the sound or volume of the voice. Other forms of voting are *raising the hands, rising, standing in different parts of the room, recording the yeas and nays*, and *by tellers*. The vote by rising or by standing in different parts of the room is known as a *division*.

Division. While the voice vote and the raising of hands are commonly used, neither is satisfactory, if the question is important and the vote close. If the chair is in doubt as to which side has it, he may call for a division or any form of voting by which he can determine the exact result. If the chair announces the result of the approximate vote, and a member in his own mind questions the decision of the chair, or thinks it uncertain, he can compel a further test. This he can do by rising and saying, "Mr. President, I call for a division of the house." Thereupon the chair calls for a division by asking those in favor to rise or to stand in a certain part of the room, while they are counted, either by the chair, by the secretary, or by tellers from both sides, appointed by the chair. When these have been counted and recorded, he calls for those opposed to rise or assemble and be counted, in like manner.

Yeas and Nays. When an important question is before an assembly and there is a desire to record how each member votes, any member present may rise and say, "Mr. President, I move that the yeas and nays be recorded on the question now before the house." If this motion is seconded and carried, the clerk or secretary calls the roll and records the votes of the members.

Ballot. Voting by ballot is a form of secret voting in which each member writes his decision on a piece of paper and deposits it in a common receptacle. After these ballots have been shaken up, so that the writers cannot be identified from the order of the ballots, they are counted by the tellers (usually in the presence of the members, but sometimes, for convenience, in a separate room).

Informal Ballot. By this method an expression of opinion upon a subject is secured from individual members without the formality of a definite motion upon the matter. Each member writes on a piece of paper his decision. The ballots are collected in a receptacle, are counted, and are classified. The result is announced to the assembly. It shows the opinions of members, but is not binding as a decision without some further action by the assembly.

Deciding Vote. If the presiding officer is a member of the assembly, he may vote on all questions. In oral voting, it is customary for him not to vote unless his vote will render or change a decision. If the vote is a tie, he may break the tie. If the vote lacks one of being a tie, he may make it a tie and thus defeat the measure. In voting by ballot, if the presiding officer does not vote before the ballots are counted, he cannot then vote without permission of the meeting. The principle of making and breaking a tie does not apply to a ballot vote.

Proxy. One is said to vote by proxy, who, though absent from the meeting, votes through another member who is present and who casts the vote of the absent member by virtue of a written authority called a proxy, signed by such absent member. Voting by proxy is allowed only when that right has been specifically given, either by public law or by the constitution or the by-laws of the particular society.

Kind of Vote Required. Unless the constitution, the by-laws, or the rules of the assembly specify otherwise, at least a majority vote is required on all questions. In important questions, such as amending the constitution or expelling a member or passing a law over the veto of the chief executive of a state or nation, it is customary to call for a vote greater than a majority. In most of such cases, a two-thirds vote is necessary, and, in rare cases, a three-fourths vote is required.

A *majority* is more than half the total number of votes cast. A candidate having more votes than any other of several rivals is said to have a *plurality*. See *Political Terms and Institutions*.

Unanimous vote means that all members vote on the same side of a question.

Pairing. In order that they may be absent from a meeting or that they may avoid having their names recorded in a yea and nay vote, two members, who have agreed to vote on opposite sides of some question, agree not to attend the meeting or not to vote if present. This practice is known as "pairing."

PROGRESSIVE ACTION ON MEASURES

Some bodies take only one vote upon a proposition, but other parliamentary bodies, such as Congress, with more time at their disposal, take several actions upon a measure before it is finally adopted.

First Reading. At the request of the presiding officer, the clerk or secretary reads the proposed measure in full, and the presiding officer states it by title. It may then be acted upon by passing it to a second reading, but it cannot be amended upon a first reading.

Second Reading. Regularly, the second reading must occur on another day than that of the first reading. It is done by the clerk, who then hands the measure to the presiding officer. The presiding officer, rising, states to the assembly the title of the bill; that this is the second time of reading it; and that the question will be whether it shall be committed or engrossed and read a third time. Upon vote, the bill may be ordered engrossed and passed to a third reading, or it may be referred to a special committee or to a committee of the whole.

Third Reading. After the bill has been approved by a special committee or by the committee of the whole, either with or without amendments, it comes before the assembly for final disposition. The assembly now decides whether the bill shall be engrossed and passed to a third reading. If the vote is favorable to this action, the measure is engrossed and read in full by the clerk. It is then passed to the presiding officer, who states the title and asks what action shall be taken on the bill. It is then before the house for final passage. Sometimes slight amendments are made to the measure after the third reading.

In some legislative bodies, bills are first read by title only; the second and third times they are read in full.

TABLE SHOWING PRECEDENCE OF MOTIONS

Motions rank in order as follows, the highest in rank being at the top of the list and the lowest at the bottom. When any one of these motions is pending, the motions above it in the list are in order, and those below are out of order. All of these motions require a majority vote, except the "previous question" and "extend limits of debate," which require a two-thirds vote.

Numbers 1 to 8, inclusive, are undebatable; 9 to 13, inclusive, are debatable. Numbers 1 to 5, inclusive, are privileged. Numbers 7 to 12, inclusive, are subsidiary.

1. Fix the Time to Which to Adjourn
2. Adjourn (when not qualified)
3. Take a Recess (when other business is pending)
4. Raise a Question of Privilege
5. Call for the Orders of the Day
6. Lie on the Table
7. Previous Question
8. Extend Limits of Debate
9. Postpone to a Certain Time
10. Commit or Refer
11. Amend
12. Postpone Indefinitely
13. A Main Motion

Answering More than 300 Questions in Parliamentary Procedure

	1	2	3	4	5	6	7	8
Explanation of the Table. Eight general rules appear in headings at the right. If a rule applies to a motion listed on the left, the letter "Y" is found under the rule and to the right of the motion. If a rule does not apply to a motion listed on the left, the letter "N" is found under the rule and to the right of the motion. A figure instead of the letter "Y" or "N" refers to a note of explanation below.	Amendable	Debatable	Must Be Seconded	Can Be Reconsidered	Requires Only a Majority Vote	Subsidiary Motions Can Be Applied	Debate Confined to Pending Question	Out of Order when Another Has the Floor
Adjourn	N	N	Y	N	Y	N	Y	Y
Adjourn (to a definite time or place)	Y	Y	Y	1	Y	N	Y	Y
Adopt or Accept a Report	Y	Y	Y	Y	Y	Y	Y	Y
Adopt Rules of Order, Constitutions, or By-Laws	Y	Y	Y	2	Y	Y	Y	Y
Adopt Standing Rules	Y	Y	Y	Y	Y	Y	Y	Y
Amend	Y	3	Y	Y	Y	Y	Y	Y
Amend an Amendment	N	3	Y	Y	Y	Y	Y	Y
Amend Rules of Order, Constitutions, or By-Laws	Y	Y	Y	2	4	Y	Y	Y
Amend Standing Rules	Y	Y	Y	Y	12	Y	Y	Y
Appeal (except relating to indecorum)	N	Y	Y	Y	Y	Y	Y	N
Appeal (relating to indecorum, etc.)	N	N	Y	Y	Y	Y	Y	N
Blanks, Filling	N	Y	N	Y	Y	Y	Y	Y
Commit, Recommit, or Refer	Y	Y	Y	5	Y	Y	Y	Y
Debate, To Close, Limit, or Extend	Y	N	Y	Y	N	Y	Y	Y
Division of the Assembly	N	N	N	N	Y	N	Y	N
Division of the Question	Y	N	6	N	Y	Y	Y	6
Fix the Time to Which to Adjourn	Y	7	Y	Y	Y	Y	Y	Y
Informal Consideration of a Question	N	Y	Y	2	Y	Y	Y	Y
Leave to Continue Speaking after Indecorum	N	N	Y	Y	Y	N	Y	Y
Lie on the Table	N	N	Y	N	Y	N	Y	Y
Main Motion or Question	Y	Y	Y	Y	Y	Y	Y	Y

TABLE OF RULES RELATING TO MOTIONS—Con.

Answering More than 300 Questions in Parliamentary Procedure

	1	2	3	4	5	6	7	8
Explanation of the Table. Eight general rules appear in headings at the right. If a rule applies to a motion listed on the left, the letter "Y" is found under the rule and to the right of the motion. If a rule does not apply to a motion listed on the left, the letter "N" is found under the rule and to the right of the motion. A figure instead of the letter "Y" or "N" refers to a note of explanation below.	Amendable	Debatable	Must Be Seconded	Can Be Reconsidered	Requires Only a Majority Vote	Subsidiary Motions Can Be Applied	Debate Confined to Pending Question	Out of Order when Another Has the Floor
Nominations, To Make	N	Y	N	N	Y	Y	Y	Y
Nominations, To Close	Y	N	Y	N	N	Y	Y	Y
Nominations, To Reopen	Y	N	Y	2	Y	Y	Y	Y
Objection to Consideration of a Question	N	N	N	2	8	N	Y	N
Order, Questions of	N	N	N	N	Y	N	Y	N
Order, To Make a Special	Y	Y	Y	Y	N	Y	Y	Y
Orders of the Day, To Call for	N	N	N	N	Y	N	Y	N
Order of the Day (when pending)	Y	Y	Y	Y	Y	Y	Y	Y
Parliamentary Inquiry	N	N	N	N	Y	N	Y	N
Postpone Definitely	Y	Y	Y	Y	Y	Y	Y	Y
Postpone Indefinitely	N	Y	Y	9	Y	Y	N	Y
Previous Question	N	N	Y	10	N	N	Y	Y
Privilege, To Raise Question of	N	N	N	N	Y	N	Y	N
Privilege, Questions of (when pending)	Y	Y	Y	Y	Y	Y	Y	Y
Reading Papers	N	N	Y	Y	Y	N	Y	Y
Recess, To Take a (when privileged)	Y	7	Y	N	Y	Y	Y	Y
Reconsider	N	3	Y	N	Y	Y	11	N
Rescind or Repeal	Y	Y	Y	2	2 13	Y	N	Y
Substitute (same as Amend)	Y	Y	Y	Y	Y	Y	Y	Y
Suspend Rules	N	N	Y	N	N	N	Y	Y
Take from the Table	N	N	Y	N	Y	N	Y	Y
Take up a Question out of its Proper Order	N	N	Y	N	N	N	Y	Y
Voting, Motions Relating to	Y	N	Y	Y	Y	Y	Y	Y
Withdraw a Motion, Leave to	N	N	N	2	Y	N	Y	Y

1. Cannot be reconsidered until after some business has intervened.
2. An affirmative vote on this motion cannot be reconsidered.
3. Not debatable when the motion to be amended or reconsidered is not debatable.
4. Before adoption, a majority vote. After adoption the vote named in rules of order, constitution, or by-laws, usually a two-thirds vote.
5. Cannot be reconsidered after the committee has taken up the subject, but by two-thirds vote the committee, at any time, may be discharged from further consideration of the question.
6. If resolutions or propositions relate to different subjects which are independent of each other, they must be divided on request of any member, which can be made when another has the floor. If they relate to the same subject and yet each part can stand alone, they must be divided only on a regular motion and vote.
7. Not debatable if made when another question is before the assembly.
8. Objection can be made only before debate begins. A two-thirds vote must be opposed to the consideration in order to sustain the objection.
9. A negative vote on this motion cannot be reconsidered.
10. Cannot be reconsidered after a vote has been taken under it.
11. Opens main questions to debate when those questions are debatable.
12. Standing rules may be amended at any time by a majority vote if previous notice has been given, or by a two-thirds vote without notice.
13. Rescind is under the same rules as to amend something already adopted. See *Note 4*.

ORDERS, SOCIETIES, AND ORGANIZATIONS

THE following section contains brief accounts of a few of the numerous orders, societies, and organizations existing in America and elsewhere. The list includes organizations devoted to fraternal, scientific, charitable, religious, patriotic, or other purposes.

The number of such societies in existence is extraordinarily great; consequently it is impossible, within a limited scope, to deal with all of them. The ones selected for special treatment, however, are prominent among the societies regarding which detailed and authentic information will be found of value to the greatest number of people.

Academy of Arts and Letters, American. This distinguished body owes its foundation to the action of the American Social Science Association, which, at its annual meeting of 1898, nominated a small group of noted authors and artists to constitute the National Institute of Arts and Letters. Membership in this body was at first restricted to one hundred fifty, but later was increased to two hundred fifty. Eligibility for membership was conditioned on distinguished attainment in literature or in the fine arts. In the course of six years the membership of the institute had grown to embrace a large proportion of the most eminent writers and artists in the United States. Corresponding members from foreign countries were chosen for the first time in 1929.

In 1904 the institute proceeded to organize the American Academy of Arts and Letters. Seven members of the institute were elected founding members of the academy, and these were authorized to choose from the membership of the institute eight additional members of the academy. The fifteen members then proceeded to choose five more, and the twenty in turn selected an additional five. This method of selecting members of the academy from the larger membership of the institute was continued until the entire membership of the academy, limited by its constitution to fifty, had been chosen.

The original seven members of the academy were William Dean Howells, the novelist; Edmund Clarence Stedman, the poet; Samuel Langhorne Clemens, the humorist; John Hay, the author and statesman; Augustus Saint-Gaudens, the sculptor; John LaFarge, the painter; and Edward Alexander MacDowell, the composer.

In 1916 the organization received a national charter from Congress. Vacancies are filled by vote of the members, at the annual meetings of the academy. The academy occupies a permanent home at 633 West 155th street, New York City.

Academy, French. This famous honorary society of letters was founded by Cardinal Richelieu in 1635. The cardinal's purpose was to enlist the service of a group of literary men in developing and purifying the French language. The academy enjoyed great prestige down to the French Revolution, when it was suppressed. It was revived, however, in 1795, as the principal branch of the newly created Institute of France. The academy is restricted to 40 members, "the immortals." Vacancies are filled through election by the remaining members.

The most important work of the academy has been the publication, in several editions, of a dictionary of the French language. Out of the income of certain trust funds, the academy each year grants various prizes to persons notable for "virtuous and laborious lives," as well as prizes for literary works most serviceable to morality. The academy shares with the other branches the policy of appointing correspondents, some of whom are foreigners.

Alcoholics Anonymous. A movement dedicated to curing persons afflicted with alcoholism, in which ex-alcoholics help alcoholics to recover. The core of the procedure is spiritual, but no particular form of organized religion is advocated. The Alcoholic Foundation in New York, organized in 1938, is the general service headquarters of the movement. There are 3000 groups of Alcoholics Anonymous throughout the world.

Alliance Française, Federation de L'. An association of local groups, clubs, and societies in the United States and Canada, formed in 1902 for the purpose of encouraging the study of the language, literature, art, and history of France. A large portion of the federation's membership is composed of students and teachers in schools and colleges. The federation holds general annual meetings, and, under its auspices, lecturers, particularly French men of letters, visit the local groups.

Altrusa International. The first service club for executive and professional women. Its ideals are patriotism, efficiency, and service. Only one representative of each occupational classification of business or profession in a community can hold membership. The idea is that business and professional women shall put their united strength into local civic development. The first club was organized in Nashville, Tennessee, in 1917.

American Legion. A patriotic, nonmilitary, nonpartisan organization to which all those who served honorably in the armed forces of the United States during the World War are eligible for membership. The society originated at a meeting of about 1000 officers and enlisted men of the A. E. F., held at Paris, France, in March 1919. As a result, a committee of fifteen returned to the United States to promote the organization among the men at home. A preliminary convention was held at Saint Louis, Mo., May 1919; the society was incorporated by act of Congress, September 16, 1919; and the first regular convention was held in November 1919.

The objects of the association are: to preserve the memories of the members' association in the World War; to uphold and defend the Constitution of the United States; to maintain law and order; to foster and perpetuate a 100 per cent Americanism; to combat autocracy whether of the classes or the masses; to make right the master of might; to promote peace and good will on earth; to safeguard and transmit to posterity principles of justice, freedom, and democracy; to inculcate a sense of individual obligation to the community, state, and nation; and to sanctify the comradeship of the war by mutual helpfulness.

Local units of the order, known as "posts," are organized into departments, one for each state and territory, the District of Columbia, Alaska, the Canal Zone, the Philippine Islands, Canada, Mexico, and continental Europe. National headquarters is at Indianapolis, Ind. The American Legion Auxiliary, having similar aims, is open to the wives, sisters, mothers, and daughters of Legion members and of deceased World War veterans. As of 1947, membership of the Legion was 3,019,002, and of the Legion Auxiliary, 924,621.

Army and Navy Legion of Valor. A patriotic society organized in 1890, to which anyone is eligible who has received a medal of honor or the distinguished service cross of the United States.

Association for the Advancement of Science, American. The leading scientific society in America. It was organized under its present title in 1847, being an outgrowth of the original Association of American Geologists, which was founded at Philadelphia in 1840. It meets each summer in 11 sections devoted to the following departments of science: mathematics and astronomy; physics; chemistry; mechanical science and engineering; geology and geography; zoology; botany; anthropology and psychology; social and economic science; physiology and experimental medicine; and education. During the past half century, the names of practically all the leaders of science in America have been on the roll of this association.

Audubon Societies, National Association of. An endowed association in the United States, the object of which is to protect wild birds and wild animals. It was the outgrowth of a movement begun in 1886 by George Bird Grinnell, then editor of *Forest and Stream*. The name of the society was chosen in honor of John James Audubon, a pioneer American ornithologist and painter of birds.

The association has an annual income of about $200,000, which is devoted to many different means of furthering the protection of wild life in America. In its junior department it annually organizes 250,000 children into bird study classes and provides them with material for study. It has also been instrumental in securing the enactment of the Audubon law in nearly all the states of the Union. This law makes it a misdemeanor to trap, snare, or kill nongame birds. Other results achieved by this organization include laws prohibiting the sale of aigrettes and feathers of native birds; a Federal law prohibiting the importation of feathers from foreign countries; and the establishment of government reservations in which breeding colonies of birds are protected from molestation. Its magazine, *Bird Lore*, is a leading bird periodical.

Aztec Club of 1847. A hereditary, patriotic society formed at Mexico City in 1847 by officers of the United States army, in order to cherish the memories and traditions of the Mexican war. Each member nominates either his first-born son or a male blood relative to succeed him in the society.

Baptist Youth Fellowship. A religious organization in which are united many of the young people's societies that are connected with Baptist churches in the United States and Canada. It was organized in 1941.

Benedictines. The general name of the monks living under the rule of Saint Benedict. The order spread from the monastery founded by Saint Benedict at Monte Cassino, Italy, about the year 529. The vows of the monks were originally three—to remain at the monastery, to labor till death in order to attain perfection, and to obey their superiors.

In the 10th century, the abbey of Cluny in southeastern France became the virtual head of the Benedictine monasteries, which so increased throughout Europe that, in the 15th century, they numbered about 37,000. The order was the chief agent in the preservation of art and literature during the middle ages, and Benedictine vows were taken by many of the greatest figures of the time, including Hildebrand, Bede, Alcuin, and Anselm.

The first congregation of the Benedictines in the United States came from Bavaria in 1846 and was established in 1855 as Saint Vincent's priory, Latrobe, Pa. There are now about 700 Benedictine monasteries in the world.

B'nai B'rith, Independent Order of, or **Sons of the Covenant.** A Jewish fraternal organization, founded in New York City in 1843 by a group of German Jews headed by Henry Jones. It has for its object the development of morality and of the principles of charity, benevolence, and brotherly love among its members. The subordinate bodies are called lodges; the governing bodies, grand lodges.

Boy Scouts of America. An organization composed chiefly of boys from 11 to 18 years of age, which has for its object the mental, moral, and physical training of its members so that they may become good citizens and live up to their motto, which is "Be Prepared."

The unit of organization is a patrol of eight boys. Four patrols compose a full troop, which is under the leadership of a scout master. The scout master is selected by a troop committee of three or more citizens, who usually represent some institution, such as a school or church, with which the troop is connected. Administration of the entire organization is directed by the national council working through an executive board. The president of the United States is honorary president of the council.

Every boy who joins the Boy Scouts of America must promise: "On my honor I will do my best,—to do my duty to God and my country, and to obey the scout law; to help other people at all times; to keep myself physically strong, mentally awake, and morally straight." The scout law states that a scout is trustworthy, loyal, helpful, friendly, courteous, kind, obedient, cheerful, thrifty, brave, clean, and reverent. There are three classes of scouts,—tenderfoot, second class, and first class. Succeeding ranks, of star, life, and eagle scout, are attained by the acquirement of a specified number of merit badges, each of which denotes recognized accomplishment in some special branch of activity. Awards are also made for life-saving by a national court of honor. A large proportion of scouts spend a week or more in camp each summer, and there are also week-end and winter camps.

The boy scout movement was originated in England by Sir Robert Baden-Powell. The Boy Scouts of America was incorporated February 8, 1910, and was further authorized by an act of Congress in June 1916. The organization is nonmilitary and undenominational. The first international meeting, or jamboree, was held in 1920 at London.

Brotherhood of American Yeomen. A fraternal, beneficiary society organized in 1897, with headquarters at Des Moines, Iowa. The society aims to unite in fraternal association all acceptable white men between the ages of 18 and 45 years. Accident, sickness, and death benefits are paid to members or their beneficiaries. The meetings of local bodies are conducted according to the ritualistic lodge system. The governing body, called the supreme conclave, meets every four years, and acts through a board of five directors who are elected by the conclave.

Brotherhood of Saint Andrew. A religious society of laymen connected with the Protestant Episcopal Church, founded in Saint James parish, Chicago, in 1883. The unit of organization is the local chapter. The headquarters of the association is at Boston. A corresponding society of women is known as the Daughters of the King.

Camp Fire Girls. An organization which provides a leisure time program for girls based on the following seven interests, or "crafts": home, hand, health, nature lore, camping, business, and citizenship. By awarding "honors" for progress in these crafts, the organization encourages its members to develop their natural aptitudes, to enjoy and be at home in the out-of-doors, and to meet cheerfully the responsibilities of home and community life.

Any group of girls ten years of age or over may form a Camp Fire under the leadership of an older friend. Interest is fostered particularly in American Indian arts and crafts. Each girl chooses for herself an Indian name symbolic of her aspirations. Every year the national organization announces a "project," which is designed to emphasize some phase of the program. Examples of these projects are Indian lore, tree planting, international friendship, home decoration, and hobbies.

The organization was founded in 1910 by a group of men and women, headed by Dr. and Mrs. Luther Gulick, interested in recreation for girls.

Catholic Knights of America. The first Roman Catholic fraternal organization in America. It was founded at Nashville, Tenn., in 1877, with the primary object of providing male Roman Catholics between the ages of 18 and 45 with the intellectual, social, and business advantages of a fraternal, mutual life insurance association. Since 1901, Catholic women have been eligible to membership. The executive authority is held by the supreme council, with headquarters in Saint Louis, Mo.

Christian Endeavor. A religious society founded February 2, 1881, in Williston Congregational

church of Portland, Me., by the Rev. Francis E. Clark. Its purpose is distinctly religious, and the full privileges of membership are extended to any society that belongs to an evangelical church and adopts the name and pledge of the organization. The pledge includes an agreement to be a regular attendant at the weekly prayer meeting which is conducted by each local society. The organization extends to more than 60 countries and is sponsored by more than 80 religious denominations.

Cincinnati, Society of the. A patriotic, memorial society organized by the officers of the Continental army at their last encampment, May 13, 1783. The first meeting was held in the Verplanck house, the headquarters of Baron Steuben, on the Hudson river, near Fishkill. As the officers were leaving the army to return to their farms, they named their society after Lucius Quinctius Cincinnatus, who left the plow to become dictator of Rome and returned to his farm when the civil emergency had passed. Membership in the society was declared to be hereditary. Washington, the first president general of the society, held this position until his death. Hereditary members now number about 1000.

Colonial Dames of America, National Society of the. An ancestral and patriotic society of American women, founded May 19, 1892. Its objects are to preserve colonial history and relics and to encourage patriotism. To be eligible, a woman must be a descendant of an ancestor who settled in America before 1750 and who rendered important service to the colonies. The valuable collection of historical relics in the old Van Cortlandt manor house in New York City is under the control of the New York branch of the society.

Confederate Veterans, United Sons of. A patriotic society organized in 1896 at Richmond, Va., for the purpose of cultivating friendship among its members, collecting material for an accurate history of Confederate activities, perpetuating the memories of Confederate veterans, and giving aid to their widows and orphans. Membership is confined to the male descendants of veterans who served actively in the Confederate cause.

Daughters of the American Revolution. A patriotic society of women, organized at Washington, D. C., in 1890, and incorporated by act of Congress in 1896. The objects of the society are: to perpetuate the memory of the spirit of those who achieved American independence; to promote institutions for the diffusion of knowledge; to cherish, maintain, and extend the institutions of American freedom; to foster true patriotism; and to aid in securing for mankind the blessings of liberty. Membership is open to women, one or more of whose ancestors gave active aid in the establishment of American independence.

The society has its own headquarters building, the Memorial Continental Hall, in Washington, D. C. Delegates from local chapters meet in annual convention at Washington during the week in which April 19 occurs.

Daughters of the Confederacy, United. A woman's patriotic society, organized at Nashville, Tenn., in 1894. Membership is open to mothers, sisters, daughters, wives, widows, or direct female descendants of those who served in the Confederate army or navy or who personally aided the Confederate cause. Local branches are called chapters; the state organization is known as a division.

Daughters of the Revolution. A patriotic, hereditary society of women, founded at New York in 1891, largely by a group which withdrew from the Daughters of the American Revolution because they wished to have more stringent eligibility requirements. The objects are very similar to those of the older society. Membership is open to women one or more of whose direct ancestors actively assisted in the American Revolution and thus became liable to conviction for treason against Great Britain.

Deaconesses. The name applied, in the early Church, to groups of women to whom certain charitable and educational work was assigned. Usually, only women who were widows of one husband and had borne children could be appointed deaconesses. In the Roman Catholic Church, the sisterhoods gradually displaced the deaconesses, although the latter survived as orders in the Greek Church until the 12th century. In the 19th century, the deaconess function was revived among Protestants, especially in the Episcopal and the Methodist Episcopal churches. The deaconesses conduct orphanages, hospitals, and schools, and assist in parish work.

Dominicans. A Catholic religious order founded in 1216 by Saint Dominic for the purpose of reclaiming heretics and ministering to the spiritual needs of the poor and ignorant. The organization includes the order of the preachers, sometimes called black friars from the black outer mantle of their uniform; the Dominican sisters, an order of nuns; and the brothers of penitence, which is open to men and women married and following secular pursuits. The order of the preachers numbers about 5000 fathers, of whom approximately 350 are in the U.S.

De Molay, Order of. A fraternal organization open to young men of good character between their 15th and 25th birthdays. An initiatory degree is conferred, which is dramatic and historical in character, memoralizing the martyrdom of Jacques De Molay (1244-1314), the last grand master of the Knights Templar. Headquarters are at Kansas City, Mo. The order was founded by Frank S. Land in 1919.

Eastern Star, Order of the. A charitable and benevolent association to which only master masons, their mothers, wives, widows, sisters, and daughters are eligible. It was originated by the poet Robert Morris about 1850, and, in 1868, it was revised to approximately its present form by Robert Macoy.

Elks, Benevolent and Protective Order of. A fraternal organization founded in New York City in 1868 from an older society composed chiefly of members of the theatrical profession and known as the Jolly Corks. White, male citizens, 21 years or more of age, are eligible for membership. Only one lodge is established in any city, and the city must have a population of at least 5000. Each year, on the first Sunday of December, a memorial service is held for the deceased members. The organization has been noted for its response in time of calamity.

Epworth League (Methodist Youth Fellowship). A society of young people founded May 15, 1889, for the purpose of promoting Christian living according to the standards of the Methodist Episcopal Church. Following the unification of Methodist churches in 1939, the scope of the organization's activities was broadened and the new name, "Methodist Youth Fellowship," was adopted.

Foreign Wars of the United States, Military Order of. A hereditary, patriotic, military organization instituted December 27, 1894. Membership is open to commissioned officers of the United States army who have served in wars against foreign powers, and to their direct lineal descendants. The order stands for defense against foreign aggression.

Foresters, Orders of. A group of benevolent and beneficent fraternal orders founded on the history and tradition of the English royal forests, especially in connection with the story of Robin Hood and his followers. The first authentic records of the society, known originally as the Royal Order of Foresters, were made at Leeds, England, in 1813. Division in the ranks of the Royal Foresters led, in 1834, to the formation of the *Ancient Order of Foresters*, which eventually superseded the Royal order. The society was introduced into America at Philadelphia, 1832.

All American "courts" held allegiance to the high court of the ancient English order until 1874, when several bodies seceded to form the *Independent Order of Foresters*. This was later reorganized in

Canada, largely under the direction of Dr. Oronhyetkha, a Mohawk Indian. Membership of women is provided for by the Miriam degree, and a uniformed grade or rank is known as the knights of Sherwood forest.

In 1889, another dissatisfied American group separated from the Ancient order and assumed the name of Ancient Order of Foresters of America, which, in 1895, was changed to *Foresters of America.* The uniformed grade of this society is called the Glenwood degree.

Four-H Clubs (head, heart, hands, and health), whose members are rural young folk from 10 to 21 years of age, are part of the educational extension program in agriculture and economics directed by the U. S. department of agriculture and state colleges of agriculture. Organized in 1914, the clubs, with a membership of 2,000,000 boys and girls, are under the supervision of county extension agents and voluntary workers.

Franciscans. The name applied to three religious orders instituted by Saint Francis of Assisi in the 13th century. These are the Friars Minor, the Poor Clares, and the Third Order, or Brothers and Sisters of Penance. The first-named is the original society and the order commonly known as the Franciscan. The Franciscans have devoted themselves particularly to missionary and educational work. Franciscan fathers who accompanied Columbus in 1493 established convents on the island of Haiti. Missions of the order which were founded by Father Junipero Serra in California in the 18th century are famous. The order now conducts numerous missions and several colleges in the United States.

The Poor Clares is the oldest of the several Franciscan orders for women, having been established in 1212, when Saint Clare adopted the religious life under the teaching of Saint Francis.

Future Farmers of America (FFA). An organization for the welfare of farm boys, 14 to about 21 years of age, who are studying vocational agriculture in public secondary schools. Organized in 1928, it has a membership of about 380,000.

Garter, Order of the. The highest order in Great Britain, and one of the oldest of European orders of knighthood. The date of its institution has been fixed approximately between the years 1346 and 1348, in the reign of Edward III, although the precise occasion of its inception is still obscure. Membership in the order is restricted to 25 knights companions, the original number, and the British sovereign, who is the permanent head of the order. However, royal princes are admitted as supernumerary members, and the distinction is frequently conferred upon foreign sovereigns. Until the reign of Edward VI, the order was known as the Order of Saint George, and the badge bears the figure of the saint on horseback fighting the dragon. The emblem is a garter of dark blue ribbon edged with gold, bearing the motto, *honi soit qui mal y pense,* "shame to him who thinks evil of it."

Girl Scouts. An organization of girls, very similar to, and based on, that of the Boy Scouts. It was founded in England by Sir Robert Baden-Powell, originator of the Boy Scouts, and is known in British countries as the Girl Guides. The name Girl Scouts was adopted in America in 1915 by an organization founded in 1912 at Savannah, Ga., by Mrs. Juliette Gordon Low (1860–1927), and previously known as Girl Guides.

Girls from 10 to 18 years of age may become Girl Scouts. There is also a younger group for girls between 7 and 10 called the Brownies. On reaching the age of 10, a Brownie becomes an intermediate Girl Scout, and at 14 or on entering high school a senior Girl Scout. The local unit is the troop which may be divided into patrols. Each patrol chooses its own leader. A troop is led by an adult.

The badge of a girl scout is the trefoil, the threefold division of which reminds her of her three promises: to do her duty to God and her country; to help other people at all times; and to obey the scout law. This law, as well as the motto, "Be Prepared," is the same as that of the Boy Scouts.

Good Templars, International Order of. A fraternal society having for its object the promotion of total abstinence from the use of alcoholic beverages, and of universal prohibition of the manufacture and sale of such products. Membership is unrestricted by age, sex, or color. A committee appointed by the governing body of the society inaugurated the Prohibition party in 1869. In 1874, Good Templar women founded the Woman's Christian Temperance Union.

Grand Army of the Republic. A patriotic society of former soldiers and sailors who served honorably in the Union forces during the Civil War, or who were members of state militia on active duty and subject to national call at that time. The first local group or post of the G. A. R. was established at Decatur, Ill., April 6, 1866. The society continued to grow until 1890, when the membership became 408,489. The final encampment was held in 1949, and the last survivor, Albert Woolson of Duluth, died in 1956 at the age of 109.

Hibernians, Ancient Order of. A fraternal, beneficiary society of men of Irish birth or descent who are of the Roman Catholic faith. The order originated in Ireland, and was introduced into America at New York City in 1836.

Holy Name Society, The. An important religious factor in the life of Catholic men in the United States. Its origin dates back to the Council of Lyon, 1274, which decreed that the faithful have a special devotion to the Name of Jesus and that reparation be offered for insults to that Name by unthinking men. Gregory X, the Roman pontiff of that period, selected the order of St. Dominic to preach the devotion. Under the direction of John of Vercelli, master-general of the Dominicans, the society was formed and spread to every nation in Europe before the close of the 16th century.

Owing to a lack of documents it is impossible to determine at what time this society was introduced into the United States. The apostle of the devotion to American Catholic manhood is generally accepted as the Very Rev. Charles H. McKenna, O. P., who was assigned to Holy Name work in 1871. In his missionary travels he established a large number of branches and rekindled the enthusiasm of members wherever it existed. To him goes a large share of the credit of propagating the Holy Name Society, which numbers more than three million Catholic men.

The purpose of the society may be summed up in one sentence used by Pope Gregory in writing to John of Vercelli, requesting him to spread devotion to the Name of Jesus among Catholic men: "We have judged it proper to persuade the faithful to demonstrate more reverence for that Name above all Names, the only Name in which we claim salvation—Jesus Christ who has redeemed us from the bondage of sin."

Honor, Legion of. A French order founded by Napoleon Bonaparte in 1802, for the purpose of recognizing and rewarding distinguished service in military and civil life. As constituted by Napoleon in 1804, after he had become emperor, the order comprised a grand master, which capacity the emperor assumed, 7 grand officers, 20 commanders, 30 officers, and 350 legionaries. The rank of grand eagle, now grand cross, taking precedence of grand officer, was added in 1805. The order was displaced at the Restoration (1815) but was reinstated in 1830 in its unique position as the only French order. The president of the republic is now the grand master. The grades are, (1) grand cross; (2) grand officer; (3) commander; (4) officer; (5) chevalier.

Admission to the legion of honor is, in peace time, based upon distinguished services continued through

20 or 25 years, although, in extraordinary circumstances, this condition may be waived. Promotion to one of the higher ranks is granted only upon completion of a certain period of years in a lower grade. *Légionnaires* who have served in the French army or navy receive small pensions, according to their rank in the legion. Loss of French citizenship involves forfeiture of membership. Women, notably Madame Curie, have been admitted. For unusual service, foreigners are accorded membership. The badge of the chevalier of the legion, when worn by a civilian or by a military or naval officer in civilian clothes, is a red watered ribbon fastened in the left lapel of the coat. For the higher grades, the badge is a red rosette.

Jesuits or **Company of Jesus.** A religious society of the Roman Catholic Church growing out of the work of Ignatius Loyola. It was formally incorporated by the pope in 1540. Its motto is Ad Maiorem Dei Gloriam (A. M. D. G.), "To the Greater Glory of God." The members pledge themselves to poverty, chastity, obedience, and willingness to go as missionaries wherever the pope may send them. The head of the order is called a general, and his rule is subject only to constitutional restrictions.

Novices are required to spend 18 years in preparation for admission to the order. This preparation consists of meditation, a thorough and wide course of study, and a strict regimen. Only those who have completed this 18-year preparation and have taken the four solemn vows are eligible to be generals or other high officials of the order.

The influence of the order spread rapidly. In the middle of the 18th century, it had 700 colleges with an enrollment of about 300,000 students, including many in China, Japan, Mexico, and Brazil. The attachment of the Jesuits to the papacy caused strained relations between the papacy and various Catholic nations, and the result was that, in 1773, the pope issued a bull suppressing the society. In 1814, the order was completely rehabilitated by papal order. The Jesuits now number 29,333.

Kiwanis International. The international association has general supervision of Kiwanis clubs everywhere. Each club is composed of business men, usually two representatives from each occupation in a community, who are particularly interested in civic and social service. Major objects are to emphasize human rather than material values; to encourage the adoption of higher business standards; to develop more intelligent citizenship; and to promote better understanding between people of various communities. The motto of Kiwanis is "We Build."

The first Kiwanis club was organized in Detroit, Mich., in 1915. The international organization was formed in 1917.

Knights of Columbus. A fraternal beneficiary society of Roman Catholic men, organized under a charter granted by the state of Connecticut, March 29, 1882. The membership is divided into two classes,—insurance and associate. Insurance policies are issued to members of the first class between the ages of 18 and 60. Associate members are those who do not make use of the insurance feature. In addition to the insurance of members, the society is devoted to the promotion of charity and vocational education. Applicants for membership must subscribe to being opposed to Socialism as an economic system. Subordinate bodies of the order are known as councils; the governing body is the supreme council. The ritualistic work leading to full membership consists of four degrees.

Knights of Pythias. A social brotherhood founded at Washington, D. C., February 19, 1864, by Justus Henry Rathbone and four others, to promote the principles of friendship, charity, and benevolence. The fundamental tenets of the order are "toleration in religion, obedience to law, and loyalty to government." Accepted candidates are advanced through the three ranks or degrees of page, esquire, and knight. Local bodies are known as lodges; the governing body is the supreme lodge.

League of Women Voters, National. This organization of American women is an outgrowth of the National American Woman Suffrage Association, the specific object of which had been accomplished by the passing, in 1920, of the woman suffrage amendment to the Federal Constitution. The prime mover in effecting the new organization was Mrs. Maud Wood Park, who, in April 1921, was elected first president of the National League.

Affiliated with the National League are state leagues in practically all the states of the Union and leagues in the District of Columbia and Hawaii. Individual membership is in local leagues, which are represented in state leagues.

At the time of its founding, the League chose a jury of prominent women who were requested to select, from nominations made by the League, the most noted living American women in each of twelve important departments of activity. The selection, which was made public in 1924, consisted of the following names: Jane Addams, Cecilia Beaux, Annie Jump Cannon, Carrie Chapman Catt, Anna Botsford Comstock, Minnie Maddern Fiske, Louise Homer, Julia Lathrop, Florence Rena Sabin, M. Cary Thomas, Martha Van Rensselaer, and Edith Wharton.

From its temporary task of urging women to use their newly-won franchise, the League soon entered upon a continuing activity in accordance with its purpose to promote education in citizenship, efficiency in government, and international cooperation for the prevention of war.

Lions International. The International Association of Lions Clubs was founded in 1917 by Melvin Jones. The Association included, in 1950, 8500 clubs in 19 countries, with about 430,000 members. It is nonpolitical and nonsectarian. Its purpose is the cultivation of a spirit of good fellowship and cooperation among its members and the direction of their organized efforts toward useful social service. Its objectives include civic improvements, citizenship, patriotism, education, sight conservation, and aid to the blind. The motto is "Liberty, Intelligence, Our Nation's Safety," the initial letters forming the word "Lions."

Loyal Legion, Military Order of the. A hereditary, patriotic organization composed chiefly of commissioned officers of the United States army, navy, or marine corps who served during the Civil War, and of their direct male descendants. The order had its beginning in 1865 at a meeting of officers of the army and navy, held on April 15, 1865, the day following the assassination of President Lincoln. Its objects are: to strengthen the ties of fraternal fellowship and sympathy formed by companionship in arms; to care for and relieve the widows and orphans of deceased companions of the order: and to promote the welfare of U. S. soldiers and sailors.

Luther League of America. A national organization having for its purpose the unification of the young people's religious societies that are connected with the Lutheran churches in America. It was founded at Pittsburgh, Pa., in 1895. The motto is "Of the Church, by the Church, for the Church."

Maccabees, The. A secret, fraternal, mutual assessment beneficiary society, organized at London, Ontario, in 1878 by the members of the Order of Foresters. The organization was incorporated in Michigan, June 11, 1881, and later became known as the Knights of Maccabees of the World. It is founded on the tradition of the followers of Judas Maccabeus, as given in several of the apocryphal books of the Old Testament. The Maccabees provide life, health, accident, and disability insurance for their members. Subordinate bodies are known as tents, while the lawmaking body is the supreme tent.

The Woman's Benefit Association of the Maccabees is an entirely independent organization.

Masons, Free and Accepted. A secret, fraternal organization which claims a very remote origin and seems to have descended from the craft guilds of operative masons that existed in the medieval period. Speculative masonry as known today dates from June 24, 1717, when four of the old lodges united at London, to form the Grand Lodge of England. Masonry was introduced into America about 1730.

The basic unit of the order is the lodge, wherein are conferred the three degrees of entered apprentice, fellowcraft, and master mason. In the United States and Canada, two systems of higher degrees, known as the York rite and the Ancient Accepted Scottish rite, are open to master masons. The degrees or grades of the York rite are conferred progressively by three distinct bodies,—the chapter, the council, and the commandery of Knights Templars. The Scottish rite, which was developed into a rite of 33 degrees at Charleston, S. C. in 1801, is organized into separate bodies called lodges, councils, chapters, and consistories. These confer the degrees up to and including the 32d. The 33d, and last, degree is restricted to active and to honorary members of the governing body known as the supreme council.

Merit, Order for, *Ordre pour le mérite.* Among the European distinctions based upon achievement, this German order is one of the most highly prized. It was the only distinction accepted by Thomas Carlyle. The order was founded in 1667 by Prince Frederick, later Frederick I of Prussia, with the name Order of Generosity. Frederick the Great gave it the present title as a civil and military order in 1740. The peace class for recognition of meritorious service to art or science, was founded in 1840 by Frederick William IV. The numbers are restricted to 30 German and 30 foreign members.

Moose, Loyal Order of. A secret, beneficiary, fraternal society founded in 1888 at Louisville, Ky., by Dr. J. H. Wilson. The society aims to furnish the advantages of fraternal membership without the necessity of accepting life insurance or of pledging to any particular cause. The society maintains a home and vocational school for needy members and their orphans at Mooseheart, near Aurora, Ill.

Odd Fellows, Independent Order of. A secret, fraternal, beneficiary society, founded in England sometime during the second quarter of the 18th century. A grand lodge of Odd Fellows for England was formed at London in 1803. In 1809 a subordinate lodge at Manchester successfully declared itself independent of the grand lodge, and, as the Independent Order of Odd Fellows, Manchester Unity, constitutes today the largest English branch.

Thomas Wildey is considered to have been the founder of the society in America, although other lodges are known to have existed before Wildey came to the United States. In 1819, Wildey and other English associates organized a lodge of Odd Fellows at Baltimore, which received a charter from the Manchester Unity. In 1843 the American order declared its independence of the older society.

Three degrees are conferred in lodges of Odd Fellows. Those who have received the third degree are eligible to membership in an encampment, where three further degrees are conferred. A uniformed degree of the order, known as the patriarchs militant, is open only to those who have received the royal purple degree of an encampment. The Rebekah degree for women members was established in 1851.

Optimist International. A men's service club organization, one of the principal objects of which is service to youth in line with the slogan "Friend of the Boy." It believes that the security of the nation depends upon the youth of today, and emphasizes citizenship training and sportsmanship in its youth program. First organized in Buffalo, N. Y., in 1911, there are now some 40,000 members in 750 clubs, of which about ninety per cent are in the United States.

Phi Beta Kappa. This honorary college fraternity in the United States is the oldest of the Greek-letter fraternities. Its title consists of the names of the initial letters of the three Greek words φιλοσοφία βίου κυβερνήτης, "philosophy the guide of life". Active membership is extended as a rule only to members of a senior class studying for a baccalaureate degree in arts or science and, within these limits, is further restricted to those of superior scholarship. Alumni and honorary members may also be chosen. The badge of membership is a specially engraved watch key.

Phi Beta Kappa was organized at William and Mary college, December 5, 1776, as a secret social club and literary society. Its secret character was subsequently abandoned by the individual chapters. Women were first admitted in 1875. A national organization was effected in 1883.

The *Sigma Xi* fraternity, organized at Cornell university in 1886, is a similar society devoted to the interests of scientific research. Its name embodies the initial letters of σπουδὼν ξυνῶνες, "companions in zealous research." The badge is also a watch key, and the colors are electric blue and white.

Red Cross Societies. National organizations devoted primarily to the care of those who are wounded in battle. These associations, which now comprise millions of members throughout the world, are largely due to the activities of two Swiss gentlemen, Jean Henri Dunant and Gustave Moynier. Dunant, who, by chance, was an eyewitness of the battle of Solferino, published a book entitled *A Memory of Solferino,* in which he vividly described the horrors of the battlefield caused by the inability of the regular surgical corps to care properly for the wounded. He also suggested the need for an organization which in time of peace should train nurses and provide supplies with which to supplement the regular medical service in time of war.

The book was widely read, and the resulting agitation led to an international conference at Geneva, Switzerland, in 1863, when a provisional plan was adopted by delegates from 16 countries. The following year, diplomatic representatives from the same nations met and signed what is known as the Geneva Convention. This convention did not provide for the organization of Red Cross societies. It did make such organizations possible by providing for the neutrality of those officially engaged in relieving the wounded.

The Geneva Convention was almost immediately ratified by 14 nations, and the number was later increased to 43, the United States joining in 1882. The agreement was revised in the Geneva Convention of 1906, and its provisions have become a part of international law. The relief societies, organized as a result of the Geneva Convention, selected as their emblem the flag of Switzerland with the colors reversed, that is, a red cross on a white background.

The American Red Cross, which began in 1881 under the leadership of Clara Barton, was reorganized and chartered by act of Congress in 1905. The original idea of an auxiliary war service organization was retained, as was shown by the recreational and medical assistance given to the fighting forces in 1917–18. However, the peacetime relief work of the Red Cross in floods, fires, hurricanes, and every other kind of disaster proved that the organization was ready to meet human need in emergencies.

During World War II the wide experience of the Red Cross enabled it to serve in innumerable ways. This was done, not only through recreational centers, with their stationery, books, and literally millions of doughnuts and cups of coffee, but in such vital matters as first-aid training, blood donor service, relief to prisoners of war, and communication or travel assistance to service men and their families.

Red Men, Improved Order of. A fraternal, beneficiary, and benevolent society, organized October 14, 1833, and based upon the manners, traditions, and customs of the North American

Indians. Subordinate bodies are known as tribes, and the supreme body as the great council of the United States. Councils of Pocahontas provide for female membership in the society. The ritual work of a tribe is divided into three sections or degrees,—those of the adoption, the warrior, and the chief. Motto. "Freedom, Friendship, and Charity."

Rotary International. The first Rotary club was organized in Chicago in 1905; a national association was formed in 1910; and in 1912 an international organization was perfected. The name was adopted originally because members met in rotation at their places of business.

The general objects are the development of the ideal of service as the basis of business; the cultivation of good fellowship among members; and the promotion of international peace. Two mottoes are recognized—"Service above Self," "He profits most who serves best." The general association encourages particularly aid of underprivileged boys and relief of crippled children.

Royal Society, London. This organization dates its foundation from the year 1660, although the weekly meetings of scientists, out of which it grew, began as early as 1645. The purpose of the society is the "improvement of natural knowledge." From November to June of each year, weekly meetings are held for discussion of scientific subjects. The organization administers, for the encouragement of discovery and invention, both its private funds and Parliamentary grants. The roll of the presidents of the society includes many distinguished scientists.

Salvation Army. A religious organization founded in England by William Booth in 1865 for the purpose of bringing spiritual and material benefit to the nonchurchgoing masses of people whom conservative religious bodies do not reach. The present name, military type of organization, and style of uniform were adopted in 1878, with William Booth as the "general" in command. In 1880 George Railton was sent from England to organize the Salvation Army in the United States.

In connection with the evangelistic meetings of the army, carried on chiefly in the poorer districts of large cities, an extensive system of social relief institutions has been developed. This includes rescue homes, shelters, and boarding houses for women, shelters and industrial homes for men, slum settlements, employment bureaus, free distribution of ice and fuel, missing friends bureau, poor men's lawyers, prison department, anti-suicide bureau, day nurseries, fresh air camps, and farm colonies. The organization has developed until it now has more than 12,000 posts distributed in 73 countries and colonies. The army publishes about 80 periodicals, the printing being done in 35 different languages.

Shrine, Ancient Arabic Order of Nobles of the Mystic. A secret social organization whose members must be either knights templars or Scottish rite masons of the 32d degree. This order was first conferred at New York City, June 16, 1871.

A similar social organization open to all master masons is known as the Mystic Order, Veiled Prophets of the Enchanted Realm. A local body of this order is called a grotto.

Sisters of Charity. Under this name many Roman Catholic communities are to be included. In general, they devote their energies and resources to religious, charitable, and educational work. The oldest of such communities was founded in Paris in 1634, by Saint Vincent de Paul. In the United States, the community of Sisters of Charity was organized by Mother Seton in 1809 at Emmitsburg, Md. In 1812 the community of the Sisters of Charity of Nazareth was established near Bardstown, Ky.

Society of Colonial Wars. A patriotic organization incorporated in the state of New York, October 18, 1892, for the purpose of perpetuating the names and valor of those who participated in the warfare of American colonial history. Membership is open to the male descendants of certain classes of men who, in the period between the settlement of Jamestown and the battle of Lexington, were active in the service of the colonies which afterward became the United States of America. These classes include officials of the colonies, officers and men in the armed colonial forces, and officers and men of the British forces which served with the colonists in any colonial war.

Sons of the American Revolution. A hereditary, patriotic society in which membership is open to direct male descendants of an ancestor who actively aided the cause of the American Revolution as an officer, soldier, sailor, marine, militiaman, or minuteman. The society was organized at New York City in 1889 by members of the Sons of the Revolution and of the Sons of Revolutionary Sires, the latter society becoming the California state branch of the Sons of the American Revolution. The national society was incorporated by act of Congress in 1906. Its objects are to foster American patriotism and to perpetuate the memory of those who achieved American independence.

Sons of the Revolution. A hereditary, patriotic society organized in 1876 and reorganized in 1883, to which is eligible any male descendant from an ancestor who, between April 19, 1775 and April 19, 1783, gave active assistance to the cause of American independence. The society has been notably active in marking with suitable tablets many of the historic locations in and around New York City.

Sons of Veterans. A patriotic society founded at Philadelphia, in September 1879. It admits to membership all male descendants, not less than 18 years old, of soldiers, sailors, and marines who served with the Union forces during the Civil War. A society of similar character, for women, is known as the Daughters of Veterans.

Spanish American War, Naval and Military Order of the. A patriotic society, instituted February 2, 1899. Membership is open to commissioned officers of the United States army, navy, marine corps, and revenue-cutter service and to contract surgeons who served in the Spanish American war or the Philippine insurrection incident thereto, and to all sons of such officers.

United American Mechanics. A secret, patriotic, political, benevolent society, founded at Philadelphia in 1845. Only native Americans are eligible to membership. Among the objects of the society are: the exhibition of the American flag on public schools; the restriction of immigration; opposition to any union of church and state; practical business aid to members; and relief for their widows and orphans. It was the parent of the *Junior Order of United American Mechanics*, which was formed at Germantown, Pa., in 1853 in order to train younger members for the senior order. In 1885 the junior order separated from the older society, which it has since surpassed in size and activity. It pays sick benefits to members and funeral benefits to their beneficiaries.

United Confederate Veterans. A federation of various organizations of former Confederate soldiers and sailors, formed June 10, 1889. The first reunion was held at Chattanooga, Tenn., in 1890. The objects of the society are: to unite all Confederate veterans and to cherish the ties of friendship that should exist among those who have shared a common danger; to gather authentic dates for an impartial history of the war between the states; to preserve relics or mementos of the war; to cherish and preserve the memory of deceased comrades; and to extend aid to their widows and orphans.

United Spanish War Veterans. A patriotic society devoted to the interests of American veterans who served in the Spanish-American war, the Philippine insurrection, and the Chinese expedition. The society has been known under its present name since 1904, when the Spanish War Veterans, which was incorporated November 28, 1899, united

with the Society of Spanish American War Veterans, the Society of the Service Men of the Spanish War, and the Society of the Hispano-American War.

United Workmen, Ancient Order of. A fraternal, beneficiary society founded at Meadville, Pennsylvania, October 27, 1868, by John Jordan Upchurch. The objects of the order are expressed by the motto "Charity, Hope, and Protection." Insurance is afforded the members, who attain full membership after receiving three degrees. Local bodies are known as lodges, and the governing body is the supreme lodge.

Veterans of Foreign Wars of the U. S. A national society of ex-service men who, as members of the United States army, navy, or marine corps, have participated in wars or campaigns upon foreign soil or in foreign waters.

This society had its beginning in 1899, when the American Veterans of Foreign Service was organized at Columbus, Ohio, and the Army of the Philippines was founded at Denver, Colo. Each of these societies expanded,—the American Veterans merging with several similar Pennsylvania organizations. Finally, at a convention at Denver in 1913, they amalgamated under the name of Veterans of Foreign Wars of the United States.

The society has for its objects the preservation of comradeship among its members; the assistance of disabled or needy veterans and of the widows and orphans of deceased ex-service men; and promotion of the teaching of true patriotism and Americanism by schools and other institutions.

Volunteers of America. A religious society that is very similar in its objects and military form of organization to the Salvation Army. It was organized in New York City, March 6, 1896 by Commander and Mrs. Ballington Booth. Ballington Booth was the second son of William Booth, who originated the Salvation Army.

Among the notable social activities of the Volunteers of America are the maintenance of about 60 principal institutions where free lodgings and meals are supplied to those out of work, a free hospital in New York City, homes for friendless young women, and a prison league which endeavors to aid discharged prisoners to return to honest living.

War of 1812, General Society of the. A patriotic, hereditary association of descendants from ancestors who served in the United States army, navy, marine corps, or revenue service, or as privateersmen during the War of 1812. This society is an outgrowth of an organization of similar purpose known as the *Military Society of the War of 1812*, open only to acceptable descendants of commissioned officers who served honorably during that war.

Woman's Christian Temperance Union. An organization of women founded at Cleveland, Ohio, in 1874 as the outcome of a women's crusade against the liquor traffic in the states of the Middle West in 1870–73. Its activities became much wider, however, and it aimed to influence public opinion and legislation in regard to prostitution, the sale of habit forming drugs, and various other matters affecting the welfare of individuals or society. It was largely responsible for introducing the study of hygiene and physiology into the public schools and long worked for the consummation of national prohibition of intoxicating liquors. An international association was founded in 1883 largely through the efforts of Frances E. Willard.

Woman's Relief Corps. A patriotic society of women, composed chiefly of mothers, wives, daughters, and sisters of Union soldiers. It was organized in 1883, to aid the Grand Army of the Republic, to perpetuate the memory of their heroic dead, to extend needful aid to the widows and orphans, and to cherish and emulate the deeds of the army nurses. The national organization, having departments in 34 states, consists of 1,425 corps, with a total membership of 78,055. A similar society, organized at Chicago in 1886, as the *Ladies of the Grand Army of the Republic*, is composed of wives, mothers, daughters, sisters, nieces, and direct female descendents of Union soldiers.

Woodmen of America, Modern. A fraternal, beneficiary society organized by Joseph Cullen Root, January 5, 1883, at Lyons, Iowa. The order provides life insurance for its members to a maximum of $3000 each. The recognized women's auxiliary of this organization is known as the Royal Neighbors of America.

Woodmen of the World, Sovereign Camp. This fraternal and beneficiary order was founded June 3, 1890 at Omaha, Nebr., by Joseph Cullen Root and associates. The principal purpose of the society is to afford insurance to its members. A monument is placed at the grave of every deceased member. The organization has its headquarters in a modern 18-story building which it erected in Omaha, Nebr. The women's auxiliary is known as the Woodmen Circle.

Young Men's Christian Association. An organization founded in London, in 1844, by George Williams, a dry goods clerk, for the "improvement of the spiritual condition of young men in the drapery and other trades." Similar associations were first established in North America at Montreal and Boston, in 1851. The movement developed rapidly, and soon attention was directed to the social, mental, and physical improvement of the members, as a means of strengthening their moral and spiritual characteristics.

The organization in North America is now composed of about 1650 local associations, each of which is entirely self-governing. These co-operate under the guidance of 42 state and provincial committees, which in turn co-operate under two national councils, one for the United States and the other for Canada. An international committee acts as a holding body for the two national councils. It consists of 200 representative business men. A world organization is also maintained, with headquarters at Geneva, Switzerland. Controlling membership in the local associations is composed of those who are connected with some evangelical church. Associate membership, with all privileges except the right to vote, is open to any man of good character without regard to his church affiliations.

The symbol of the association is a red triangle, standing for the equal upbuilding of "Mind—Spirit—Body." The movement is carried on chiefly in the larger cities, where, in the Y. M. C. A. buildings, members may attend religious meetings, Bible classes, other educational classes of all kinds, recreation rooms, or well equipped gymnasiums. Special attention has been given to Y. M. C. A. work among college students, railroad and industrial employees, the men in the army and the navy, Negroes, and Indians.

As of 1954, the Y. M. C. A. had a total membership of 3,012,527 in the United States, of whom about one-fourth were boys. It owns property valued at more than $200,000,000 and has annual operating expenses of about $57,000,000. Over 167 million dollars was raised by subscription to be used for work among the soldiers and sailors during the World Wars.

Young Men's Hebrew Association. An organization founded in 1874, at New York City, having for its object the mental, moral, social, and physical improvement of Jewish young men. It has branches in many of the larger American cities.

Young Men's National Union, Catholic. A national federation of the local diocesan unions of Roman Catholic young men. It was organized at Newark, N. J., in 1875. In addition to its work of uniting and strengthening local societies, it has established night schools and reading rooms, and supplied reading material for soldiers and sailors.

Young Women's Christian Association. An organization designed to advance the physical, social, intellectual, and spiritual interests of young

women. The society had its beginning in England in 1855, when Miss Emma Robarts founded the English Prayer Union. Its existence in the United States dates from 1858, when the Ladies' Christian Association of New York City was founded. The first association bearing the present name was formed in Boston in 1866. The World's Young Women's Christian Association was organized in 1894, although a complete national organization including almost all the local associations in the United States was not perfected until 1906.

The activities of the Y. W. C. A. include religious and missionary work; travelers' aid, with especial attention to immigrant girls; the operation of rooming and lodging houses, cafeterias, restaurants, and gymnasiums; and vocational and other forms of instruction.

In the United States there are from 900 to 1000 local associations, with a total membership of 717,091, but the total constituency, numbering 2,929,583, includes many active participants who have not joined as members.

Active or controlling membership in the organization was formerly open only to those affiliated with some evangelical church. This denominational test was abandoned in 1928 and was replaced by a pledge to uphold the purposes of the organization. The symbol of the Y. W. C. A. is a blue triangle.

CALIFORNIA MISSIONS

This term is applied to a group of missions founded by Spanish missionaries from 1697 to 1823 in Lower and Upper California. A total of 17 were built in Lower California by the Jesuits, who were intrusted with complete control, religious and civil, throughout the peninsula. The arid nature of the soil and the unpromising character of the aboriginal Indians whose conversion was the object of the enterprise made the task one of extreme difficulty. In 1767, the Jesuits were expelled, and the missions were handed over first to the Franciscans and later to the Dominicans, who founded seven more missions. The work in Lower California was much less successful than that of the missions founded in the more favorable territory to the north in Upper California.

Northern Missions. In 1769, Spain took measures to make good her claims to Upper California. Father Junipero Serra, the Franciscan superior of the missions in Lower California, was encouraged to found a mission farther north, and the government planned to support the missions by a number of garrisoned forts. The first mission was founded by Serra the same year and was called San Diego. In the ensuing half century, 20 other missions were founded, which, in the order of their establishment, are as follows: San Carlos Borromeo, 1770; San Antonio, 1771; San Gabriel, 1771; San Luis Obispo, 1772; San Francisco de Asis (Dolores), 1776; San Juan Capistrano, 1776; Santa Clara, 1777; San Buenaventura, 1782; Santa Barbara, 1786; La Purisima Concepcion, 1787; Santa Cruz, 1791; La Soledad, 1791; San Fernando Rey, 1797; San Miguel, 1797; San Juan Bautista, 1797; San Jose, 1797; San Luis Rey, 1798; Santa Ynes, 1804; San Rafael, 1817; and San Francisco Solano, 1823.

The first nine of these missions were established by Serra before his death in 1784, and the remainder were founded by his successors between 1786 and 1823. They were located on carefully chosen sites in fertile valleys near streams, whose waters were often used to irrigate a part of the surrounding land. In general, they lay at intervals of about 30 miles, a full day's journey apart, and most of them were connected by a highway called El Camino Real, "The King's Highway."

Organization. As each new mission was opened, two fathers were placed in charge of it, and to them the secular governor attached a guard of five or six soldiers under a corporal. The guard was subject to the authority of the missionaries. The church, built usually of sundried brick, or adobe, and in a few cases of stone, occupied one corner of a courtyard. The quarters of the missionaries adjoined the church, and no girl or woman was admitted into them. Then followed the rooms of the attendants and cooks, who were Indian youths selected from among the converts. The sides and rear of the courtyard consisted of shops, storerooms, granaries, stables, and the apartments for the young women, who remained under the eye of a matron until they were married. The unmarried men were also kept in a building by themselves. If a young man asked for one of the girls and she was willing, a marriage ceremony was performed and the couple was housed in a hut in the village of converts which surrounded the mission. After baptism, converts were not allowed to return to their former homes without the consent of the missionaries, and then only for short periods. The administration of justice was entirely in the hands of the missionaries.

Economic Activities. The day was devoted mainly to work, by means of which the community not only supported itself but enjoyed a considerable measure of prosperity. The Indians in their wild state were acquainted with practically none of the arts that give men a measure of independence from their immediate environment. They lived on berries, seeds, roots, and sometimes fish. Under the control of the missions, however, the Indians learned to practice agriculture, tanning, weaving, and many other arts of civilization. The products of their labor included wheat, oranges, leather, cloth, soap, furniture, some ironware, and a little wine and olive oil. They possessed immense herds of cattle and sheep. At the time of their greatest prosperity, these communities sheltered, clothed, and gave instruction to about 30,000 Indians.

Final Results. As a permanent Christianizing process, the enterprise failed in its main purpose; when the missions were later disrupted, the Indians relapsed into barbarism. Nevertheless, the work of Serra and of his associates and his successors transformed the lives of a large part of these Indians over a period of half a century, and about 90,000 in all were baptized. This achievement stands out as perhaps the greatest missionary accomplishment on the American continent.

Disruption of the Missions. Soon after Mexico threw off its allegiance to Spain, the California missions were secularized and their property was confiscated. The final decree for their disestablishment was signed in 1823, and, for the next ten years, the lands, buildings, and goods of the missions fell a prey to unscrupulous speculators and politicians. The Indians, unable to carry on by themselves the economic activities that had been directed by the missionaries, were speedily reduced in numbers by hardship and starvation.

Later Influence. The style of architecture used in the California missions has been extensively imitated in many public buildings and residences in the Pacific states, especially in southern California. It is characterized by a rugged strength combined with charming simplicity and harmony of design.

Modern Remains. Most of the original mission buildings are now in a state of more or less complete ruin, although a few, such as the Santa Barbara mission and the San Gabriel mission, are well preserved and several have been partially restored. The work of restoration owes much to the labors of various organizations formed for the purpose, conspicuous among which is the Landmarks club, founded by Charles Fletcher Lummis. All these missions which have visible remains continue to attract thousands of visitors and tourists annually.

The following paragraphs contain information of historical or general interest regarding each of these missions, the names of which are given in the order of their location from south to north.

San Diego, 6 miles east of the city of San Diego, was the first mission founded by Serra. He labored for a whole year at this point before making his first convert. In 1775, an attack by the Indians resulted in the ruin of most of the buildings and the death of several of the defenders. Better buildings were erected and, by 1800, there were 1523 converts living around the courtyard. A dam was built about 3½ miles above the mission in order to irrigate the land. Today the mission is in a ruined condition, although the walls remain standing and the dam may also be seen.

San Luis Rey, about 85 miles south of Los Angeles, is similarly in a ruinous state. It has a perfectly proportioned dome over the chancel and beautiful groined arches on each side of and over the altar. A Byzantine pulpit is one of the few ornaments of which the building has not been despoiled. At the time of its greatest prosperity, this mission numbered 2869 resident Indians. About 1200 bushels of grain were raised yearly, and the flock of sheep owned by the community comprised about 29,000 animals. The accessory mission of San Antonio de Pala is 25 miles from Oceanside.

San Juan Capistrano, 58 miles south of Los Angeles, is one of the best preserved of the missions, although the church was damaged by an earthquake in 1812. Some parts of the mission, however, are still habitable. It has several large bells, which were imported from Chile. This mission was founded in 1776 and, by 1800, there were 1046 Indian residents. These Indians were taught to weave by a Spaniard named Mendoza, who was sent from Monterey under contract from the government to work for $30 a month. Instructions were given by the government that, if he neglected his work, he was to be chained up at night.

San Gabriel, in the town of San Gabriel, is 8 miles east of Los Angeles. The tribes surrounding this mission were numerous, but for a considerable period they were hostile to the Spaniards, partly on account of the treatment they received at the hands of the soldiers comprising the guard of the mission. The earlier buildings were badly damaged by earthquake in 1812; the steeple of the church and the main altar were thrown down, and the walls were cracked. A new church was built as a result. It consisted of rubble stone as far as the windows, and the upper part was of brick. The mission celebrated 7709 baptisms in the course of its history.

In 1912, the first performance of the famous mission play was given at San Gabriel. The drama tells vividly a story of the early mission settlements For the periodical presentation of the play a well equipped theater was erected.

San Fernando Rey, 20 miles northwest of Los Angeles, is in a state of almost complete ruin. A Spaniard, connected with this mission, Francisco Lopez by name, is said to have been the original discoverer of gold in California. In 1841, when digging up some wild onions, he found a piece of gold. This and other discoveries soon attracted prospectors from all parts of the continent.

San Buenaventura is about 75 miles northwest of Los Angeles. In 1893, the old church was so renovated as to lose most of its distinctively historic characteristics. The largest population of this mission was attained in 1830, when it amounted to 1330. In that period, it owned about 4500 horses and 13,000 sheep.

Santa Barbara, in the city of the same name, is still in the hands of the Franciscans. It is well preserved and has a carefully cultivated garden, into which no woman may enter except the wife of the president of the United States. The walls, which are six feet thick, consist of irregular limestone blocks and are further strengthened by solid stone buttresses measuring nine by nine feet. This mission has a very fine fountain ornamented with carvings.

Santa Ynes is about 25 miles northwest of Santa Barbara. It is in a ruined condition, but two reservoirs may be seen which were formerly used for laundry and bathing purposes, being supplied with water brought by a conduit from a point several miles distant. In 1835, the mission was secularized, but was restored to Franciscan control in 1843. It never became as prosperous, however, as it had previously been. The maximum number of cattle owned was 7300 and of sheep, 6000.

La Purisima Concepcion is about 40 miles northwest of Santa Barbara. It is one of the most desolate of the ruins, consisting now of one long, low adobe building with a few arches of the corridor. The maximum population of the mission was reached in 1803, when it housed 1522 people. The earliest buildings were destroyed by earthquake in 1812.

San Miguel, about 210 miles southeast of San Francisco, is notable for the completeness of its interior decorations. There were 2917 Indians baptized in the course of the mission's history.

San Luis Obispo is in the town of the same name about 250 miles southeast of San Francisco. Being founded in 1772, it was one of the earliest missions. The first buildings had roofs of bulrushes, to which hostile Indians twice set fire by discharging burning arrows upon them. As a protection against this mode of attack, tile roofs were made and, from San Luis Obispo, this practice was adopted by all the other missions. The greatest population attained by San Luis Obispo was 946. This was the figure for 1794 and, in that year, the live stock owned by the mission consisted of 6500 head of cattle and horses and 6150 sheep. The church has been restored in a form quite different from the old church, the likeness of which is known from an old painting.

San Antonio de Padua, about 180 miles southeast of San Francisco, near the quaint village of Jolon.

La Soledad is about 45 miles south of San Francisco and 4 miles from the town of Soledad. The original buildings are in complete ruin.

San Carlos Borromeo, also called Carmel mission, is about 125 miles southeast of San Francisco and 6 miles from the town of Monterey. The original roof has collapsed. In this mission is the tomb of Father Junipero Serra.

San Juan Bautista, 6 miles from Sargent and 87 miles south of San Francisco, is one of the better preserved missions. It has been partially restored, but many of the original features remain, including a bell cast in 1809 and several figures of saints. The greatest population was reached in 1823, when 1248 people were attached to the mission.

The *Santa Cruz* mission, 80 miles south of San Francisco, has virtually disappeared and a modern parish has been built on the site. It was one of the less successful of the missions, never having included more than 644 persons. Its history is clouded by certain charges and countercharges of cruelties and murders.

Santa Clara, in the town of the same name, near San Jose, has been restored and has been used in recent times as a college. It contains an old picture representing Jesus multiplying the loaves and fishes. The mission at one time had a population of 1464, but, after 1820, it began to decline and, at the time of its secularization, the number of live stock was less than one-third the 17,806 which had been owned in 1820.

The four remaining missions are all in advanced stages of ruin. They are *San Jose*, 14 miles from the city of San Jose; *San Francisco de Asis*, on 16th and Dolores streets in San Francisco; *San Rafael*, in the town of that name; and *San Francisco Solano*, in Sonoma about 45 miles north of San Francisco.

HEROIC DEEDS AND EXPLOITS

HERO is derived from the Greek word *heros*, applied to those who were more than men but less than gods. Heroes were capable of performing exploits that were above the capabilities of mere men. In modern English, the word designates a person distinguished for deeds that appear to demand a courage not possessed by the average man. The most heroic deeds are generally acknowledged to be those in which the actor voluntarily risks his dearest possession—his life—in order to attain a highly important result, such as the preservation of other people's lives or the safety of his country.

For rewarding acts of heroism performed in the United States, Canada, or Newfoundland, the Carnegie hero fund was established in 1904 by Andrew Carnegie. The commission administering the fund awards medals to persons who, upon conclusive evidence, are shown to have risked their lives voluntarily in some heroic effort for the benefit of others. Acts thus recognized must have been performed outside the regular course of a person's occupational duties. Medals are presented to the heroes themselves or to their surviving dependents or nearest relatives. In case of need, the commission pays money grants also, not exceeding $1000 in any one year, for the support of the hero, if he is disabled, or of his widow and children. Special grants are frequently made for educational and other worthy purposes.

The following pages contain a selection of the more noteworthy deeds of heroism performed from early times down to the present. The great number of such deeds that have been recorded makes it necessary that this selection should be limited to acts of especial distinction or impressiveness. Many others will be found in the Department of Biography. Among these latter are, for example, the stories of Edith Cavell, Grace Darling, Joan of Arc, Leonidas, Richmond P. Hobson, and many others whose acts entitle them to a place in the roll of heroes. Others will be found in appropriate passages of the Department of Geography and Travel. The ride of Lady Godiva, for example, is dealt with under *Coventry* on page 792, and the heroic conduct of the Swiss guards of Louis XVI is narrated under *Lucerne*, page 798, where a memorial to their valor is described.

Alfred the Great in the Danish Camp. Among the many heroic tales of Alfred is this one of his playing the spy among the Danes. Having gathered enough soldiers to make practicable an attack upon the invading Danes, he approached the Danish camp in the guise of a musician and was allowed to wander through it at will, so excellently did he play the harp and sing. What he learned enabled him to lead a successful attack. It is said that, after the victory, he enjoyed the pleasure of disclosing his identity to the captured Danish chief by singing for him again the song which the chief had previously heard from the wandering musician.

Arnold von Winkelried (*ärn'ôlt fŏn vĭng'kĕl-rēt*). A national hero of Switzerland. The Swiss cantons were compelled to fight for their independence against Austria in 1386. In the battle of Sempach, when the day was too hot for fighting in armor and the Swiss forces had beaten in vain against the serried array of Austrian spears, Arnold von Winkelried persuaded his compatriots to form in the shape of a wedge while he took his place at its point. In this formation, they charged the Austrian army. When at close quarters, von Winkelried gathered as many Austrian spears as he could reach by his outstretched arms and concentrated them against his own breast. He thus fell transfixed, but he had opened a breach, into which his friends rushed. The Austrian army was routed, and the liberty of the Swiss cantons was preserved.

The authenticity of this early incident has not been positively established. Nevertheless, unlike the tradition of William Tell, the story involves no mythical or impossible elements.

Betty Zane, the Heroine of Fort Henry. In the days of the Revolutionary War, the Indians were frequently induced by the British forces to attack the American settlements in the western wilderness. Fort Henry, situated near the present site of Wheeling, West Virginia, was at that time assaulted by about 500 Indians led by Simon Girty, a white man who had lived with the Indians since childhood.

On the approach of the Indians, the settlers hastily took refuge within the fort. After beating off the first attack, the defenders found that they were short of powder, a small keg of it having been left behind in a hut outside. The commander asked for a volunteer to fetch the precious explosive. Betty Zane, the young daughter of one of the settlers, urged that, since she was of no value as a combatant, she should be permitted to undertake the venture. Realizing the value of every fighter in the crisis, the men consented. The girl boldly crossed the open space, found the powder, carried it through the midst of whizzing bullets, and returned safely to the fort. This powder enabled the men to beat back all attacks until help arrived.

Borromeo (*bôr'rô-mē'ō*), **Saint, Cardinal of Milan.** An outstanding example of the few heroic souls that have had the courage to minister to the sick and dying in time of plague. Milan was devastated by this terrible disease in 1576. Infected houses were marked with a cross and were carefully guarded, the inhabitants being left within to perish in the order in which the plague or starvation and thirst should carry them off.

Cardinal Borromeo, conceiving it to be his duty as bishop to minister to the sick and dying, resisted the admonition of his friends and, with his 28 priests, continued, throughout the 4 months in which the plague raged, to visit the stricken and to perform the last rites over those claimed by death. Neither the cardinal nor the priests were attacked by the disease. A statue 112 feet high stands in a park at Arona, Italy, erected to the memory of the cardinal.

Captain Smith and the Elsie. Captain John W. Smith, commanding his little boat, the *Elsie*, succeeded in effecting a heroic rescue of a number of survivors of the wreck of the *Larchmont*. The *Larchmont*, a side-wheeler from Providence, R. I., was making its way in a stormy midwinter night through the eastern entrance of Narragansett bay when a schooner drove into its side and the ship sank. Its hurricane deck, being torn from the hull, continued to float, carrying a few men who had not been able to get into the lifeboats.

In order to save these survivors, Captain Smith, a fisherman who had learned of the disaster from the occupants of one of the lifeboats, set out with the *Elsie* and seven helpers. Hours were spent in battling with the storm. The ice-incrusted survivors of the wreck had to be lifted into a dory which the *Elsie* had in tow and into which four of the fishermen had climbed in order, with it, to approach the raft. When the party reached land two hours later, every one on board was almost helpless from the cold. One of the rescued men died later from the exposure. Each of the fishermen received a Carnegie gold medal, and funds were made available for the education of their children.

Carlyle and the Loss of His Manuscript. After Thomas Carlyle had produced the manuscript for the first volume of his French Revolution, expending on it the passionate pains characteristic of his rugged spirit, he loaned the manuscript to John Stuart Mill. The latter's servant girl, not

understanding the unique value of the paper littering her employer's desk, consigned the manuscript to the flames. Mill was compelled to inform his friend of what had happened. When Carlyle heard the tragic news, he remained silent and for several days did not utter a word. Then with undaunted spirit, he set about rewriting the book. Mill persuaded him later to accept $500 indemnity for the loss of his work.

Catharina the Heroic. After the battle of Muhlberg in 1547, Charles V desired to have his Spanish army pass through the Thuringian town of Schwarzburg, which was governed by the countess Catharina. She gave him the right of passage and agreed to provision his troops at a fair price on condition that her people should not be molested.

When the army arrived at Schwarzburg, the emperor's general invited himself to the countess's castle for entertainment. While he and his aides were dining, their arms laid aside, a messenger arrived, announcing that the Spaniards were looting the houses of the town and taking the cattle. The countess immediately armed her retainers and secretly locked all the doors and gates. She then protested to the general and asked him to restrain the soldiers. Her only satisfaction was his explanation that the troops were merely following the custom of war. "Very well," replied the countess, "but my poor subjects must have their own again, or prince's blood shall be given for oxen's blood." The general found himself helpless and was compelled to order his men to make full restitution and then pass on before he was allowed to leave the castle.

Cecil Rhodes in Rhodesia. The British diamond miner and imperialist Cecil Rhodes set out in 1896 to colonize the African territory now called, after him, Rhodesia. The natives, judging themselves wronged by the British settlers, took up arms and, after several months of hostilities, retreated to an almost impregnable position in the Matoppo hills. With characteristic daring and candor, Rhodes undertook to end the war single-handed.

Moving his tent away from the British troops to the base of the Matoppo hills, he encamped alone and without weapons for six weeks, in the power of the enemy if they chose to attack. Word was circulated among the natives that he had come alone and undefended to hear their side of the case. He was invited to attend a council held by the natives in the midst of their camp. He accepted without hesitation and rode unarmed into their midst. After mutual concessions were agreed upon, Rhodes asked them, "Now for the future, is it peace or war?" The chiefs, laying down their weapons, replied, "We give you one word; it is peace."

Chivalry of Sir Philip Sidney. The story told by Lord Brooke of Sir Philip's conduct after the battle at Zutphen illustrates the character of this mirror of knighthood. As he was being borne from the field, severely wounded, he called for water, which was brought to him. Then, seeing a poor wounded soldier look longingly at the bottle, he forbore to drink, giving the water instead to the soldier, with the words, "Thy need is greater than mine."

Conquerors of Yellow Fever. When, at the close of the Spanish American war, the United States army assumed control of the city of Havana, that capital was still subject to the dread tropical scourge of yellow fever. No one knew how the disease was transmitted, although a Havana physician had suggested that it was carried by a certain kind of mosquito. In 1900, the government of the United States appointed a yellow-fever commission to study the disease. This task, which involved a thorough test of the "mosquito theory," was in charge of four physicians—Major Walter Reed, James Carroll, Jesse W. Lazear, and Aristides Agramonte.

Since yellow fever is a disease that attacks human beings only, it was necessary to find those who would volunteer to be made the subject of experimentation. Dr. Lazear and Dr. Carroll consented and permitted themselves to be bitten by infected mosquitoes. Both contracted the fever, and Dr. Lazear died, leaving to Dr. Carroll the account of his experience and his observations. In memory of this hero of science a tablet was erected in Johns Hopkins hospital at Baltimore. Dr. Reed's health was so broken that he succumbed to fever the following year.

Besides the physicians, however, there were several men from the army and from civil life who sacrificed themselves in the hope of conquering the disease. Among the latter were two young soldiers from Ohio, John Kissinger and John Moran, who, refusing money compensation, entered a room containing infected mosquitoes in order to make a further test. They contracted the fever, while men in a room with no mosquitoes remained in health. Equally heroic were Dr. Robert Z. Cooke and his two companions, who, to prove that the fever was not carried by clothing, slept for many nights under blankets used by yellow-fever patients.

Such deeds of deliberate heroism deserve perhaps to rank above acts of a more impulsive courage. Assuredly few sacrifices have been so valuable to the human race. Through these experiments, it was proved that the germ of yellow fever is carried by the mosquito *Aëdes ægypti*. Consequently, by taking means to prevent the breeding of these mosquitoes, the disease has been virtually stamped out. See *Mosquitoes*.

Escape of Grotius (*grō'shĭ-ŭs*). Although sentenced to life imprisonment for his religious views, Grotius, the jurist and author, was permitted to have his wife with him in captivity. After he had been confined in a castle for nearly two years, she contrived a means for his escape.

Grotius was in the habit of having books sent to him from a friend, and the trunk in which they arrived was returned with clothing to be washed and books which the author no longer required. His wife persuaded him to feign illness and, when the guards brought the trunk, she asked them not to disturb the invalid. On their withdrawal, she locked Grotius in the trunk, making holes to admit air. The guards who came to remove the trunk supposed the sick man was still in bed. The trunk was sent to the friend's house, and Grotius, disguised as a miller, escaped to safety.

His wife dressed in her husband's clothes in order to delay discovery. When the guards did not appear for some time, however, she went to them, told them of the escape, and took them to task for failure in their duty. They were so taken aback that she was enabled to walk from the castle unmolested.

Garibaldi's Summons to His Troops. After Rome had surrendered to the French in 1848, this indomitable hero of Italian liberty addressed his men in the square of Saint Peter's: "I offer you hunger, thirst, cold—no pay, no barracks, no rations—forced marches, bayonet charges, battles, death. Whoever loves Italy in his heart, and not with his lips only, let him follow me! We leave from the Lateran gate." Four thousand men followed him.

Geneviève. The patron saint of Paris. About 450, news reached Paris that Attila the Hun was approaching. The people would have fled, had not Geneviève stood on the bridge over the Seine and urged them to return and to pray for and defend their homes. A present arrived at that moment for her from the bishop Germanus, and the people were so impressed that they turned back. Attila never reached Paris, but was stopped at Chalons.

Later the city was besieged by the Franks and was suffering cruelly from hunger. Geneviève embarked in a small boat on the Seine river, begged

the people outside to send food, and brought into the city a convoy of boats laden with provisions. The Franks did not molest her, apparently believing her person to be sacred.

On another occasion, when the Franks had taken Paris while Geneviève was outside, the chief of the Franks gave orders that she should not be admitted into the city since he feared her power. Dressed in a shepherdess' gown, she entered unnoticed and, making her way to the spot where the chief was holding revelry, she begged for the safety of the citizens and of the prisoners that had been taken. Her prayer was granted. She lived to see Clovis, the king of the Franks, embrace Christianity.

Golyer's Ben and the Indians. Before the days of railroad travel in the Western states, one of the regular stage routes was covered by Golyer's Ben, an intrepid young man whose real name was unknown and who was called Golyer's because he had worked for a man named Golyer.

On one occasion, a child recently orphaned was being taken on the stage to relatives who had volunteered to care for him. He wished to sit with Golyer's Ben, who made a place for him on the driver's seat. When the coach was nearing the end of the day's trip, the air was suddenly rent with the fierce yells of Indians. The driver, crouching down to cover the body of his companion, urged on the horses through the hail of bullets that the Indians sent after their escaping victims. When the stage reached its destination, the passengers were all found to be safe, including the child, but the driver had been pierced by three bullets. He expired shortly, having saved the life of his young charge.

John Maynard. The pilot of a passenger steamer on Lake Erie whose heroism saved all on board. The incident occurred before the general use of effective safety devices on steamers.

One night when his ship was plying at some distance from the shore, fire broke out near the bow. The captain gave orders to steer for the shore. The lifeboats were hastily manned but were found unseaworthy. The only remaining hope was that the ship might traverse the intervening three miles of water and come to shore before the flames overcame those on board. Twice the pilot house took fire, but the conflagration was extinguished by means of fire hose. The hose burst later and, when the ship was safely beached, the flames were wreathing about the pilot house. John Maynard was seen to be still clinging to the wheel, but he was dead. The passengers were all taken safely ashore.

John Paul Jones and the Bon Homme Richard. The conflict between the English *Serapis*, under Captain Pearson, and the American *Bon Homme Richard*, commanded by John Paul Jones, on September 23, 1779, is famous in naval annals for the bravery of both commanders. The daring of Captain Jones won the battle. With his old and rotten ship riddled below the water line, four feet of water in the hold, all guns but three silenced, the intrepid captain heard amid the smoke and hail, "Have you struck?" Instantly he replied, "I have not yet begun to fight." Matching the word with the deed, by seizing a favorable chance, he boarded and captured the *Serapis*, while the *Richard* sank with colors flying.

Kate Barlass. A name given to Katherine Douglas, a maid of James I of Scotland, in allusion to her brave attempt to save the king.

When the king was staying at the abbey in Perth and his men were scattered about the city, certain conspirators bribed the servants of the abbey to leave the door unbarred. That night a noise of arms was heard. The king surmised his danger and concealed himself beneath some boards in the floor. In order to obtain time for the replacing of the boards, Katherine placed her arm in the bolt rings of the door, thus replacing the missing barlass, or bolt. At the same time she begged the men to keep out since only ladies were in the room and they were disrobing. The conspirators, however, forced open the door, thereby breaking the maid's arm. The king was discovered and murdered.

Lafayette in Prison. In the course of the French Revolution, the Jacobins dismissed Lafayette from the army, declared him an exile, and offered a reward for his capture. While attempting to escape to America, he was taken at Liege and was then imprisoned in Germany. When he fell ill in prison, he was offered freedom on condition that he would join in a plot against France. His heroic reply, which brought him long confinement in an Austrian prison, was "Never! I am still Lafayette."

Medals for Valor in World War II. Space does not permit a complete listing of the noteworthy examples of heroism which earned recognition for American fighting men in World War II. In many instances, it was the courage and teamwork shown by groups that called for special notice. To mention only a few, these included the heroic defenders who held out to the last at Corregidor, then made the "Death March of Bataan;" the fliers led by "Jimmie" Doolittle, who bombed Tokyo early in the war; the daring Marines who raised the Stars and Stripes over Iwo Jima under heavy shell fire; the three Navy Chaplains, Catholic, Protestant, and Jew, who gave their life preservers to others and went down with their ship; the small band of American soldiers, hopelessly isolated, who held out at Bastogne until the tide of battle turned. Two of the group mentioned have already been made the subject of commemorative postage stamps.

The records are filled with instances of heroism shown by individuals. The typical cases cited below, representing different branches of the service, are matched by many comparable instances of high courage displayed throughout the war.

At the beginning of the war with Japan, during an engagement off the Philippine coast, Captain Colin Kelly led a dive-bombing attack upon a battleship of the Kongo class. Although he was killed in a crash while returning, he had succeeded in sinking the Japanese warship. The Congressional Medal of Honor, awarded posthumously, was given to Captain Kelly's son.

In the fighting on Okinawa, like courage was shown by Hospital Apprentice 1/c R. E. Bush, who disregarded mortar and machine-gun fire during a Japanese counterattack, while he administered plasma to a wounded Marine officer. With his pistol, and later with a discarded carbine, Bush assisted in repelling the counterattack and accounted for six of the enemy while suffering serious wounds and the loss of one eye. This exploit won him a Congressional Medal.

Pfc. Lloyd C. Hawks received the Congressional Medal of Honor for rescuing wounded men who were lying in an exposed position during the fighting near Carano, Italy, in January, 1944. Another aid man had already been wounded in an attempt to relieve the two men. Pfc. Hawks crawled 50 yards under fire to administer first aid to his wounded comrade, then proceeded 50 yards farther to reach the two casualties. An enemy machine-gun bullet penetrated his helmet and knocked it from his head, momentarily stunning him. Thirteen bullets passed through the helmet while it lay on the ground beside him. He crawled the rest of the way to the casualties, gave first aid to one and dragged him to a covered position 25 yards away, then returned for the other man. As he raised himself to obtain bandages from his aid kit, his hip was shattered by a burst of machine-gun fire, and a second burst splintered his left forearm. Nevertheless, he completed bandaging the casualty and dragged him to cover where he had taken the first man. Pfc. Hawks then crawled 75 yards in an effort to regain his company, reaching the ditch in which his fellow aid man was lying. He was still on crutches at the time when the Medal was awarded.

Man Who Saved Saint Helier, The. Edward Touzel, a carpenter connected with the fort at Saint Helier, in the island of Jersey, preserved the town from a disastrous explosion on June 4, 1804. A celebration of the coronation of King George IV of Great Britain took place on that day, and the sticks dipped in brimstone, by means of which the guns of the fort had been fired, were returned and locked in the powder magazine.

In the evening, smoke was noticed issuing from beneath the great door of the magazine. Edward Touzel, asking his brother Thomas to hasten to the commander for the keys, seized a crowbar and, with the help of a soldier named Ponteney, forced open the door. The sticks had taken fire, but he carried them out at the cost of severe burns. At the same time, the soldiers of the fort brought water and succeeded in extinguishing the flames that were already curling ominously about the barrels of gunpowder.

Men of the Birkenhead, The. Of the many instances of heroism exhibited during shipwrecks, one of the most impressive is that which occurred off the west coast of Africa in 1852, when the steamer *Birkenhead* struck a hidden rock and foundered. The ship was carrying a detachment of soldiers intended for garrison duty in South Africa, and with them were a number of women and children.

The small boats had been launched and had pushed off with the women and children. The ship broke in two, and the captain called to the soldiers to swim for the boats. The military officer, however, seeing that to do so would swamp the boats and mean the death of all, kept the soldiers drawn up in their ranks. As the ship sank lower, they calmly and heroically awaited death in the engulfing waves.

Oates and the South Pole Tragedy. Captain Scott's party reached the south pole on January 18, 1912, a few weeks after Amundsen had won the honor of its discovery. The expedition had encountered such difficulties that all the pack animals had been lost or killed before arrival at the pole. The return journey without the help of dogs was likely to be beyond human endurance.

L. E. G. Oates was taken sick after some weeks of traveling. Perceiving that delay might cause the death of the whole party, he arose unobserved, and, leaving the shelter where his companions slept, he wandered out into the night in order to court death in the blizzard. This sacrifice proved unavailing, however, for the whole party perished later a few miles from a relief post. The diary of Captain Scott, narrating this incident, among other records, was recovered by a search party and was made the basis of a recent book entitled *The Worst Journey in the World.*

Perry at the Battle of Lake Erie. Among the many heroic exploits of American naval officers and men, that of Commander Oliver Hazard Perry in the battle on September 10, 1813, is unique. When, after desperate fighting, his flagship, the *Lawrence,* was hopelessly shattered, Perry seized his blue ensign, bearing the legend "Don't Give Up the Ship," and, with eight men and his 12-year-old brother, made his way in a small boat, among the battling ships, to the *Niagara.* Commanding from this vessel, within a few minutes he forced the British to surrender their fleet. "We have met the enemy and they are ours—two ships, two brigs, one schooner, and one sloop," was Perry's report concerning the battle.

Regulus (*rĕg'ū-lŭs*). A Roman general who became a type of heroic endurance and of patriotism. In 255 B. C., he was defeated near Carthage and was taken prisoner. According to a later account, he was kept in prison for two years and, after a defeat of the Carthaginians by the Romans, was sent to Rome on parole to negotiate a peace or to effect an exchange of prisoners. Before leaving Carthage he was compelled to swear that he would return in case he was unsuccessful in persuading his compatriots at Rome.

On arrival in Rome, Regulus urged the Senate that they should continue the war and dissuaded them from exchanging the numerous Carthaginian officers for him, whose strength had already been undermined in Punic prisons. True to his oath, he then returned to Carthage, where he was tortured to death.

Robert Emmet. The character of Robert Emmet is a favorite with his countrymen. Particularly famous is his heroic speech before the court that condemned him to death. The revolt which he led in Dublin having failed through treachery, he turned back in flight to see his sweetheart, Sarah Curran, who had refused to go to America with him. Betrayed and captured, he refused to defend himself in court lest Miss Curran's name be dragged in. "What have you to say?" asked the clerk when the verdict of guilty had been rendered. Then, facing ignominious death, Emmet's defiant eloquence in the cause of liberty blazed out in a historic speech, which closed with the words, "When my country takes her place among the nations of the earth, then, and not till then, let my epitaph be written."

Sergeant York. An American hero of the World War. In the battle of the Argonne forest, October 8, 1918, the body of troops in which Alvin C. York (b. 1887) was a sergeant was ordered to attack a German position. The expected preparatory barrage failed to take place, and the charging troops were decimated by the German machine guns. Sergeant York and 17 other survivors made their way to a German machine gun nest. Most of the 17 were killed or wounded, but York himself succeeded in capturing the whole German body of about 90 men. Then, marching his prisoners before him toward a second machine gun stronghold, he captured that also, taking in both places a total of 132 captives and 35 machine guns.

Marshal Foch stated that this feat was the greatest thing accomplished by any noncommissioned soldier of all the armies in Europe. On his return, Sergeant York received a farm in his native state of Tennessee and a York foundation was established at his request, the proceeds of which were to be used for the support of primary schools in the mountains of Tennessee.

Stephen Girard, Hospital Nurse. It was during the terrible epidemics of yellow fever in Philadelphia in 1793 and 1797 that his fellow citizens discovered the true nobility in the character of the great merchant Stephen Girard. His reputation had previously been that of a cold, heartless moneymaker. When the epidemic of 1793 broke out, however, he not only gave liberally of his wealth, but entered the hospitals himself, risking all the danger of infection, and tenderly nursed the sick. During the second scourge of the fever, Girard again gave his services courageously. To hundreds of children orphaned by the plague he became a second father, and out of this interest grew his purpose which found expression in the establishing of Girard college.

Vincent de Paul. This French priest, known as the slaves' friend, had learned by experience in northern Africa the hard lot of a slave. After his escape, he visited a gang of convicts on a galley at Marseille. Seeing a broken-down man in chains, Vincent was so moved with pity that he offered to take the man's place. The guard agreed, and the priest became a galley slave. Though he was soon released, the hardships then suffered affected him for many years. The remainder of his life was devoted to ameliorating the lot of convicts and slaves, and he founded the orders of the Lazarists and the Sisters of Charity.

SOBRIQUETS AND NICKNAMES

THESE terms refer to names given in place of real names. They have much the same meaning, although their origins are diverse. Sobriquet is a French word of uncertain derivation; it is sometimes explained as having originally meant an affront. Nickname is derived from an Old English term *ekename*, "additional name," or "surname." "An ekename" was pronounced like "a nekename," just as, in conversation, "an ice man" is easily confused with "a nice man." The form nekename later became nickname.

Nicknames may express derision, affection, sportive familiarity, or various other feelings. They arise in ways too numerous to catalogue, but their essential features are that they should be graphic and should have a certain inevitable fitness about them which makes their use contagious and enduring.

Sobriquets may be applied, not only to individuals, but, in some cases, to nations or to an imaginary person typifying a nation, such as Uncle Sam, Jack Canuck, or John Bull. A particular type of person also is frequently designated, in malice or otherwise, by some picturesque name, such as Bluestocking. The more common sobriquets of these and other types will be found in the following section, in which also, wherever possible, their origin, application, and explanation are stated.

Almighty Dollar. The earliest use of this Americanism is attributed to Washington Irving. It is to be found in *A Creole Village*, published in 1837. The phrase pungently expresses the old idea of the power of wealth. Ben Jonson is credited with a similar phrase, "almighty gold."

Amen Corner. A small locality in the neighborhood of Paternoster Row, London, England. In Pre-Reformation days a procession of clergy and people on the feast of Corpus Christi foregathered at the end of Cheapside. There the first two words of the Our Father, or Paternoster, were intoned, and the prayer continued as the procession passed through the full length of the street. When the Paternoster came to an end and the word Amen was sung, the procession stopped to turn down Ave Maria Lane. Hence the stopping place came to be called Amen Corner.

American Sphinx. One of numerous nicknames applied to General Grant on account of his uncommunicative, enigmatic attitude while in command of the army during the Civil War.

Anzac (*ăn'zăk*). A composite word made from the initials of the Australian-New Zealand Army Corps, the British troops whose gallant, though unsuccessful, attempts at Gallipoli form one of the most brilliant pages in the history of the World War.

Apostate, The. The Roman emperor Julian (331–363) was so designated by Christian writers, and the sobriquet has since become virtually a surname of the ruler. He had been educated as a Christian but renounced that religion in favor of Neoplatonism and tried to restore the pagan worships in the Roman Empire.

Apostle of Free Trade. Richard Cobden (1804–65) was so called because of his effective advocacy of the policy of free trade in England.

Attic Bee. This sobriquet has been often applied in ancient and modern times to Sophocles, the Athenian dramatist. Athens is situated in Attica, and the word bee alludes to the sweetness of Sophocles' poetry. Plato also is sometimes so designated.

Beggars. A nickname applied to deputies in Holland who protested against the establishment of the Inquisition in 1556. The name was later adopted by the Dutch patriots.

Black Friday. Good Friday; so called from the black vestments worn by the clergy on that day. The term has also been applied to any Friday on which some public calamity has happened. In England, Dec. 6, 1745, the date of the Pretender's landing in London, was called by this name. In the United States, Sept. 24, 1869, and Sept. 19, 1873, occasions when great financial panic occurred, were each known as Black Friday.

Black Maria. A term used colloquially both in England and in the United States to denote the closed van, or wagon, in which prisoners are conveyed to or from jail.

Black Monday. In English history, the name given to Easter Monday, April 14, 1360, when numerous soldiers in the army of Edward III died from cold before the city of Paris. English schoolboys apply this name to the first Monday after the long vacation, when they are forced to resume studies. The term is applied also in reference to Monday, March 30, 1209, when the Irish made an onslaught on the English settlers in Ulster and put some thousands to the sword.

Blighty. A corruption of a Hindustani word used to designate England or Europe in general. During the World War, it was introduced into the British army by troops who had seen service in India. It gained popularity at once with the rest of the British "Tommies," who thereafter used "Old Blighty" as the slang term for their native land.

Blood and Guts, Old. A name given to General George Patton, Jr., commander of the American Third Army in the invasion of Continental Europe in World War II. As applied by his soldiers, this name was regarded as a tribute to General Patton's aggressiveness and his colorful personality.

Blood and Iron, The Man of. A nickname of Prince Bismarck, taken from a phrase in a speech delivered by him in 1862.

Bluestocking. Applied to one, particularly a woman, who makes a pretentious or unnecessary display of erudition. The expression, it is said, originated in Dr. Johnson's time from the fact that Mr. Stillingfleet invariably wore blue stockings when attending Mrs. Vesey's or Mrs. Montagu's celebrated literary receptions.

Bobby. See *Peeler*.

Bohemian. This term is applied to an artist or a literary person who leads a free and easy life and gives but little heed to the conventions of society. Ignoring its distinctions and despising its formalities, his heart and studio door are ever open to friend and stranger alike.

Boy Orator. This sobriquet and also the longer one, "Boy Orator of the Platte," were applied to William Jennings Bryan, on his entrance into national politics, in reference to his remarkable oratorical power and his youth. The longer phrase carries reference to his home state, Nebraska, in which the Platte river is an important stream.

Brother Jonathan. A nickname used in England to designate an American of the United States. Its origin is obscure and has never been satisfactorily explained.

Buffalo Bill. The well-known sobriquet of William F. Cody. The name was applied to him in consequence of his success in supplying immense quantities of buffalo meat to the construction gangs when the Union Pacific railroad was being built.

Bull Halsey. Admiral William F. Halsey was so called because, in his command of the fleet attacking Japan, he was a symbol of dogged determination.

By declaring his purpose to ride the Japanese emperor's white horse, he dramatized the main objective of the American Naval forces, the capture of Tokyo.

Calamity Jane. A person who sees only the darker side of events, a prophet of misfortune and doom.

It was the nickname of Mary Jane Canary (c. 1852–1903), notorious in the annals of Deadwood, South Dakota, in frontier days. How she came to be called Calamity Jane is not clear. She dressed as a man, was a crack shot, and claimed to have led a life of danger and daring as a pony express rider and scout.

Canuck or **Jack Canuck.** A type name applied to Canadians. It referred earlier to Canadians of French descent, but outside Canada, and recently in Canada, its application has widened to include any inhabitant of that country. The origin of the name is uncertain. Some scholars derive it from an Indian word; others say that it was originally applied by the French to the English and is a corruption of Connaught.

Carpet Knights. Civilians knighted in the old days were so called because they received this honor in times of peace as they knelt on a carpet before the king in his royal chamber. They were also known as "knights of the green cloth" to distinguish them from warriors who were dubbed knights on the field of battle. The expression as now used is one of contempt to denote the drawing-room or easy-chair soldier who wins all his battles "on the carpet."

Cincinnatus, The American. A sobriquet of George Washington, given in allusion to his services in saving the country like the Roman statesman Cincinnatus, who was called from his agricultural labors to be dictator of Rome.

Commoner, The Great. The sobriquet by which William Pitt, Earl Chatham, is best known. It was occasioned by his outstanding skill and authority as a leader of the English House of Commons.

William Jennings Bryan also was so called, apparently because of his appeal to the common people.

Czar Reed. This title was given to Thomas Brackett Reed, former speaker of the House of Representatives. He won it by his ruling that all members present, though not voting, should be counted toward a quorum.

Desert Fox. In the campaign for North Africa during World War II, the German General Erwin Rommel earned this name by his elusiveness. Rommel's British opponents, and particularly Prime Minister Winston Churchill, paid tribute to him for his cleverness in using the Fabian tactics of swift attack and skillful retreat.

Dixie. A popular name used to designate the southern United States. The most plausible origin of the name is that to be found in the folklore of old New York, which shows that Manhattan island was called Dixie Land by the Negroes in the early 19th century. Dixie was a slave owner on the island and was a kind and beneficent master; hence Dixie, or Dixie's Land, among the Negroes came to mean paradise. When sentiment for abolition began to grow, Dixie sent many of the slaves south. They bitterly regretted the change and expressed a longing to remain in "Dixie's Land." Their distress inspired D. D. Emmett in 1859 to compose the famous "Dixie" ballad, later the war song of the Confederates.

Dumb Ox. The sobriquet given to Saint Thomas Aquinas by the Dominican novices in the monastery at Cologne. They found the nickname well suited to the young monk, who was shy, retiring, and somewhat rotund. However, Albertus Magnus, their master, once interrogated him on some very deep and abstruse metaphysical problems. The answers given by Thomas displayed so profound an intellect that the great master, addressing the other students, said: "You call him 'the dumb ox'; one day his bellowing will be heard throughout the world."

Easy Boss. The American politician Thomas Collier Platt (1833–1910) earned this title by the lack of ambition for wealth or preferment which he displayed in spite of the fact that he dominated Republican politics for many years.

Expounder of the Constitution. A sobriquet of Chief Justice John Marshall. Its appropriateness was due to his great influence in determining the interpretation of the Constitution.

Eye of Greece. The ancient city of Athens has been so designated because it was long the center of the brilliance and intellect of the Greek world.

Father of His Country. The most popular of the sobriquets applied to George Washington. It is said to have been used of him first in an almanac printed at Lancaster, Pa., in 1799.

This name, it should be noted, has been applied to many national heroes in the course of history. The first instance of its use within strictly historical times is the application of the title *Pater Patriæ* to Cicero by the Roman Senate.

Father of History. Herodotus was so called because he was the earliest writer to raise historical narrative to the level of literature. The name was first applied by the Roman orator Cicero.

Father of the Constitution. James Madison was so called because of the leading part he took in the formation and adoption of the Constitution of the United States.

Fourth Estate. A term analogous to the *tiers état*, "third estate," of the French Revolution period. Fourth estate is used humorously to designate the press, the laboring classes, or other elements of a state which exercise a great, but unofficial, power in politics.

Gadfly of Athens. A term applied to Socrates. It arose from a simile attributed to him when on trial for his life. According to Plato, Socrates declared that, in rousing the Athenians from intellectual apathy by means of questioning, he was like a gadfly stinging a lazy horse into activity.

Gods, Gallery. In the old days, the ceiling of the Drury Lane theater, London, was painted to represent a blue sky with clouds and the conventional cupids and cherubs disporting themselves thereon. Since the ceiling extended over those seated in the gallery, such occupants were said to be "among the gods." Subsequently, "the gods" or "gallery gods" came to mean those who occupied the uppermost seats in any theater.

Golden Mouthed. The Greek church father Saint John received the surname Chrysostom, "Golden Mouthed," because of his conspicuous oratorical ability.

Grand Old Man. A sobriquet of William E. Gladstone. It expresses the affectionate admiration inspired by his long career of political leadership in England.

Gringo. A contemptuous term applied by Spanish Americans to foreigners, especially to Englishmen or to Americans of the United States. The word is from the Spanish meaning gibberish, or unintelligible speech, and is possibly a variant of *Griego*, the Spanish word for Greek.

Honest Old Abe. This is perhaps the most widely known of the sobriquets applied to Abraham Lincoln. During the Civil War, the Confederates applied to Mr. Lincoln the term "Old Abe," and to the Negroes he was "Uncle Abe."

Iron Duke. This sobriquet was conferred on the Duke of Wellington to express admiration for his determination and vigor that resulted in the

victories over Napoleon's forces in Spain and at Waterloo.

Jingo. This word has been found within recent years to be a transliteration of a Basque word *Jinko* which means "God." It is not at all improbable that *by jingo* was heard as an oath among the Basques by British sailors in foreign parts. The word came into especial prominence in the year 1878, when Disraeli, then English prime minister, announced his resolution of defending Turkey against the advance of Russia. In a topical song composed at the time, and sung by "the Great Macdermott," occurred these lines:

"We don't want to fight, but by jingo, if we do,
We've got the ships, we've got the men, we've got the money too."

In a flash, the expression became a happy catchword for the opponents of Disraeli, whose followers there and then were christened Jingoes and whose policy thereafter was known as jingoism. The word still retains this meaning of national aggressiveness and braggadocio.

John Bull. A popular nickname for England and the English people. It was used first by Arbuthnot in the title of his satire *The History of John Bull*, published in 1712. F. C. Gould, the celebrated cartoonist of the *Pall Mall Gazette*, has long since made the figure of John Bull familiar. He is depicted by the artist as a stout old gentleman, wearing a "tile" hat, cutaway coat, riding breeches, and boots.

Kickshaws. A corruption of the French word *quelquechose* meaning "something" and analogous to *vol-au-vent*, a light and airy trifle which a breath of wind can blow away. It is used half contemptuously of certain dainty and delicate French dishes which fascinate the eye but give no substantial support to the "inner man."

King Maker. The earl of Warwick was so designated because of his decisive influence in the Wars of the Roses. He succeeded in having Henry VI deposed in favor of Edward IV, whom he later drove from the country and supplanted by restoring Henry VI to the throne.

Last Cocked Hat. This nickname was applied to President Monroe in reference to his being the last of the presidents to wear the characteristic hat of the Revolutionary period.

Laughing Philosopher. The Greek philosopher Democritus was so called. He believed all happenings in the universe to be dependent on the mechanical interaction of atoms. He therefore regarded the drama of mankind's activities as a mere puppet show, in which the actors thought they moved themselves and followed their own purposes, but Democritus, believing that he and Nature knew better, is said to have professed ceaseless amusement at the spectacle.

Lion of Sweden. Johan Gustafson Banér, a Swedish field marshal (1596–1641), was so called because of his military prowess.

Lion of the North. The sobriquet of Gustavus Adolphus of Sweden (1611–32), whose extraordinary successes in the Thirty Years' war made this appellation appropriate.

Little Corporal. A sobriquet applied to Napoleon Bonaparte after the victorious battle of Lodi in 1796. On this occasion, Napoleon, who was only 5 feet, 2 inches tall and had begun his career as a corporal, led his troops across a bridge against a greatly superior number of Austrians.

Longshanks. The nickname of Edward I, king of England, 1272–1307. He was a tall man with long legs.

"Mad Anthony" Wayne. The popular nickname applied to General Anthony Wayne during the Revolution on account of his energy and reckless daring.

Maiden Queen. This name is frequently applied to Queen Elizabeth, who ruled England from 1558 to 1603. Disregarding the wishes of her advisers, she persistently refused to choose a husband.

Maid of Orleans. The name given to Joan of Arc after the relief of Orleans in 1429.

Mantuan Bard. So Virgil is often called in allusion to Mantua, his birthplace.

Mill Boy of the Slashes. A popular nickname applied to Henry Clay. It originated in his boyhood, when he was frequently seen driving a donkey on which was loaded a bag of meal being brought to his home from a mill on the Pamunky river. His home at that time was situated in low, marshy ground, known as slashes.

Old Hickory. The nickname is probably the earliest of the numerous names applied to Andrew Jackson. The use of the name is traced to the soldiers under his command in 1813, who, observing his endurance, remarked that he was as tough as hickory. The sobriquet developed from this beginning.

Old Lady of Threadneedle Street. The humorous appellation given to the Bank of England, obviously from its location in a street formerly called Three Needle street. The name of the street owes its origin, according to some authorities, to the circumstance that the Merchant Tailors' Company have their hall in it; others trace the name to the three needles on the coat of arms of the Needlemakers' Company in Crooked lane.

Old Man Eloquent. His eloquent defense of the right of petition in Congress occasioned the application of this sobriquet to John Quincy Adams.

Old Rough and Ready. General Zachary Taylor, president of the United States, 1849-50, was so called by his soldiers during the Mexican war.

Pearl of the East. Zenobia, queen of Palmyra, was so designated. A closely allied sobriquet, Pearl of the East Indies, is applied to Java in allusion to its natural beauty.

Peeler. A nickname given by the Irish to the police constabulary formed under the secretaryship of Sir Robert Peel (1812–18). It was thereafter applied to policemen in England until 1828, when Peel, who was then home secretary, introduced the new Metropolitan Police act. The former slang name then was changed to "Bobby," the perversion of Peel's first name, which is now regularly used in England to designate a policeman. In Ireland, however, the old name "Peeler" still obtains.

Perfidious Albion. In the French form *Albion perfide*, this appellation is said to have been applied to England by the emperor Napoleon I, who thereby expressed his attitude toward his chief antagonist. Albion was an ancient name for the island of Britain, probably derived from the Latin *albus*, "white," and applied in allusion to the white chalk cliffs on the southeastern coast of England. The name Albion is still often used in poetry to designate England.

Plumed Knight, The. The striking sobriquet applied by his admirers to James G. Blaine. It was first used in 1876 as a rhetorical comparison in a speech by Robert G. Ingersoll when nominating Blaine for the presidency.

Prince of Skeptics. This name is frequently applied to Voltaire, who rejected Christianity and devoted his life to the crushing of the spirit of intolerance which characterized the Church of his day.

Printer's Devil. A term applied to a young apprentice who does the odd chores in a printing office. The innocence of a black appearance resulting from printer's ink has alone earned for him this invidious

appellation. In England a junior legal counsel serving a barrister without pay, or any literary hack, is likewise referred to as a "devil."

Rail-Splitter. The origin of this sobriquet of Abraham Lincoln is traceable to the Republican state convention in Illinois in 1859, when two rails said to have been split by Thomas Hanks and Abraham Lincoln were presented to the convention. The nickname immediately became popular.

Rare Ben. Ben Jonson is often so referred to in allusion to the inscription on his tombstone, "O rare Ben Jonson," erroneously ascribed to Shakspere. "O rare" (*orare*) is Latin, meaning pray for.

Roe and Doe. The names given to fictitious parties in a suppositious case devised by Chief Justice Rolle in the reign of Edward III of England. By the framing of this imaginary lawsuit between Richard Roe and John Doe, a plaintiff who claimed title was saved the costly procedure of a *real action* against the wrongful possessor of an estate and could sue through the simple *action of ejection*. Hence arises the expression "John Doe proceedings."

Roughrider. The sobriquet applied to Theodore Roosevelt in reference to his organization of the so-called Roughriders, a regiment of volunteer cavalry in the Spanish American war.

Sage of Monticello. This sobriquet of Thomas Jefferson contains an allusion to his Virginia estate and his great reputation for statesmanship and political wisdom.

Scourge of God. The terror aroused in Europe by Attila the Hun in the 5th century is reflected in this appellation applied to him by medieval writers.

Serpent of the Nile. Cleopatra has been so called. In the 1st century B. C., she ruled Egypt, the habitable part of which is confined to the vicinity of the Nile river. A serpent was the ancient symbol of Egyptian royalty.

Sir Veto. The name applied to Andrew Johnson because of the unusual number of his vetoes of Congressional bills.

Son of Liberty. A sobriquet of John Adams occasioned by his direct descent from some of the first New England immigrants.

Spellbinders. A sobriquet which seems to have assumed its particular present day sense of a political orator during the presidential campaign of 1888. It is said to have been applied by a member of the Republican national committee to speakers who reported that they held their audiences "spellbound."

Swan of Avon, Sweet. A name sometimes applied to William Shakspere, who was born at Stratford on Avon. The swan is traditionally a bird sacred to the Greek god Apollo, who was the father of all the Muses, and its song is accordingly regarded as due to inspiration from the god. The epithet was used first by Ben Jonson.

Teddy. The most popular of the several nicknames applied to Theodore Roosevelt during his vigorous career.

Tenth Muse. This sobriquet is often applied to women poets and, by implication, raises them to the dignity of the nine muses of Greek mythology. The earliest and most appropriate use of the term was that made by Plato, who so designated the Greek poetess Sappho.

Tiger. The famous French statesman, Georges Clemenceau, earned this sobriquet early in his career. It was applied to him because of his watchful, dangerous, and relentless character in political conflict. The fitness of the name was emphasized by the determined patriotism he exhibited as a publicist and as premier of France during the World War.

Tippecanoe. The popular nickname applied to William H. Harrison during the campaign which resulted in his election to the presidency. The name refers to his military success at the battle of Tippecanoe, Nov. 7, 1811.

Tuxedo. A name given to the ordinary dinner jacket and said to have originated with a country club at Tuxedo Park, New York.

Uncle Joe. Joseph Gurney Cannon received this familiar name in the course of the 46 years which he spent as a member of Congress.

Uncle Sam. A sobriquet for the United States, which probably originated during the War of 1812. A commissarial contractor named Elbert Anderson had his store yard at Troy on the Hudson. Samuel Wilson, who, with his brother, superintended the examination of provisions, was known as "Uncle Sam" among the workmen. As each case or package of provisions was passed, it was marked with letters EA—U. S. A wag among the longshoremen, being asked what the initials meant, replied that they stood for Elbert Anderson and "Uncle Sam." The joke spread at once throughout the country. The name since that time has passed current as a personification of the United States among other countries.

The first cartoon of Uncle Sam appeared in the comic weekly, the New York *Lantern* of March 13, 1852. The artist was F. Bellew. Thomas Nast, cartoonist for *Harper's Weekly*, about 1870 added whiskers and put stars on the vest.

Unconditional Surrender. The sobriquet applied to General Grant on account of his famous message to the commander of Fort Donelson in 1862, "No terms other than unconditional and immediate surrender can be accepted."

Watchdog of the Treasury. William Steele Holman, long a member of Congress from Indiana, earned this title by his persistent opposition to unnecessary appropriations.

Weeping Philosopher. The Greek philosopher Heraclitus was so described, who, in the early 5th century B. C., taught that there is nothing permanent except change. The realization of the transient character of all things human produced in him a sadness memorialized by this sobriquet.

Whig and **Tory.** Names applied to political parties in British and early American history. Whig was originally an opprobrious term, being derived, it is said, from the Scotch word for whey. Tory is derived from the Irish *Tar a Ri*, "Come, Oh King!" The Tories were Royalists.

Wisest Fool in Christendom. This appellation, first applied to James I of England by the French statesman Sully, attained wide celebrity. It expresses the combination of the king's considerable range of learning and his notable weakness of character.

Wizard of Kinderhook. A nickname applied to Martin Van Buren in reference to his reputation for political sagacity and skill.

Yankee. Throughout the British Empire, this name is applied to any inhabitant of the United States. In its narrower meaning in America, however, it is limited to the people of the New England states. During the Civil War, the name was applied generally to Northerners. Various derivations have been given to account for the origin of the word. It has been traced to a corrupt pronunciation of the word *English* or the French word *Anglais* by the North American Indians; also, and more appropriately, to the Scotch word *yankie*, meaning "shrewd, sharp, clever." A more probable source still, however, is that of the Dutch diminutive *Jankin*, "Johnny," a name which the Dutch settlers of New York gave to the English colonists of Connecticut.

NATIONAL AND STATE EMBLEMS

THE human sentiments of fealty to rulers and of tribal or national loyalty have been embodied in many different symbols. On the other hand, for rulers and reigning houses there have been evolved, through the science of heraldry, elaborate emblems and arms. Heraldry has devised an extensive and intricate system of patterns and colors by which to depict the relationships and the history of families.

In the Old World, national coats of arms have often combined the personal emblems of rulers with symbols of the composition and the authority of the state. Primitive tribes had their totems, or figures of animals or birds, which served as tribal symbols. These emblems carried more or less religious meaning. In the ancient Eastern nations, the emblem of the ruler was frequently some animal form which represented a deity.

For the Romans, the *fasces*, or rods, of the lictor became the symbol of civil authority, while the eagle was adopted as the sign of the conquering might of Roman legions. Both these symbols have persisted down to modern times. The official seal of France, for example, carries a seated female figure representing the republic, bearing the fasces. Recent coinage of the United States bears the same emblem.

The eagle and the lion have been the favorite animal emblems of European states. The Byzantine emperors adopted the double-headed eagle as representing their sovereignty over the East and the West. The black double-headed eagle was the emblem of the former Austrian and Russian empires. Montenegro also made it the chief feature of her national arms. Imperial Germany and Italy use the single black eagle; the arms of Serbia bear a silver eagle. In the New World, Mexico and Chile each show a gold eagle in their official arms.

American Eagle, The. The white-headed or bald eagle is the emblem on the coat of arms of the United States, and is also the adopted badge of the order of the Cincinnati. Owing to the alleged cowardice and predatory habits of the white-headed eagle, Benjamin Franklin is said to have expressed regret that it had been chosen as America's national emblem. Geographically, however, the choice of this bird is appropriate, since its habitat extends over the whole of North America, so that veritably it is the American eagle.

Among European states, the lion as a heraldic device symbolizes power and has shared honors with the eagle. The arms of Great Britain, Belgium, Bulgaria, Holland, and Norway bear each a golden lion; those of Denmark carry blue lions; while those of Spain bear a red lion. Rumania and Sweden have in their arms both an eagle and a lion. On the arms of Czechoslovakia, two gold lions support a shield, in the quartering of which appear eagles. In the middle ages, travelers' stories about the courage of a fabulous animal called the unicorn, from the one horn in its forehead, were widely current. Belief in these tales doubtless accounts for the adoption of the unicorn into the royal arms of Scotland and its incorporation in the British arms after the union of the kingdoms of England and Scotland.

Latin American states have generally avoided in their emblems all suggestions of Old World royalty. In their official arms, the liberty cap and flags frequently appear. For Bolivia, Colombia, and Ecuador, the condor, native to these countries, takes the place which the eagle holds in the heraldry of other nations.

Greece and Switzerland have a cross as the chief emblem in their arms, the former silver, the latter white. In Japan, the imperial emblem is the golden chrysanthemum. The national emblem of China is very complicated, its central element being a hatchet, with a flowery bird on the right and a green dragon on the left.

Flowers or plants have frequently been chosen as national emblems. The following list gives those that by tradition have come to be regarded as emblems of various nations.

Australia	Golden Wattle
Canada	Maple Leaf
China	Narcissus
Egypt	Lotus
England	Rose
France	Fleur-de-lis
Germany	Cornflower
Greece	Violet
India	Lotus
Ireland	Shamrock
Italy	White Lily
Japan	Chrysanthemum
Mexico	Nopal Cactus, or Prickly Pear
Persia	Rose
Scotland	Thistle
Spain	Pomegranate
Switzerland	Edelweiss
United States	Goldenrod (by popular choice)

Practically all the American states have chosen official state flowers and state birds. These will be found in the table *State Mottoes, Nicknames, Birds, and Flowers*, on pages 2067 and 2068.

NATIONAL FLAGS

In ancient times, just as a motto was usually a slogan, or battle cry, an emblem or a banner was a symbol of religious or patriotic devotion that was calculated to rouse the fighting spirit of a group of warriors. Banners with tribal or national significance are mentioned in Biblical references, as in Psalm 20:5, 60:4, and Isaiah 13:2. There is abundant evidence that similar devices were used by Persian, Greek, and other national armies among the ancients. Sometimes an emblem was restricted to a particular group or leader, but with the merging of military units there was need for a symbol to stand for the army as a whole, and for the nation which it served. Thus the eagle became the official emblem for all the Roman legions and was recognized as the symbol of national authority throughout the Roman empire. In medieval times the standard often took the form of a banner borne upon a lance, or "flagstaff," and in appearance was comparable to a pennant flying from the mast of a ship. The standard might be a religious banner, or "oriflamme," but could also be a symbol of personal leadership or political authority.

Reminders of these early flags are seen today in school or college pennants, and, as noted above, the history of particular standards and mottoes is closely bound up with traditions of heraldry. To trace the evolution of a nations flag is to review many important details of that nation's history. How the British flag came to incorporate with the Union Jack the crosses of St. George, St. Andrew, and St. Patrick, is a fascinating story. In it many literary allusions as well as historical references will be encountered. Conspicuous among these is the well-known passage from Shakspere's Henry V, in which the king's stirring address to his troops closes with the words:

"Follow the spirit; and upon this charge
Cry 'God for Harry! England and St. George!' "

The evolution of the present American flag is described in detail in another part of this work. The history of the Star-Spangled Banner, like that of the British flag, is reflected in many literary allusions.

Design of National Flags

Modern national flags are to be distinguished principally by the colors they display. Different arms of the national service, however, and various officers and dignitaries usually have flags of special designs. Thus, the merchant marine flags are generally different in design from the naval flags and ensigns. On board naval vessels, each rank of admiral has its appropriate flag. In the United States navy, the admiral's flag is a solid blue field bearing four stars. The flag of the president is a blue banner bearing in its center the arms of the Unite States.

The official flags of the principal countries of the world are here briefly described. For United States and British flags, see page 383 and illustrations opposite pages 428 and 429.

Afghanistan. The national flag of Afghanistan has three vertical stripes, black, red, and white. In the center stripe is a white crescent.

Argentina. In the flag of Argentina are three horizontal stripes. The top band is blue, the center white, and the bottom blue. Upon the naval ensign a golden sun appears in the white bar.

Belgium. For both the naval and the merchant marine flag of Belgium, the vertical tricolor,—black next the staff, yellow in the middle, and red on the outer margin,—is employed. This is the ancient standard of Brabant. The royal ensign bears the king's coat of arms in the yellow stripe.

Bolivia. The Bolivian flag is a tricolor with horizontal bars. At the top is red; in the middle, yellow; at the bottom, green. The naval flag shows the national arms in the center of the yellow band.

Brazil. The national standard is a green field in the center of which appears a yellow lozenge. Upon the lozenge is a blue circle in which is represented a heavenly constellation. Across the blue circle runs a white band bearing the motto, *Ordem e progresso*, "Order and Progress."

Bulgaria. The naval flag, which is the national ensign, has three equal horizontal stripes,—the upper white, the middle green, the lower red. The gold crowned lion appears on a red ground, in the upper corner next the staff. For the merchant marine, the plain tricolor is used.

Chile. In the Chilean flag are two wide horizontal bars, the upper white, the lower red. Upon the blue canton, next the staff, appears a five-pointed white star.

China. The national flag of China, formerly the naval flag, has a red field and a blue canton bearing a white sun.

Colombia. The upper half of the Colombian flag is a horizontal yellow band. Below this is a blue stripe, and under the latter a red band. In the center of the naval flag are the state arms; in the same position, the merchant ensign bears a white star on a blue ground set in a red oval.

Costa Rica. The flag is composed of five horizontal bands. The topmost band is blue, with a white stripe below it. At the bottom is a blue stripe, with a white band above it. The center stripe, broader than the others, is red. In the naval flag, the red stripe bears the Costa Rican arms.

Cuba. The standard of Cuba bears next the staff a red triangle, upon which is a white star. From the triangle run alternating horizontal stripes, two white and three blue.

Denmark. The flag of Denmark, the Dannebrog, is a red field bearing a white cross dividing the field in quarters. This is the oldest national flag design in the world, said to date from 1219. The naval ensign is swallow-tailed.

Dominican Republic. The field of this flag is divided by a white cross. The upper quarter next the staff is blue; the upper outer quarter is red. The lower outer quarter is blue; the lower, next the staff, is red.

Ecuador. The upper half of the flag of Ecuador is a yellow horizontal band. The lower half is divided equally between a blue and a red band, the latter being at the bottom. The national ensign bears the arms of the state.

Egypt. The flag of Egypt has a green field. In the center is a white crescent moon, the horns of which point away from the staff and half surround three white stars.

Finland. The national flag of Finland, similar in general design to the standards of Norway and Sweden, carries a blue Latin cross imposed upon a white field.

France. The flag of France is the tricolor, composed of three vertical stripes of equal width,—blue next the staff, white in the middle, and red at the outer edge. The French Revolution, in 1789, gave rise to this standard, which combines the colors of the city of Paris with the white of the former monarchy.

Greece. The national flag is a white rectangular cross on a dark blue field. The naval ensign has four white and five blue alternating horizontal stripes, with a canton of blue upon which appears the white cross, with a crown in the center. The merchant flag is like the naval, but lacks the crown.

Guatemala. This state has a flag of three vertical bars,—blue, white, blue. On the central white band, in the national ensign, appear the state arms.

Haiti. The Haitian merchant flag has two horizontal bands,—blue above, red below. At the center of the naval ensign appear the national arms in a white rectangle.

Honduras. The Honduran national ensign is three horizontal bars,—blue, white, blue. On the central white stripe are the national arms surmounted by five gold stars.

Hungary. The flag of the Hungarian state is a tricolor. It is made up of horizontal bars,—the upper being red, the center white, and the bottom green. Formerly, the lower stripe of the Austro-Hungarian flag carried the red of Austria in the half next the staff and the green of Hungary in the other.

Iran. The Iranian imperial flag is blue with a white circle in the center bearing the national arms. The military ensign, as well as the merchant flag, is a tricolor, with horizontal stripes,—green above, white in the center, and red at the bottom.

Ireland. The flag of the Irish republic is green, white, and orange vertical stripes.

Israel. White with two horizontal blue stripes, the blue shield of David in the center.

Italy. The Italian flag consists of three equal vertical bands,—green next the staff, white in the middle, red at the outer border. On the white stripe is a blue-bordered red shield, bearing a white cross, the latter being the arms of Savoy. On the naval flag, a crown surmounts the shield.

Japan. The flag of the mikado is a rectangular field of red bearing a gold chrysanthemum in the center. For the merchant marine, a white field with a red disk in the center is used. On the naval flag, the rayed, red disk is placed just out of the center of the white field, toward the staff.

Liberia. The ensign of the Negro republic has 11 horizontal alternating red and white stripes, with a union of blue containing a large white star.

Mexico. The flag of Mexico is a vertical tricolor. The green bar is next the staff; the central stripe is white; the outer one is red. On the naval ensign, the white stripe bears the national arms.

Netherlands, The. The design of the naval and merchant flag of Holland is a tricolor of three equal horizontal bands,—red above, white in the middle, blue at the bottom.

Nicaragua. A flag of three horizontal stripes, white between blue. In the central white stripe of the naval flag are the state arms; on the merchant ensign, a blue anchor.

Norway. The merchant flag of Norway is red and bears a blue cross edged with white. The field of the naval ensign is red and bears a broad blue cross. This latter flag is swallow-tailed, with the end of the cross projecting in the angle of the swallowtail.

Panama. This republic has a flag of four quarters. The upper, inner quarter is white and bears a blue star; the upper outer quarter is red; the lower inner quarter is blue; the lower outer quarter is white, bearing a red star.

Papal State (Vatican City). Two equal vertical stripes of yellow and white, charged with the insignia of the Papacy on the white stripe, a triple crown, or tiara, over two crossed keys, one of gold and one of silver, tied with a red cross and two tassels.

Paraguay. The Paraguayan flag is a tricolor of horizontal stripes. The upper bar is red; the lower is blue; the center, white. On the white band are the national arms, and on the reverse a lion with the inscription *Paz y Justicia.* This is the only flag in the world with differently designed sides.

Peru. A flag of three stripes is the national ensign. The inner and the outer bar are red. On the center, white, band are the national arms.

Poland. The Polish flag is a simple banner of two equal horizontal stripes,—white above, red below.

Portugal. The field of the Portuguese flag is made up of a green and a red portion divided in the proportion of two to three, the green being next the staff. Over the dividing line are placed the arms of Portugal, a red-bordered white shield on a gold armillary circle, the latter commemorating the fame of the explorer, Prince Henry.

Rumania. Three equal vertical bars,—blue next the staff, yellow in the middle, red in the fly,—constitute the national ensign. In the naval flag, the yellow band bears the national arms.

Russia. The banner of Soviet Russia is a plain red field, whose upper corner next the staff has a golden five-pointed star in outline and, below, in gold, a sickle and a hammer, symbolizing agriculture and industry.

Salvador. The national flag has three horizontal stripes. The upper and the lower bar are blue; the center band is white, bearing the national arms and, in Spanish, the legend, Republic of Salvador and Central America.

Spain. The flag of the Spanish republic is a tricolor, having three horizontal bars. The uppermost bar is red, the center is yellow, and the lowest is purple. Alternating horizontal bars, three yellow and two red, constitute the merchant flag.

Sweden. The merchant flag of Sweden is a rectangular blue field bearing a yellow cross. The naval ensign is of the same colors, but swallow-tailed, with the cross projecting in the angle of the swallowtail.

Switzerland. The Swiss flag has a rectangular red field charged with a white cross. The ends of the cross do not touch the edges of the flag.

Thailand (Siam). The national flag of Thailand consists of five horizontal bars. From top to bottom, they are red, white, blue, white, and red.

Turkey. The Turkish flag is a red field on which, in white, is the historic emblem of a star and the crescent moon. The symbol of star and crescent was the ancient emblem of Byzantium (Istanbul), said to have been adopted by the city when, by the light of a crescent moon, a night attack by Philip of Macedon was foiled. Mohammed III appropriated the device after the Turkish capture of Istanbul in 1453.

United Nations. The flag of the United Nations is blue and white. In the center of a light blue field is a white global map of the world supported by two olive branches, symbols of peace. Adopted in 1947, it was first flown by armed forces at war in July 1950, when the Security Council authorized its use by General Douglas MacArthur in Korea.

Uruguay. The flag of Uruguay is made up of nine alternating white and blue stripes,—five white and four blue,—with a white canton bearing a golden sun.

Venezuela. The Venezuelan naval flag is a horizontal tricolor. The upper stripe is yellow, the center blue, the lower red. On the yellow stripe, at the end next the staff, appear the national arms. In the center of the flag are grouped seven white stars.

Yugoslavia. A horizontal tricolor is the national flag of Yugoslavia. The top bar is blue; the middle one is white; the bottom, red.

STATE MOTTOES, NICKNAMES, BIRDS, AND FLOWERS

State	Motto, with Year of Adoption	Translation	Nickname of State	State Bird	State Flower
Alabama	Audemus Jura Nostra Defendere.	We Dare Defend our Rights, 1939	Cotton	Yellowhammer	Goldenrod
Arizona	Ditat Deus. 1863	God Enriches	Grand Canyon	Cactus Wren	Saguaro Cactus
Arkansas	Regnat Populus. 1864	The People Rule	Wonder	Mocking Bird	Apple Blossom
California	Eureka.	I Have Found It	Golden	Valley Quail	Golden Poppy
Colorado	Nil sine Numine	Nothing without the Deity	Centennial	Lark Bunting	Rocky Mountain Columbine
Connecticut	Qui Transtulit Sustinet. 1842	He Who Transplanted Continues to Sustain	Constitution (Nutmeg)	Robin	Mountain Laurel
Delaware	Liberty and Independence		Diamond (Blue Hen)	Blue Hen Chicken	Peach Blossom
Florida	In God We Trust. 1846		Peninsula	Mocking Bird	Orange Blossom
Georgia	Wisdom, Justice, Moderation		Cracker	Brown Thrasher	Cherokee Rose
Idaho	Esto Perpetua. 1886	Mayest Thou Endure Forever!	Gem	Mountain Bluebird	Syringa
Illinois	State Sovereignty, National Union. 1818		Prairie (Sucker)	Cardinal	Native Violet

STATE MOTTOES, NICKNAMES, BIRDS, AND FLOWERS—Con.

State	Motto, with Year of Adoption	Translation	Nickname of State	State Bird	State Flower
Indiana	The Crossroads of America		Hoosier	Cardinal	Zinnia
Iowa	Our Liberties We Prize, and Our Rights We Will Maintain		Hawkeye	Eastern Goldfinch	Wild Rose
Kansas	Ad Astra per Aspera. 1861	To the Stars through Difficulties	Sunflower (Jayhawker)	Western Meadow Lark	Native Sunflower
Kentucky	United We Stand, Divided We Fall. 1792		Blue Grass (Corncracker)	Cardinal	Goldenrod
Louisiana	Union, Justice, and Confidence		Pelican (Creole)	Eastern Brown Pelican	Magnolia
Maine	Dirigo	I Guide	Pine-Tree	Chickadee	Pine Cone and Tassel
Maryland	Scuto Bonæ Voluntatis Tuæ Coronasti Nos	With the Shield of Thy Good-Will Thou Hast Covered Us	Old-Line	Baltimore Oriole	Black-eyed Susan
Massachusetts	Ense Petit Placidam sub Libertate Quietem. 1780	By the Sword We Seek Peace, but Peace only under Liberty	Bay (Old Colony)	Chickadee	Mayflower
Michigan	Si Quæris Peninsulam Amœnam Circumspice. 1835	If You Seek a Pleasant Peninsula, Look around You	Wolverine	Robin	Apple Blossom
Minnesota	L'étoile du Nord. 1858	The Star of the North	Gopher	American Goldfinch	Moccasin Flower
Mississippi	Virtute et Armis. 1894	By Valor and Arms	Bayou (Magnolia)	Mocking Bird	Magnolia
Missouri	Salus Populi Suprema Lex Esto. 1822	Let the Welfare of the People Be the Supreme Law	Show-Me	Bluebird	Hawthorn
Montana	Oro y Plata. 1864	Gold and Silver	Treasure	Meadow Lark	Bitterroot
Nebraska	Equality before the Law. 1867		Corn Husker (Tree-Planter)	Western Meadow Lark	Goldenrod
Nevada	All for Our Country. 1866		Sagebrush (Silver)	Mountain Bluebird	Sagebrush
New Hampshire	Live free or die		Granite	Purple Finch	Purple Lilac
New Jersey	Liberty and Prosperity. 1776		Garden	Eastern Goldfinch	Violet
New Mexico	Crescit Eundo. 1850	It grows as it goes	Sunshine	Road Runner	Yucca Flower
New York	Excelsior. 1809	Higher	Empire	Eastern Bluebird	Rose
North Carolina	Esse quam Videri. 1893	To Be rather than to Seem	Tar Heel (Turpentine)	Cardinal	Dogwood
North Dakota	Liberty and Union, Now and Forever, One and Inseparable		Sioux (Flickertail)	Western Meadow Lark	Wild Prairie Rose
Ohio	None		Buckeye	Cardinal	Scarlet Carnation
Oklahoma	Labor Omnia Vincit	Labor Conquers All Things	Sooner	Scissortailed Flycatcher	Mistletoe
Oregon	The Union		Beaver	Western Meadow Lark	Oregon Grape
Pennsylvania	Virtue, Liberty, and Independence. 1809		Keystone*	Ruffed Grouse	Mountain Laurel
Rhode Island	Hope. 1864		Little Rhody	Rhode Island Red	Violet
South Carolina	Animis Opibusque Parati.	Ready in Soul and Resource	Palmetto	Carolina Wren	Yellow Jessamine
South Dakota	Under God the People Rule		Coyote	Ringnecked Pheasant	Pasque Flower
Tennessee	Agriculture and commerce. 1797		Volunteer	Mocking Bird	Iris
Texas	Friendship. 1930.		Lone-Star	Mocking Bird	Bluebonnet
Utah	Industry		Beehive	Seagull	Sego Lily
Vermont	Freedom and Unity. 1866		Green Mountain.	Hermit Thrush	Red Clover
Virginia	Sic Semper Tyrannis	Thus ever to Tyrants	Old Dominion	Cardinal	Dogwood
Washington	Alki	By and By	Evergreen	Willow Goldfinch	Western Rhododendron
West Virginia	Montani Semper Liberi. 1863	Mountaineers Are Always Free Men	Panhandle	Cardinal	Big Rhododendron
Wisconsin	Forward		Badger	Robin	Violet
Wyoming	Cedant Arma Togæ. 1868	Let Arms Yield to the Gown	Equality	Meadow Lark	Indian Paintbrush

*Reference is to situation at apex of arch formed by states from North Carolina to New England.

FESTIVALS AND HOLIDAYS

THE word festival still carries the joyous sense of the Latin word *festum*, "feast," from which it is derived. The etymology of the word holiday, so commonly associated nowadays with business and national life, suggests in the old form, "holyday," the religious significance of all feasts and days of cessation from labor among early peoples. Popular customs, especially among more backward nations, still bear witness to the origin of popular festivals.

At the very dawn of history we find the widespread cult of the dead, accompanied with banquets at which, in the act of eating, there was believed to be communion with departed spirits. Thus the striking fact and mystery of death became the occasion of social and religious observance. Similarly, nomadic tribes, whose habits were vitally affected by the variation of light due to the phases of the moon, developed lunar feasts, in which they celebrated with joy the return of the new moon. Out of such recognition of the phases of the moon probably came originally the Jewish Sabbath, or "day of rest," which in turn gave rise to the Christian Sunday, dedicated to rest and religious observance. At a later stage of civilization, the mysterious succession of the seasons, governing human activity, occasioned the observance of festive days at planting time and at harvest. All these celebrations assumed a religious character.

The commemoration of notable events in the history of peoples and nations has given occasion for patriotic holidays. Many cities and other local communities maintain certain civic holidays upon which notable features of the community life and enterprise are celebrated. Such are the flower festivals of European and of some American cities. Colleges and schools observe many of their own holidays in celebration of their founding and of various stages of the school year.

Many of the modern festivals and holidays preserve, according to their season, much of the character of very ancient nature feasts. Recent years have seen fruitful efforts to give the festival a more effective place in modern community life. Under wise direction, it has become in many places an occasion for community expression in music, drama, and other forms of art. The ancient purpose of the holiday and the festival in æsthetic and spiritual education is thus happily being recaptured. In the following section, the observances of the most notable of the world's festal days and seasons are described, and the occasions of the most important modern national holidays are explained.

April Fools' Day or **All Fools' Day.** The first day of April, when for centuries throughout Christendom it has been customary to play irresponsible tricks on one's neighbors. Many and varied explanations have been vouchsafed for the origin of this practice, but all seem to lack the stamp of authenticity. The most convincing surmise, however, is that the custom owes its origin to the French, who adopted the Gregorian calendar in 1564. Prior to this date the French were wont to pay formal visits to their friends on April 1. On the change of the calendar these visits took place on January 1, but mock visits continued to be paid on April 1, especially on those who might forget the new order of things. The French term for this custom, *poisson d'avril*, is more euphemistic and appropriate than our own. It means an "April fish," that is, a young fish, consequently one that is easily caught.

Arbor Day. This annual tree-planting day is now generally observed throughout the United States and in parts of Canada and Britain. In some of the states, it is a legal holiday. The particular date selected varies necessarily with the climate and season, from January in Florida to April or May in most of the Northern states. To Mr. J. Sterling Morton, former commissioner of agriculture, belongs the credit for the suggestion of a definite Arbor Day. In 1872, he induced the authorities of his state, Nebraska, to set apart a day for tree planting.

Arbor Day is now the occasion of impressing upon children in the schools the importance of forestry. Its observance has grown from the simple school exercises and the planting of single trees to beautify school grounds or streets to the planting of thousands of seedlings.

Armistice (Veterans) Day. November 11. This day commemorates the signing of the armistice which ended hostilities in World War I. The armistice became effective at 11 A. M., which hour is observed in many countries by a salute of guns or one minute of complete suspension of the usual activities.

Ash Wednesday. The first day of the forty days of Lent according to modern observance. The name is significant of the custom of the Jews, who were wont to garb themselves in rough sackcloth and sprinkle their heads with ashes. It refers, however, in particular to the ritual observed by the Catholic Church. On this day the priest, before beginning mass, blesses a quantity of ashes made from the palms blessed on the Palm Sunday of the previous year. The people approach the altar rails, and the ashes are placed on the forehead of each one in the manner of a small cross, the act being accompanied by the words: *Memento homo quia pulvis es, et in pulverem reverteris*, "Remember, man, that thou art dust and unto dust thou shalt return." This custom dates from early in the 8th century.

Bank Holiday. In Great Britain, a secular day when by law banks are closed, and parties are exempt from presentment or payment of negotiable paper. The bank holidays in England, established by act of Parliament in 1871, are Easter Monday, Whitmonday, the first Monday in August, and Dec. 26 (boxing day). In Scotland, New Year's Day, the first Monday in May, the first Monday in August, and Christmas Day are bank holidays. In the United States and Canada, the term means legal holiday.

Candlemas Day. In its ecclesiastical meaning, Candlemas is the feast of the Purification of the Virgin Mary, and is observed on February 2. This festival is very strictly kept by the Roman Catholic Church, there being a procession with many lighted candles, and those required for the service of the ensuing year being consecrated on that occasion; hence the name Candlemas Day. The candles symbolize the words spoken by Simeon of the Infant Christ, "a light to lighten the Gentiles."

Popular observance of this date seems, however, to have prevailed in pre-Christian times. The Romans were accustomed to burn candles on February 2 to the goddess Februa. In modern times many traditions have attached themselves to the day. Among these is the belief that a fair Candlemas Day indicates a long winter. This is expressed in the Scotch lines:

> "If Candlemas is fair and clear,
> There'll be twa winters in the year."

In the United States the day is popularly known as Ground-hog Day, in reference to the fancy that if on this day the ground hog, or woodchuck, comes out of his burrow and sees his shadow, he will go back for another six weeks. In Canada, the bear is commonly substituted for the ground hog in this fanciful belief. A popular rural proverb runs thus:

> "February, second day,
> Have half your corn
> And half your hay."

Carnival. The word comes from the Latin through the Italian *carnevale*, meaning "farewell meat!" It is applied to a season of feasting and merrymaking observed, especially in Italy, Spain, and France, as an offset to the gloomy forebodings which the forty days of approaching Lent

are said to bring. It is probably a relic of a pagan festival held in honor of Saturn. The period of carnival extends from the feast of the Epiphany, or Twelfth Day, to the eve of Ash Wednesday; but it is on the last three days, known as high carnival, that the spirit of revelry is supreme. Arrayed in whatever garb fancy may suggest, masked revelers with music and song parade the streets and give themselves up to acts of irresponsible folly. Rome has always been the recognized home of carnival; but, among all the cities in which this reign of abandoned merriment holds sway, Venice stands unrivaled for its scenes of picturesque splendor and romantic pageantry such as are to be witnessed by day or night on the Grand Canal. In 1830, carnival was established in New Orleans, and has since grown in popularity each succeeding year. See *Mardi Gras*.

Christmas. This name, meaning Christ's Mass, is applied to the festival commemorating the birth of Christ celebrated on December 25.

The exact day of the birth of Jesus is unknown. It was not until the 3d century that his birth anniversary was celebrated to any appreciable extent by Christians, nor was there then any general agreement regarding the date on which it should be celebrated. January 6 and December 25, however, were commonly chosen in the 4th century. The general adoption of December 25, first in the West and a little later in the East, dates from the 5th century. December 25 was already a festive day for the sun god Mithra and appealed to the Christians as an appropriate date to commemorate the birth of Jesus, the "Light of the world." Theaters in the Roman Empire were ordered closed on Christmas as early as 400 but the day did not become a legal (court) holiday until 534.

In Germany the Yule feast, held at the winter solstice, had been celebrated in pre-Christian times, and many customs of the earlier festival were transferred to the Christian holiday. To replace some of these, dramatic representations of Jesus' early life were instituted; hence arose the medieval "manger songs" and Christmas carols. The Yule log first became a public ceremony in England in 1577. Plum puddings and mince pies had long since been associated with the day. The exchange of gifts at Christmas had its origin in early medieval times, but the use of Christmas cards dates from the latter half of the 19th century.

The Christmas tree is believed to have its origin in the ceremonial use of the palm tree in the worship of the Egyptian goddess Isis. A palm with twelve shoots, one to represent each month of the year, was carried in a festival of Isis at the winter solstice, celebrating the completion of one year and the beginning of another. In northern climates, this association of the palm tree with the celebration of December 25 was modified by the substitution of a fir tree.

The Christmas stocking comes from an Italian practice associated with January 6. The fairy Befana is supposed on that night to fill the stockings of children with gifts in accordance with their deserts, the naughty children receiving only ashes.

Chrysanthemum, Feast of. A celebration day observed by the Japanese, toward the end of October, when as a rule the chrysanthemum is to be found blooming in almost solitary splendor. The *Kiku-no-sekku*, as the feast is called by the Japanese, partakes of the nature of a public holiday. Gay crowds, wearing kimonos and dalmatics that take on the colors of the rainbow, pass through the streets on their way to the flower shows where gorgeous specimens of this favorite flower are on view. It is the custom on this day to sprinkle chrysanthemum leaves over the tables spread for tea, to which quaint and picturesque practice is attributed the virtue of conferring longevity.

Coconut Day. A festival observed among the Hindus for the purpose of propitiating Varuna, the god of the waters and the floods. With the Brahmans at their head, vast multitudes wend their way in procession to the sea or a river, singing hymns and reciting prayers. On the arrival at the shore or river bank, lighted tapers together with garlands of flowers and innumerable coconuts are cast into the waters. By this means, Varuna is conciliated, and, in consequence, it is believed, the earth bears fruit plentifully.

Dead, Festival of the. Among the Japanese the belief is held that the dead return once a year to visit their living relatives. In honor of such visitation a festival is celebrated from the 13th to the 15th of July. In all the temples and private shrines, fruit and other delicacies are placed upon the altars, and from time to time tea is poured out for the refreshment of the unseen visitors. Many prayers meantime are recited, and, when night sets in, tapers are lighted to guide the footsteps of the unseen, and innumerable lanterns are hung along the streets and in the cemeteries. From this picturesque display, the Festival of the Dead has come to be known among strangers as the Feast of Lanterns.

Dead, Festival of the Unforgotten. This festival among the Chinese corresponds to that of the Christian All Souls' Day. The Chinese have always been noted for their filial piety, and this love does not cease with the death of relatives, but rather is increased; hence ancestor worship forms an essential doctrine of the Chinese religion. The Festival of the Unforgotten Dead is celebrated twice a year, in the third and seventh months. On these occasions the people pay solemn visits to the tombs of their ancestors, and, after adorning these houses of the dead with flowers, they place thereon food, paper money, and paper figures representing servants. The worshipers then prostrate themselves and perform many devotions at the altars erected before each tomb, and, when the prayers are ended, wine is poured over the altars, and fireworks and crackers are lighted to exorcise the evil spirits. Finally, the pious celebrants seat themselves and partake of the material portion of the viands provided, the spiritual elements of which have already been consumed by the dead.

Dolls, Festival of. A gala day celebrated in Japan for the delectation of little girls and their dolls. The festival usually takes place toward the latter end of April. It is at this time that the sakura trees, somewhat akin to our peach trees, begin to blossom. The children and their mothers don holiday attire and proceed to decorate a special room in the house with sakura blossoms and other festoons for the reception of the waxen visitors. A banquet is then prepared for the protégées of the little foster mothers, and friends are invited to the feast. When the dolls have been admired, petted, and flattered, they are then supposed to partake of as many luxuries as they are able to consume; whatever delicacies may be left over, the children and the grown-ups finish by way of economy.

Dominion Day. The national holiday in the Dominion of Canada. It is celebrated on July 1 and commemorates the formation of the Dominion, which took place in 1867 in accordance with the British North America act, previously passed by the British Parliament. By this act, Upper Canada (Ontario), Lower Canada (Quebec), Nova Scotia, and New Brunswick were united under one Federal government.

Easter. The season which commemorates the death and resurrection of Jesus Christ is universally regarded as the chief of Christian festivals. The Venerable Bede, who was the great scholar of the early English churches, is authority for the derivation of the word Easter from the name of the Anglo-Saxon or Norse goddess of spring, Eostre or Ostara, to whom the month Eostur, corresponding to our April, was sacred. The French name *pâque*, as well as similar names in other languages, is derived through the Greek from the Aramean *pascha*, which

signifies "passing over." In apostolic times, the Christians continued to celebrate the Jewish passover, giving to the feast a Christian significance. Hence the retention of the ancient name.

Between the Jewish Christians and the Gentile Christians there arose very early a dispute as to the proper date for the celebration of the resurrection. The former adhered to the 14th day of the month *Nisan*, while the latter adopted the Sunday following. A wide variation soon arose in the date observed and, despite a decision of the Council of Nice in 325, uniformity was not attained until the 7th century. The date fixed by this council, now universally accepted, was the first Sunday after the full moon which follows the vernal equinox. If that full moon falls on a Sunday, Easter is the following Sunday.

The times of the movable feasts in the Church calendar are reckoned from the date upon which Easter falls in each year. In this connection, four periods closely connected with Easter should be mentioned: Lent, or the forty days preceding Easter Sunday; the period of Holy Week, beginning with Palm Sunday and ending with Easter; the Octave of Easter, extending from Easter to the following Sunday; Eastertide, the season from Easter Sunday to Whitsunday, or Pentecost, 7 weeks after Easter.

In addition to the ecclesiastical observances of Easter, numerous ancient pagan customs have persisted in more or less altered form. These latter are such as were connected with the primitive spring festival celebrating the return of the goddess of spring and the signs of rebirth in the world. The Easter egg was a symbol of reviving life, often colored for flowers or, by Christians, for the blood of Christ. Egg rolling at Easter was a game played at Greenwich hill, England, from early times. The custom was introduced on the lawn of the White House by President Madison. See *Calendar*; *Freya*.

Ember Days. So called from an Old English word *ymbryne*, signifying a recurring period of time, although the name is commonly regarded as a corruption of the Latin *quatuor tempora* "four seasons." The Ember Days are four periods of fast and abstinence appointed by the Church, and can be traced as far back as the early part of the 3d century. Originally there were only three, but in the time of Pope Gelasius I (492–496) a fourth had already been added. These Ember Days were definitely prescribed by Pope Gregory VII (1073–1085) to be observed by the whole Church in the four seasons of the year; namely, Wednesday, Friday, and Saturday following (1) December 13 (Feast of Saint Lucy), (2) the first Sunday in Lent, (3) Whitsunday, (4) September 14 (Exaltation of the Cross).

Empire Day. See *Victoria Day*.

Father's Day. Celebrated chiefly in the United States on the third Sunday of June, this date being generally accepted since 1924. The movement is said to owe its origin, in 1910, to Mrs. John Bruce Dodd, of Spokane, Wash., as a tribute to her father, William J. Smart, who had brought up his children orphaned of their mother. The ministerial association of Spokane, newspapers, and various commercial interests promoted the acceptance of the idea, which was facilitated by the existing popularity of Mother's Day.

Feast of Lanterns. See *Dead, Festival of the*.

Flag Day. A holiday observed in the United States to commemorate the adoption of the stars and stripes by the Continental Congress, June 14, 1777. The observance of the day was first advocated by Dr. B. J. Cigrand (1876-1932), who founded an association in 1895 to promote it. This patriotic anniversary has become an important one in the calendar of the schools. On this day also, it is generally customary to display the flag on residences and business houses.

Flowers, Battle of. The most fascinating feature of all the carnival celebrations. It originated at Nice, where it is always to be witnessed to best advantage. Carriages and vehicles of all descriptions and sizes come into requisition. Those of the wealthy are adorned with a profusion of flowers, while those of the humbler classes are decked out in white calico on which are sewed rosettes of various hues and colors. The vehicles drive up and down the *promenade des anglais*, and the occupants, as they pass, salute their friends by hurling bunches of flowers at them. The greeting is returned in the same way, and so the battle begins and is continued for many hours.

In many places on the continent of Europe, these battles of flowers take place outside carnival, generally in April, May, or June. At Ventnor, in the Isle of Wight, a famous battle takes place every year the first week of April.

Fools, Feast of. One of several strange and amazing celebrations which were permitted to take place with the sanction of ecclesiastical authority during the latter part of the middle ages. This "feast" was a development of a celebration observed by the subdeacons, on or about the Feast of the Circumcision (Jan. 1), who on this day were allowed, by way of relaxation, to assume the dignity and privileges of the higher clergy. This feast of the subdeacons was later taken up by the lower clerics called *esclaffardi*, and also by guilds and brotherhoods of "fools." It was then that it turned into a blasphemous extravaganza ending often in sacrilegious orgies and riots. Eventually it was suppressed by ecclesiastical authority.

Good Friday. The Friday before Easter, celebrated in commemoration of the crucifixion of Jesus. It was made a legal holiday by Constantine the Great in the early fourth century and is still so observed in England, Ireland, Canada, and certain parts of the United States. The eating of "hot cross buns" on Good Friday goes back to very early times.

Halloween. The name of the popular, boisterous autumn celebration means "holy eve," the occasion being the eve of "All Hallows'" or All Saints' Day, November 1. These names represent a Christian appropriation of an ancient pagan festival of autumn. Indeed the familiar customs of our Halloween—the games and pranks of children and grown-ups, together with the ghostly tales by the firelight—are relics of ancient pagan days. Long before Christian times, the Romans celebrated, at about the Halloween season, the festival of Pomona, goddess of gardens. The druidic autumn feast fell at about the same time. Hence, in western Europe and in England, Roman customs were added to the druid observances and perpetuated in the popular festivities of modern times.

Jackson's Day. The popular name given to the anniversary celebration of the defeat of the English at New Orleans, January 8, 1815, by General Andrew Jackson, who afterward became seventh president of the United States. It is a legal holiday in Louisiana, and is observed by the Democrats in general throughout the United States.

Jubilee. From the Hebrew word *jobel* or *yobel*, which means a "ram" or "ram's horn" and, by extension, "the blast of a trumpet." According to the Jewish law mentioned in Leviticus XXV, the year following each seventh Sabbatical year was to be announced by the sound of trumpets on the Day of Atonement as a year of remission and universal pardon. The year of Jubilee occurred, therefore, once in every 50 years.

The year of Jubilee was instituted in the Christian Church by Pope Boniface VIII in 1300. From the year 1450, the Jubilee has been held every 25 years, with but three exceptions due to political upheavals.

July First. See *Dominion Day*.

July Fourteenth. The national festival of France, which practically corresponds to Independence Day in America. The Bastille, a huge fortress built in the 14th century, and used as a prison for political offenders and victims of those in power.

had long since become the symbol of despotism and oppression to the French people. Goaded by the memory of centuries of persecution and tyranny, the mob of Paris, on the morning of July 14, 1789, stormed and took this hitherto impregnable fortress. The taking of the Bastille was the tocsin of the Revolution, for on the ruins of the old régime typified by this hated structure was to be built at no distant date the Republic of France.

The first anniversary of the capture of the Bastille was called the Feast of Federation, at which the unfortunate Louis XVI swore allegiance to the Revolutionary constitution, which oath was later to be sealed by his blood. Only in 1880 was July 14 proclaimed by the National Assembly a general holiday. Since then, the Republican anniversary is celebrated with unabated enthusiasm and rejoicing, such as the French, especially those of Paris, know so well how to manifest.

July Fourth. The birthday of American independence and the greatest holiday of all those observed in the United States. On this day in the year 1776, the Declaration of Independence, as prepared by a committee of five, of which Thomas Jefferson was chairman, and amended by the Congress, was adopted.

Kermis or **Kirmess.** As the name indicates, *kirmess* or *kirkemesse*, that is, Church mass, was an old religious festival which took place on the anniversary of the dedication of a church. After the mass, the people gave themselves up to merrymaking and general feasting. The Kermis has lost its former devotional significance, being in the nature of an annual fair where music and dancing are the order of the day. The idea of the kermis has been adopted in America, and under this name fairs and open-air bazaars are frequently organized for the benefit of some hospital or other charity.

Kiteflying Festival. Once a year, the Chinese, young and old, devote a day to kiteflying. This day is called *Teng Kao*, or "Feast of High Flight," which is celebrated on the ninth day of the ninth month of the Chinese calendar. If the kiteflier be guilty of wrongdoing, the kite will fly away with the penalty due to it. Accordingly, when the kite is sky-high, the Chinaman cuts it loose, and settles down once again with an easy conscience.

Labor Day. In America, the celebration of the first Monday in September with parades and demonstrations in the cause of improved labor conditions was begun by the Knights of Labor in 1882 under the leadership of P. J. Maguire of Camden, N. J. The plan was adopted by other organizations. Since 1887, when the first act making the day a legal holiday was passed in Colorado, Labor Day has been established in all of the states of the Union and in Canada, the first Monday in September being the usual date adopted. In Europe, since about 1890, May 1 has been observed as Labor Day. See *Holidays in the United States*; *Holidays in Canada.*

Leap Year. The custom of women proposing marriage in leap year goes back at least as far as 1288, when a law in Scotland gave any unmarried woman the right to propose marriage in leap year. The eligible man to whom a proposal was made must accept or pay a maximum fine of one pound. Similar laws were passed in France, Genoa, and Florence.

Lent. A word from the Anglo-Saxon *lencten* meaning "springtime." It is employed to denote the forty days preceding Easter, the period observed in the Catholic Church as a fast. From the earliest times this custom of fasting was enjoined on Christians. But the law requiring of all Catholic Christendom the fast from Ash Wednesday to Holy Saturday (Sundays excluded) was not promulgated until the beginning of the 9th century.

In those early days the law of fasting was very strictly enforced and kept. Only one meal a day, and that to be taken in the evening, was permitted. In the course of succeeding centuries many relaxations and concessions were allowed, and in modern days the pope is accustomed to grant various dispensations lightening the burdens of strict observance. However, those whose health will permit are still bound to but one meal a day, two ounces of solid food being allowed as *frustulum* or *break-fast* in the morning, and a collation of eight ounces sometime before or after the chief meal.

Wednesdays and Fridays throughout Lent, and also the days of Holy Week, except Maundy Thursday, are days when flesh meat is forbidden. By special indult, the Holy See grants faculties to bishops in the United States, whereby workingmen and their families may use flesh meat once a day throughout the year, except on Fridays, Ash Wednesday, Holy Saturday, and during the vigil of Christmas.

Lupercalia. A name signifying "the festival of the wolf," which was celebrated by the ancient Romans on the 15th of February in honor of Lupercus, the protector of shepherds. Goats and young dogs were sacrificed on this day by the Luperci or priests of Lupercus. Clothed in the skins of the slaughtered animals and armed with thongs, they ran through the street striking all whom they met. Such blows were welcomed by women in the belief that thereby they were preserved from sterility.

Mardi Gras (*mär'dē grä'*). The French name for Shrove Tuesday, and, by extension, for the celebration of that day in the European carnival. In the United States, the most elaborate festival of Mardi Gras is that held annually at New Orleans, in which much of the Old World carnival spirit is preserved. The principal feature of this festival is a magnificent civic procession and pageant. See *Shrove Tuesday*; *Carnival.*

Maritime Day. May 22, the anniversary of the departure in 1819 from Savannah, Ga., of the *Savannah*, the first vessel equipped with steam propulsion to make a successful trip across the Atlantic Ocean. In accordance with a resolution of Congress approved in May 1933, the president proclaims annually the observance of this day, which is celebrated by the display of flags.

Marriage of the Adriatic. After the victory of the Venetians over the Imperial fleet in 1177, Pope Alexander III sent to the doge a gold ring as a symbol of the city's dominion over the sea. Thereafter the annual celebration of the victory took place on Ascension Day, when the doge from his state barge cast into the sea a consecrated ring, with the words: "We wed thee, O Sea, in sign of true and everlasting dominion." Thus, as a bride to her husband, the sea became subject to Venice. This picturesque ceremony was called by the Venetians, *il sposalizio del mare*, or "espousal of the sea."

May Day. The first day of May, which in olden times in England, France, and Germany was celebrated with much show of rejoicing and merrymaking. This festival is said to be a survival of an ancient one observed by the Romans in honor of Flora, the goddess of flowers.

Though the custom of keeping May Day still survives in country districts and attempts are being made to revive it in the schools, as a general celebration it may be said to be moribund. In medieval England, lads and lassies sallied forth on May Day morning to gather the hawthorn blossom or "May" along the country lanes. With it they crowned the fairest maiden of them all and proclaimed her "Queen o' the May." They then set up the Maypole decked with garlands, and danced the morris dance all day.

Toward the end of the 19th century, the various labor organizations in Europe adopted May Day as the occasion of annual demonstrations. In some countries, the day was frequently marked by clashes between the workingmen and government troops. More recently the First of May has been observed in an orderly manner as Labor Day.

Memorial Day or **Decoration Day.** This annual memorial takes place on May 30 throughout the Northern states, where it is observed generally

as a legal holiday. The beautiful custom, now nation-wide, was first inaugurated by the women of the South who, in the first days of early spring, went out to strew flowers on the graves of their beloved dead. This example was imitated here and there in the North. In 1868, General John A. Logan, then commander in chief of the Grand Army of the Republic, issued an order designating May 30 as a day for the decorating of soldiers' graves. Since that time, the 30th of May has become the occasion in most states for the commemoration of American soldiers and, in many localities, of all dead.

Middle Kingdom, Feast of the. This is a feast celebrated among the Chinese usually about the middle of the second month according to their calendar. On this occasion, branches of the cactus tree with bunches of sago plant and garlic are hung outside the doors. The women bake a special cake, the chief ingredient of which is the poison-fish plant. These cakes are to be eaten sitting, as thus they are efficacious against evil spirits. The cakes are frequently sent also to friends who have emigrated to other countries.

Mother's Day. This day is celebrated on the second Sunday of May by the wearing of a carnation—red if one's mother is living, white if she is dead. Frank E. Hering of South Bend, Ind., proposed before conventions of the Eagles lodge, first at Indianapolis on February 7, 1904, that a day should be set aside by lodges for honoring mothers. Miss Anna Jarvis (d. 1948) of Philadelphia proposed the manner and time of celebration in a public meeting in 1907. Philadelphia was the first city to observe the day—May 10, 1908. By presidential proclamation dated May 8, 1914, flags were flown on government buildings in honor of the day. The observance was introduced into England in 1913.

Navy Day. Since 1922, the anniversary of Theodore Roosevelt's birthday, October 27, has been observed as Navy Day in the United States. Its purpose is to educate the people in navy policy. Addresses are given by public men setting forth the requirements of sea service, the defense value of the navy, and its importance in international affairs.

New Year's Day. The celebration of the first day of the calendar year is one of the oldest of festivals. The reason of its observance has varied, of course, with the different calendar systems. Its holiday character is today well-nigh universal in civilized countries. In China and Japan, and generally throughout the Orient, the customs attending New Year's Day are elaborate, and in the air of rejoicing and the exchange of gifts the festival partakes of the nature of the Western Christmas celebrations.

New Year's Day in Scotland, as well as in France and some other countries of Europe, is a more important holiday than Christmas. In America, observance of the day has varied with the sections of the country and the traditions of the people.

Generally, New Year's Eve and New Year's Day are occasions of visiting and entertainment; in many communities, churches observe New Year's Eve with watch night services. The arrival of the new year is generally signalized by the noise of bells, sirens, whistles, and horns. Since Washington's time it has been the custom for the president of the United States to hold a reception at the White House. In Philadelphia, the mummers' parade, with the marchers in fancy dress, is a colorful annual fixture that has become famous.

Olympic Games. These contests formed the most notable of the four Greek festivals of ancient times, and citizens from all the Grecian states were eligible to take part in them, provided they gave proofs of civic and personal integrity. The games took place on the plain of Olympia in Elis every fourth year, and consisted of wrestling, throwing of the discus, chariot racing, and foot racing. The names of the victors were kept on record, and great honors were shown them. Each successful competitor was crowned with a garland of wild olive and received a palm branch, the emblem of victory. Moreover, their statues were erected in the Altis, or central enclosure of the sacred precincts of Olympia. The year 776 B. C. was taken as the date of the first Olympic games, and Greek dates were reckoned from that time.

In 396 A. D., the Olympic games were suppressed by order of Theodosius, the Roman emperor. After a lapse of 15 centuries, they were revived, and in 1896 a great international contest of athletes was organized at Athens, to be the forerunner of a long series of such competitions. The outstanding feature of the modern Olympic games is the Marathon race, over a course of 26 miles, 385 yards—the distance from Marathon, Greece, to Athens. This race commemorates the famous run of Phidippides, the messenger who brought to Athens the report of the Greek victory over the Persian army at Marathon in 490 B. C. Phidippides is said to have expired immediately after delivering the message. The dates and places of holding the modern Olympic games are as follows: 1896, Athens, Greece; 1900, Paris, France; 1906, Athens, Greece; 1908, London, England; 1912, Stockholm, Sweden; 1920, Antwerp, Belgium; 1924, Paris, France; 1928, Amsterdam, Netherlands; 1932, Los Angeles, U. S.; 1936, Germany; 1948, England; 1952, Helsinki, Finland; 1956, Melbourne, Australia.

Pan-American Union Day. This day is observed on April 14 in the United States and the Latin American republics of America. It was proclaimed by the governments of these countries for the first time in 1931. Exercises are held in schools, colleges, and municipalities.

Passover. The most important of the Jewish festivals, called also the Feast of Unleavened Bread. It is observed in commemoration of the liberation of the Hebrews from bondage in Egypt. This feast begins on the 14th day of the month known as *Nisan*, the first of the Jewish year, corresponding to parts of March and April, and lasts until the 21st. The first and last days of the feast are observed as holydays. During this week Passover cakes, made simply of flour and water and baked hard, are eaten. For many centuries this festival has been begun with a festal meal, at which appear symbols of the meaning of the celebration.

Red-Letter Days. Saints' days and other holidays were formerly, and usually are still, marked in Church calendars with a red letter. From this custom comes the expression "red-letter day," meaning an especially fortunate or happy one.

Rose Festival. The annual civic celebration held in Portland, Oregon, during a week in the early part of June, when the roses, for which the city is noted, are at the height of their splendor. The festivities include a pageant of roses, a water carnival, and a program of athletic games.

Sabbatical Year. According to ancient Jewish law, every seventh year the Israelites allowed their fields to lie fallow, neither tilling nor sowing them, and even refraining from gathering the vintage. By extension, this term is applied to prolonged vacations which, in some colleges, are allowed to professors about every seventh year for the purpose of travel and research.

Saint Patrick's Day. March 17, the day on which the Irish commemorate their great national saint, who died at Saul (Sabhal), County Down, March 17, 493, at the patriarchal age of 106. He was buried at the chieftain's dun or fort two miles outside the town. From all parts, it is recorded, bishops, priests, and people gathered round his tomb to honor the venerable father of their faith. For over 14 centuries, this same spirit of reverencing the memory of Patrick has survived in the hearts of the Irish in every part of the world.

Saint Valentine's Day. A festival called also popularly Valentine Day, falling on February 14. The origin of the observance of this day is

altogether uncertain. Equally vague are the circumstances that led to its connection with Saint Valentine. Among the many interesting folk customs of medieval France and England was a gathering of the young people on Saint Valentine's eve. Names were drawn by chance from a receptacle, the person whose name was on a slip becoming the "valentine" or sweetheart of the holder for the ensuing year. Some antiquarians find a precedent also in certain similar customs connected with the ancient Lupercalial which occurred in February.

Saturnalia (*săt'ŭr-nā'lĭ-ȧ*). An ancient festival among the Romans, held in honor of Saturn and celebrated about the middle of December. It usually lasted several days beyond the date set apart for the official rites. A king was chosen to preside over the feasting, which was a mixture of mirth and license, when masters and mistresses were wont to wait on their slaves. The term is now used to designate any festivity where the manner of merrymaking is of an unrestrained and intemperate nature.

Shrove Tuesday. The Tuesday before Ash Wednesday, which is the equivalent for the French *mardi gras* and the Italian *martedi grasso* (fat Tuesday), the last day of carnival in the greater part of southern Europe. The English term shrove comes from "to shrive," or hear confessions, and is further explained by a quotation from the *Ecclesiastical Institutes*, translated by Abbot Ælfric, 1000 A. D.: "In the week immediately before Lent every one shall go to his confessor and confess his deeds, and the confessor shall so shrive him as he then may hear by his deeds what he is to do (by way of penance)."

The English custom of eating pancakes on this day arose from the economy of using up the eggs and fat which were formerly forbidden articles of diet during the forty days of Lent; hence also the origin of the name Pancake Tuesday, or Pancake Day.

Sunday or **Sabbath.** The first day of the week, called Sunday, is recognized by Christians as a holy day. By the church, the sanction of the fourth commandment has long been invoked for the observance of Sunday by worship and by cessation of ordinary labor. The Jewish Sabbath, or "day of rest," coincides with Saturday in the modern calendar. The word Sabbath is also frequently applied to the first day of the week. Following precedents of English common law, Sunday is generally recognized as a legal holiday throughout the United States.

Terminalia (*tûr'mĭ-nā'lĭ-ȧ*). An ancient Roman festival held annually on February 23 in honor of Terminus, the god of boundaries. Neighbors on adjoining lands met at the boundary stones and there united in offering up sacrifices, after which they gave themselves up to feasting, games, and dances.

Thanksgiving Day. In the United States, a day set apart annually and appointed by the president and by the governors of the various states for giving thanks to God for the favors and mercies of the year past. It is essentially a harvest festival and owes its origin to the Pilgrim Fathers. Despite the lean harvest of the summer of 1621, Governor Bradford decreed a day of thanksgiving and rejoicing after the scanty crop had been gathered in.

In the course of the Revolution, Congress frequently recommended days of thanksgiving and prayer. After the close of the war many of the states adopted the custom of an annual day of thanksgiving. There was, however, no uniformity of date for holding this festival. Owing, however, to the persistence of Mrs. Sarah Josepha Hale, President Lincoln in 1863 appointed Thursday, August 6, "as a day for national thanksgiving, praise and prayer." From 1864 until 1939, the last Thursday in November was proclaimed annually by the president as the day of national thanksgiving. In 1939–41, President Roosevelt moved the date forward one week to leave more time between Thanksgiving and Christmas. A number of states retained the later date.

In December 1941, through a joint resolution adopted by the United States Senate and House of Representatives and signed by President Roosevelt, the fourth Thursday of November was officially designated as the date for Thanksgiving Day.

Tournament of Roses. At Pasadena, California, on January 1 of each year, is held a festival to which the floral wealth of southern California contributes in lavish profusion. The fête is a civic enterprise of the city of Pasadena, in which neighboring communities, large and small, participate. A brilliant pageant of flower-decked floats, automobiles, and carriages forms the principal feature of the celebration, which includes also games and races. Since its inauguration in 1890, this festival has become a famous event which attracts thousands of visitors from all parts of the world.

Victoria Day. The birthday of Queen Victoria, May 24. A movement to celebrate this date as Empire Day was initiated by Reginald Brabazon, earl of Meath, an English philanthropist. The aim of the proposal was to emphasize the unity of interest among the parts of the British Empire. Both the observance and the name of Empire Day have gained wide acceptance in Canada and in other parts of the British Commonwealth of Nations.

Wedding Anniversaries. Anniversaries of the wedding day are named from a custom (generally observed in all civilized countries) of giving certain kinds of presents as each anniversary comes about. The three most important anniversary celebrations are known as the silver wedding, after twenty-five years; the golden wedding, after fifty years; and the diamond wedding, after sixty, seventy, or seventy-five years. Other anniversaries of different periods have various other names, but are observed only locally, as in England. For instance, the first anniversary is known as the, *paper* or *iron* wedding; the second, *straw*; the third, *candy*; the fourth, *leather*, the fifth, *wooden*; the seventh, *floral;* the tenth, *tin;* the twelfth, *linen;* the fifteenth, *crystal;* the twentieth, *china*; the thirtieth, *pearl;* the thirty-fifth, *coral*; the fortieth, *emerald;* and the forty-fifth, *ruby*. These latter names are now practically moribund and are seldom used.

Yom Kippur. This "Day of Atonement" is the holiest day of the Jewish religious year. It occurs on the 10th day of Tishri, the seventh Hebrew month, between the middle of September and the first of October. It marks the close of the ten Penitential Days, which begin with Rosh Hashanah, the first day of the Jewish New Year.

HOLIDAYS IN THE UNITED STATES

Although the term "national holiday" is popularly applied to the Fourth of July and other generally observed holidays, the term is really a misnomer. Congress can point the way by legislating holidays for the District of Columbia and the territories under Federal control, but legal holidays are established by statute in the various states, as shown in the following list. Unless otherwise stated, Labor Day is the first Monday in September.

HOLIDAYS IN THE VARIOUS STATES

Alabama.—Jan. 1; Jan. 19 (Lee's birthday); Feb. 22 (Washington's birthday); Mardi Gras; Apr. 13 (Jefferson's birthday); Apr. 26 (Confederate Memorial day); June 3 (Jeff. Davis's birthday); July 4; Labor day; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Alaska.—Jan. 1; Feb. 12 (Lincoln's birthday); Feb. 22; Mar. 30 (Seward day); May 30; July 4; Oct. 18 (Alaska day); Thanksgiving day; Dec. 25.

Arizona.—Jan. 1; Feb. 14 (Admission day); Feb. 22; May 30; July 4; Labor day; Oct. 12 (Columbus day); General Election day; Nov. 11; Thanksgiving; Dec. 25; Arbor day.

Arkansas.—Jan. 1; Jan. 19; Feb. 22; June 3; July 4; Oct. 12; Labor day; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

California.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Sept. 9 (Admission day); Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Colorado.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Aug. 1 (Colorado day); Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Connecticut.—Jan. 1; Feb. 12; Feb. 22; Good Friday; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Delaware.—Jan. 1; Feb. 12; Feb. 22; Good Friday; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 7 (Delaware day); Dec. 25; Arbor day.

District of Columbia.—Jan. 1; Jan. 20 (Inauguration day); Feb. 22; May 30; July 4; Labor day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Florida.—Jan. 1; Jan. 19 (Lee's birthday); Feb. 22; Mardi Gras; Good Friday; April 26 (Confederate Memorial day); June 3 (Jeff. Davis's birthday); July 4; Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Georgia.—Jan. 1; Jan. 19 (Lee's birthday); Feb. 12 (Georgia day); Feb. 22; Apr. 26 (Confederate Memorial day); June 3; July 4; Labor day; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Idaho.—Jan. 1; Feb. 22; May 30; June 15 (Pioneer day); July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Illinois.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Indiana.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Iowa.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Kansas.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Kentucky.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Louisiana.—Jan. 1; Jan. 8 (anniversary of the battle of New Orleans); Feb. 22; Mardi Gras; Good Friday; June 3 (Jeff. Davis's birthday); July 4; Labor day; Oct. 12; Nov. 1 (All Saints' day); General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Maine.—Jan. 1; Feb. 22; Apr. 19 (Patriots' day); May 30; July 4; Labor day; Oct. 12; General Election day (Courts only); Thanksgiving day; Dec. 25; Arbor day.

Maryland.—Jan. 1; Feb. 22; Mar. 25 (Maryland day); Good Friday; May 30; July 4; Labor day; Sept. 12 (Defenders' day); Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Massachusetts.—Jan. 1; Feb. 12; Feb. 22; Apr. 19 (Patriots' day); May 30; July 4; Labor day; Oct. 12; Thanksgiving day; Dec. 25; Arbor day.

Michigan.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Minnesota.—Jan. 1; Feb. 12; Feb. 22; Good Friday; May 30; July 4; Labor day; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Mississippi.—Jan. 1; Jan. 19; Feb. 22; Apr. 26 (Confederate Memorial day); June 3; July 4; Labor day; Thanksgiving day; Dec. 25; Arbor day.

Missouri.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 1 (Missouri day); Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Montana.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Nebraska.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Nevada.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; Oct. 31 (Admission day); General Election day; Thanksgiving day; Dec. 25; Arbor day.

New Hampshire.—Jan. 1; Feb. 22; fast day appointed by the governor; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

New Jersey.—Jan. 1; Feb. 12; Feb. 22; Good Friday; May 30; July 4; Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

New Mexico.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; General Election day; Thanksgiving day; Dec. 25; Arbor day.

New York.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

North Carolina.—Jan. 1; Jan. 19; Feb. 22; Apr. 12; May 10 (Confederate Memorial day); May 20 (anniversary of the signing of the Mecklenburg declaration of independence); July 4; Labor day; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

North Dakota.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Ohio.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Oklahoma.—Jan. 1; Feb. 22; May 30; July 4; Labor day; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Oregon.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Pennsylvania.—Jan. 1; Feb. 12; Feb. 22; Mar. 4 (Pennsylvania day); Good Friday; May 30; July 4; Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day: Dec. 25; Arbor day.

Puerto Rico.—Jan. 1; Feb. 22; Mar. 22 (Emancipation day); Good Friday; May 30; July 4; July 25 (Occupation day); Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Rhode Island.—Jan. 1; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

South Carolina.—Jan. 1; Jan. 19 (Lee's birthday); Feb. 22; May 10 (Confederate Memorial day); June 3 (Jeff. Davis's birthday); July 4; Labor day; General Election day; Thanksgiving day; Dec. 25; Dec. 28 (Woodrow Wilson's birthday); Arbor day.

South Dakota.—Same as in North Dakota, excepting Oct. 12.

Tennessee.—Jan. 1; Jan. 19; Feb. 12; Feb. 22; Good Friday; May 30; June 3; July 4; July 13 (Gen. Bedford Forrest's birthday); Labor day; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Texas.—Jan. 1; Feb. 22; March 2 (anniversary of Texas independence); Apr. 21 (anniversary of battle of San Jacinto); June 3 (Jeff. Davis's birthday); July 4; Labor day; Oct. 12; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Utah.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; July 24 (Pioneer day); Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Vermont.—Jan. 1; Feb. 22; May 30; July 4; Aug. 16 (Bennington Battle day); Labor day; Oct. 12; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Virginia.—Jan. 1; Jan. 19; Feb. 22; May 30; June 3; July 4; Labor day; General Election day; Nov. 11; Thanksgiving day; Dec. 25; Arbor day.

Washington.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

West Virginia.—Jan. 1; Feb. 12; Feb. 22; May 30; June 20 (West Virginia day); July 4; Labor day; Oct. 12; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Wisconsin.—Jan. 1; Feb. 22; May 30; July 4; Labor day; General Election day; Thanksgiving day; Dec. 25; Arbor day.

Wyoming.—Jan. 1; Feb. 12; Feb. 22; May 30; July 4; Labor day; General Election day; Thanksgiving day; Dec. 25; Arbor day.

HOLIDAYS IN CANADA

The following holidays are generally observed in the Dominion of Canada with the closing of banks and public offices and the cessation of business: Jan. 1, Good Friday, Easter Monday, May 24 (Victoria day or Empire day), July 1 (Dominion day), first Monday in September (Labor day), Dec. 14 (King's birthday), Dec. 25 (Christmas day). Thanksgiving day is fixed by proclamation of the governor-general, usually the second Monday in October.

RELIGIOUS BODIES—FACTS AND PHILOSOPHIES

For understandable reasons, statistics concerning church organizations are subject to frequent revision. Variations from year to year are explained partly by the growth of population, by increased or decreased activity of church bodies, and sometimes, particularly in the United States, by the merging of related sects. Owing to changes in classification, a detailed comparison of statistical tables by decades is not practical beyond certain limits. However, a summation of totals reported by the various groups gives a fairly accurate picture of church membership as of a particular date.

The assembling of information concerning 258 religious organizations in the United States is a continuing process which depends upon voluntary reporting of statistics by the various groups. At present the compiling is done by the Bureau of Research and Survey of the National Council of the Churches of Christ in the U.S.A. The membership data thus collected, along with many additional facts, can be found in the *Yearbook of American Churches*. In this volume, and in *Statistical Abstracts of the United States*, which summarizes information from it, a breakdown of membership figures is given, both for groups numbering 50,000 or more and for branches and smaller organizations.

CHURCHES IN THE UNITED STATES
(A partial list of larger groups)

Name	Members	
	1946	1956
Adventists	244,157	312,782
Assemblies of God, General Council	241,782	400,047
Baptist Bodies, Grand Total	15,084,530	18,035,823
Brethren (German Baptist, Dunkers)	182,947	239,664
Church of Christ, Scientist	(Membership figures not available)	
Churches of God	——	382,775
Church of the Nazarene	201,487	270,576
Churches of Christ	——	1,600,000
Congregational Christian Churches	1,140,824	1,342,045
Disciples of Christ	1,889,066	1,897,736
Eastern Orthodox (Seven groups)	711,517	891,348
Evangelical and Reformed	695,029	774,277
Evangelical United Brethren	——	746,206
Friends	113,465	121,468
Jewish Congregations	4,641,000	5,500,000
Latter Day Saints	911,279	1,179,887
Lutheran (All branches)	5,089,986	6,700,147
Mennonite (Combined totals)	105,764	158,419
Methodist (All branches)	8,430,146	11,572,016
Presbyterians (All branches)	3,044,800	3,628,975
Reformed Bodies	310,852	426,737
Roman Catholic	24,402,124	33,396,647
Salvation Army	205,881	249,641
Unitarian	74,789	96,715

Some groups not represented in the foregoing table are given below, with their latest available totals:

African Orthodox, 7,000; American Ethical Union, 5,265; Buddhist Churches of America, 67,000; Christian Union, 15,400; Churches of God in Christ, 305,000; International Church of Four Square Gospel, 67,287; Moravian Bodies, 47,427; New Apostolic Church of North America, 10,100; Pentecostal Assemblies, 302,446; Polish National Catholic Church, 265,879; Reformed Episcopal, 8,701; United Brethern, 21,615; Universalist Church of America, 73,194; Volunteers of America, 25,860.

BIBLIOGRAPHY ON WORLD RELIGIONS

Since the formation of the United Nations organization, comprising member countries with widely divergent religious backgrounds, new impetus has been given to the study of world religions, their traditions and philosophies. For the guidance of persons seeking information concerning this field of knowledge, a "Committee on College Reading" has recently compiled a carefully selected group of references dealing with various aspects of the subject.* By permission, the following titles, with the Committee's descriptive notes, are given here.

Apocrypha (tr. by Goodspeed) *Univ. Chicago Press*
Religious writings similar to the books of the Old and New Testament, but not universally accepted.

Ballou, Robert (Ed.)—World Bible . . . *Viking*
Comprehensive selections from basic texts of Hinduism, Buddhism, Confucianism, Taoism, Zoroastrianism, Judaism, Christianity, and Mohammedanism.

Bates, E. S. (Ed.)—The Bible Designed to be Read as Living Literature . . *Simon and Schuster*
Largely the King James version, but modernized and arranged chronologically by subject matter.

Browne, Lewis—This Believing World. *Macmillan*
An objective summary and analysis of the chief religions of the world.

Brunini, John G.—Whereon to Stand . . *Harper*
Handbook on the Roman Catholic Church and its doctrines. Statement by a layman for non-Catholics who want facts without controversy.

Burrows, Miller—The Dead Sea Scrolls.

Fosdick, Harry E.—A Guide to Understanding the Bible . . . . . *Harper*
Traces the development of concepts of God, man, right and wrong, suffering, fellowship with God, and immortality.

Goodspeed, E. J.—The Story of the Bible. *Univ. of Chicago Press*
An account of the manuscripts that form the Bible.

James, William—Varieties of Religious Experience. *Modern Library*

Jurgi, E. J. (Ed.)—The Great Religions of the Modern World . . . . *Princeton Univ. Press*
Ten essays, each by an authority, on the ten great living religions.

Roth, Cecil—The Jewish Contribution to Civilization . . . . . *Harper*
An authoritative account of the part that the Jewish people have played in western civilization.

Sheen, Fulton J.—Preface to Religion . . *Kenedy*
A presentation of the Catholic philosophy in answer to the quest for happiness and peace.

Williams, Michael—Christian Classics . *Liveright*
An anthology of religious autobiography, of spiritual counsel, of English mysticism and of religious poetry.

*Published by Hendricks House, Farrar Straus, N. Y. (library edition). New American Library, N. Y. (pocket book)

RELIGIONS OF THE WORLD

Name	North America	South America	Europe	Asia	Africa	Oceania	Total
Christians	154,754,000	62,258,000	333,415,000	30,000,000	9,000,000	16,000,000	605,427,000
Jews	5,180,000	598,000	3,780,000	1,030,000	745,000	40,000	11,373,000
Mohammedans	20,000	10,000	4,000,000	170,000,000	40,000,000	35,500,000	249,530,000
Buddhists	5,000	1,000	100,000	165,000,000	5,000	150,000	165,261,000
Hindus	100,000	100,000	50,000	260,000,000	100,000	150,000	260,500,000
Confucianists, Taoists	100,000	5,000	25,000	350,000,000	25,000	1,200,000	351,355,000
Shintoists	1,000	1,000	5,000	30,000,000	5,000	700,000	30,712,000
Animists	20,000	1,300,000	5,000	30,000,000	80,000,000	24,000,000	135,325,000
Miscellaneous*	10,000,000	1,000,000	163,000,000	11,185,000	263,000	273,000	185,721,000

*Includes atheists where, as in Russia, government is officially atheist.

POPULAR SUPERSTITIONS

The term superstition, like religion, is a word of uncertain origin. The process by which the Latin word, *superstitio*, literally "standing over," acquired the sense of "awe" or "excessive devotion" is a matter of conjecture. In modern times, especially within the recent scientific period of thinking, superstition has borne two related meanings. As contrasted with the development and application of scientific knowledge, superstition is a relic of the prescientific ages,—of the childhood thought and fancy of the race. As compared with the orderly, systematic conceptions of science about the world and human conduct, superstition accepts a strange, disorderly world of chance, in which men must encounter the play of unknown forces with traditional rites and irrational charms. The practices of primitive superstition are usually directed to propitiation or control of mysterious and lawless powers.

The early history of the human race produced a huge mass of superstition, born of ignorance and fear. Much of this body of beliefs and practices is yet in vogue among primitive tribes, and not a little of it persists in the backward sections of civilized nations. Indeed recent studies have shown that few even of the most highly educated men and women are free of traces of superstition. Many of these appear, however, merely as survivals of childhood practices; others are retained as amusing, playful fancies.

Because of the fact that many superstitions arise from efforts to explain phenomena and to adapt human activity to the explanations, a close relationship between superstition and science is observable. This fact is particularly evident in the connection between the pseudo science astrology and the science astronomy. Astrology, like alchemy, mingles much true scientific observation with superstitious reasoning.

As science advances, superstition recedes. For science brings increasing freedom through comprehension and rational use of natural forces, while superstition holds the human mind in bondage to blind magic and fear. The progress of education is indicated by the disappearance of superstitions.

In the following pages, a large number of the most prevalent superstitions are briefly treated. Some of these examples are drawn from the lore of primitive peoples, but most are popular superstitions found today in America and Europe.

Astrology. The pseudo science which purports to explain human character and to forecast conduct by the supposed influences of the planets and the stars. The practice of the art of casting *horoscopes*, or predicting the course of a person's life by reference to the positions of heavenly bodies at the time of his birth, is almost as ancient as civilization. By means of great circles passing through the poles, the astrologers divided the heavens into 12 "houses," each house having a planet as lord. That "house" which, at the moment of a person's birth, was about to appear above the horizon was said to be in ascendant, and to be most powerful in its influence. The point just visible on the ecliptic was called the horoscope. If, for example, the house of Mars was in ascendant at a child's birth, it was prophesied that the child would become warlike. Other qualities and fortunes were predicted from various relations of the planets and constellations.

Astrology is the most elaborately organized of superstitions. It was practiced as a means of livelihood by the celebrated astronomer Kepler. It became more and more discredited in Europe during the 17th century, although it still has its devotees in all countries.

Basilisk (*băz'ĭ-lĭsk*; *băs'-*). A serpent, lizard, or dragon, mentioned in fable, whose hissing could drive away all other snakes. By its very look, it was said to fascinate to helplessness, and its breath meant death to its victims. To have the eye of a basilisk means figuratively to attract others by one's gaze and to have a mysterious sway over them.

Birds and Beasts, Superstitions about. In Holland and in other northern European countries, the *stork* is welcomed about homesteads. Platforms are often erected on the roofs of houses to induce the birds to build their nests. The birds are fabled to bring children, and there is a prevalent fancy that where the storks nest no fire will come.

According to the ancients, the seven days prior to and the seven days following the winter solstice, the shortest day of the year, were halcyon days. During this period the *halcyons*, or kingfishers, are said to build their floating nests upon the sea and hatch their young, "so that by their privilege we have seven days and seven nights in the very heart of winter, wherein we may sail without danger." Hence the expression "halcyon days" is used figuratively to mean a time of rest and tranquil enjoyment.

In Ireland is found the belief that a *robin* entering a peasant's house is a sign of severe frosts and snow. In the Kentucky mountains, the flight of a bird into a house is a sign of bad luck, particularly an omen of death.

The common *dragon fly* is the object of several curious superstitions. Perhaps the most prevalent is that this beautiful insect will get into children's hair and sew up their ears. Hence the name "devil's darning needle."

Around the *petrels* many superstitions have gathered. These birds are supposed by sailors to be under the Virgin Mary's protection. Each is said to represent the soul of a mariner lost at sea. The coming of one species near a ship is believed to forbode storm; hence the name "storm petrel."

Certain Eskimo tribes are said to bury a *dog* with a dead child, that the dog may guide the child in another world.

Among the Negroes of the southern United States, much superstitious lore about animals is current. It is regarded as an omen of bad luck, for example, to have a *rabbit* cross one's path from right to left; if the rabbit crosses from left to right, good luck will follow. The left hind foot of a rabbit is held to be a lucky talisman. While possession of a horseshoe is lucky, finding a mule shoe is most unlucky.

Birthstones. In addition to their value as ornaments, certain precious stones have been endowed with fancied lucky qualities and worn as talismans. Astrologers have developed an elaborate symbolism of gems, and out of this has arisen the widely prevalent fancy of birthstones, or jewels supposed to be magically appropriate to the month of one's birth. Several lists of these lucky gems are current, the most common being the following: January, garnet; February, amethyst; March, aquamarine, bloodstone; April, diamond; May, emerald; June, pearl, alexandrite, moonstone; July, ruby; August, peridot, sardonyx; September, sapphire; October, opal; November, topaz; December, turquoise, zircon.

Bugaboo (*bŭg'ə-bōō'*), **Bogie** (*bō'gĭ*). Names with which nurses in former times were wont to frighten recalcitrant infants into being "good." The origins of the words seem to be doubtful, though bugaboo (and possibly bogie) may be traced to the Celtic word *pouca* (pooka) meaning a mischievous phantom; or to the Old French *bugibu*, the name of a demon.

Caul (*kôl*), **Lucky.** The caul is a membrane found sometimes enveloping the head and face of a child at birth. It is regarded as an omen of good luck and as a talisman against drowning. Sailors

are known to give large sums of money to be in possession of "lucky cauls." Whence the superstition arose is a mystery, but its antiquity is vouched for by no less a personage than Saint John Chrysostom (347–407 A. D.), who tells us that the midwives of his time sold these cauls for the purposes of magic.

Charms. Belief in magic gives rise to faith in the power of various objects to produce unusual effects, especially in either bringing on or warding off evil. Among primitive folk, probably the most potent charms are believed to reside in material upon which magic words have been written. Extraordinary virtue also is ascribed to objects of unusual form, especially if they resemble the human body or some of its parts. Thus the ginseng root is said to be especially prized among the Chinese if it suggests the form of the body.

Through long years of tradition, certain stones, gems, bones, and pieces of metal have acquired a popular reputation as charms which, when worn on the body, will ward off various diseases and troubles. As words are held to be of greatest magical potency, so their evil effects may often be obviated by touching some substance. The common, jocular custom of rapping on wood when a possible disaster is mentioned is a survival of this ancient superstition.

The pain and the crippling effects of rheumatism have occasioned the wearing of many kinds of charms against the disease. In some parts of America, cedar knots or galls from goldenrod stems are esteemed for this purpose. Elsewhere, a buckeye or horse-chestnut or a ring made of a potato is deemed efficacious. The wearing of an iron ring for a similar purpose is said to be a survival of primitive notions that the metal would draw out the disease as the magnet or lodestone attracts metal.

Dwellings also, as well as human bodies, are believed to need protection from evil influences. For this purpose, the familiar horseshoe serves. In China, certain herbs are suspended over doorways as protection against witchcraft. In rural England, hawthorn branches are similarly used.

An *amulet* is a charm worn on the person as a protection against evil. The word is of uncertain origin, being referred by some authorities to the name of a plant, *amuletum*, mentioned by Pliny as reputed to possess magic powers. A *talisman* is a charm believed to endow its wearer with power over other things and people.

A *fetish* is a charm or amulet in which the protecting spirit is supposed actually to dwell.

Clover, Four-Leaved. The fancy of luck attaching to the finding of four-leaved clovers probably springs, like so many other beliefs, from the rare or unusual occurrence of the four leaves. In Ireland, the corresponding superstitions are connected with the four-leaved shamrock. The miniature maltese cross formed by the leaves is suggested as additional reason for belief in the four-leaved clover as a talisman.

Divining or **Dousing Rod.** The belief that hidden springs and water courses may be located by means of a forked hazel or apple twig is widespread and persistent. Only certain gifted persons, however, are supposed to be able to use the method. The twig, held firmly and horizontally in the hand, is said to tilt or bend downward when the operator stands over a vein of water. Much popular evidence for the efficacy of the practice is available, but recent careful, scientific study has failed to justify the claims made for the rod.

Evil Eye. The superstitious belief persists that certain persons are endowed with diabolical powers which they exercise through looking at people. This belief and its attendant fears are found among all peoples. Certain charms and talismans are supposed to afford protection against the malignant influence of the evil eye.

Friday, Ill Luck of. The superstition which attributes ill luck to this day of the week may have originated among the Norsemen. With them, Friday was sacred to the goddess Freya, the northern Venus, after whom it was named. Anyone who undertook a journey or devoted himself to business projects on this day was looked upon as dishonoring her, and she was known to avenge herself by overwhelming him with misfortune. Among Christians, this irrational fear of Friday as a day of ill omen is no doubt associated with the death of Christ. Friday is, however, but one of many days which the strange fancies of astrology have declared unlucky.

It is interesting to note, in this connection, that Friday is the Moslem Sabbath. Among Mohammedans generally, the day is regarded as especially lucky. The Mohammedan peasants in the northwest frontier of Hindustan are said to reverence the day particularly because of a tradition that on that day God rested from the work of creation.

Horsehair Turning to Snake. Among children, especially, and even among many grown-ups, it is believed that, if a horsehair is thrown into a pool, the hair will be changed into a snake. The truth is that what people imagine to be snakes are merely what are known as hairworms, which usually breed in ditch water or in any stagnant pool. These worms belong to the genus *Gordiacea*, named in reference to the Gordian knot, because they are often found in tangled masses. The larvæ develop in the bodies of insects, whence they escape into the water. In this breeding stage, they have the appearance of threads, and measure about 10 to 30 inches in length. Their eggs are deposited in long strings in the water.

Horseshoe, Lucky. The custom of nailing a horseshoe over the door of a house, as a talisman and a charm against evil spirits, is to be found in all English-speaking countries, as well as among the Norwegians, Swedes, Danes, and several other northern races. Nor is the custom unknown in Hindustan. Among the ancient Saxons and the Irish, the horse was regarded as a creature that brought good luck, and from this belief their superstition of the power existing in the horseshoe may have arisen. Ancient authorities aver that the horseshoe must be placed with the open side up, else the luck will all run out. Finding horseshoes also is said to be lucky, and it is said that, if a maid find a horseshoe with nails in it, their number counts the years before she shall marry.

Magic. A word of very wide application. It is used to signify the entire field of primitive religion and science as well as the tricks of the modern sleight of hand performer. As a phase of superstition, magic includes the use of occult formulas and strange devices to insure success in daily affairs, to cure disease, to avert punishment or catastrophe, to punish enemies, and generally to command the aid of powerful spirits.

The use of magical words, such as are employed in the *Arabian Nights* tales, which, when pronounced, will open doors or summon genii, is a typical form of magic. Perhaps the most widespread and interesting form is the so-called sympathetic magic. This practice rests upon the idea that effects produced upon a representation or image of a thing will be accompanied by similar effects upon the thing itself. Hence arises the practice of making an image of a person one desires to injure or torment. Injury or mutilation of the image, accompanied by proper incantations, will, it is believed, result in corresponding suffering and injury to the person himself. The widely prevalent custom of hanging people in effigy probably has its origin in these beliefs.

To the kinds of magic which were employed to do harm, the name "black magic" is applied; magical practices used to summon good spirits and to counteract evil are called "white magic."

Magic in Medicine. Among many primitive tribes the mystery of death presented itself as the result of evil magic worked by some enemy. Disease also was looked upon as the work of evil spirits controlled by magicians and sorcerers. In consequence, treatment of the sick became a magical process of weird performances of the savage priest or medicine man. Among the ignorant of all countries many survivals of this primitive magic are to be found. One of the greatest tasks of modern medical science is to banish the suffering and cruelty which attach to these ancient practices.

A common practice of the savage doctor is the use of loud noises to frighten away evil spirits. For this purpose, he uses drums and rattles. The patient is often subjected to physical torture to accomplish the same results. Exorcism, or the banishment of spirits by magical formulas of words, is also a frequent practice.

Sympathetic magic finds its place in medicine also, as in the prescription of a flower resembling the eye for eye trouble, or, for disease of the brain, a nut having a shell resembling the skull and a kernel resembling the two halves of the brain. A more primitive belief leads to applying cooling remedies to a weapon that has made a wound rather than to the wound itself. Very widespread also is the belief that, by contact, or even by wishing, a disease may be passed to an animal, and thus the human sufferer be cured.

A very persistent superstition is that which ascribes potency to a medicine in proportion to its disagreeable taste,—the more uncanny and nauseating the mixture, the more efficacious it is believed to be. Similarly, the wearing or carrying of onions, pieces of sulphur, or camphor gum is superstitiously regarded as a shield against various diseases. See *Charms*.

Mascot. A word brought into prominence by Audran's comic opera "La Mascotte" in 1880. It signifies something animate or inanimate that brings good luck to the one who wears it or to whom it belongs. Thus, "for luck," baseball and other playing teams will take some animal with them on their tours. The derivation of this word is somewhat uncertain, though it has a very close analogy to the Provencal *masco*, a sorceress or witch. It has been traced also to the French term *né masqué*, said of a child born with a membrane or *caul* over its face, which was regarded even among the ancients as being extremely lucky. Though the cult of the mascot has always been cherished among sailors and soldiers, it came much more into evidence during the World War, when such was the demand for these charms that their manufacture became a thriving business. See *Caul, Lucky*.

Mistletoe, Legends of. The mistletoe is a parasitic, excrescent shrub which grows on the trunks and between the forked branches of various trees, such as hawthorn, sycamore, pear, and apple. With its white, translucent berries, the mistletoe is a great favorite at Christmastide, both as a decoration and as a license-giving sign for the harmless pastime of promiscuous kissing.

In ancient times it was regarded by the druids as sacred when it grew on the oak—which seldom happens with the European variety. It was then supposed to have all-healing properties. It had also the reputation among the early Christians of helping in cases of old age infirmities and was called *lignum Sanctæ Crucis*, "wood of the Holy Cross." In northern European mythology, Balder, the sun god, who was held to be invulnerable, was shot to death with an arrow made from this wood. In the Saturnalia of the pagans, the mistletoe played a prominent part, whence the tradition of kissing has been handed down to modern times.

Numbers, Luck of Odd. One of the most ancient types of superstition is that which is concerned with the magical significance of odd numbers. In various forms, this kind of belief is widely prevalent today. The ancient Pythagoreans regarded the unit as the father of numbers. Odd numbers were consequently held to be masculine and more worthy than the feminine, even numbers. In China, pagodas are built with odd numbers of stories, for good luck, and the Siamese construct their houses with odd numbers of floors and stair steps.

The number three has been regarded as sacred by many peoples, including the Phœnicians, the Greeks, and the Hindus as well as Christians. Multiples of three, such as nine, share in the mystical significance of three. It is said that among the ancient Mayas the number nine signified indefinite power and excellence. A very fortunate man was said to have nine souls. Thirteen, with these people, had similar significance.

Seven, likewise, has been endowed with mystic significance. It was used frequently in ancient Babylonian incantations. The astrologers divided man's life into seven parts, each governed by one of the seven planets. Indeed, the widespread reverence for the number seven is probably traceable to the speculations of ancient astronomers or astrologers.

Oak, Ash, and Thorn. In English folklore, popular beliefs about these trees represent very well the persistence of superstitions attaching to trees. These beliefs may be regarded as remnants of ancient religious ideas. Among English country folk, quaint rimes and oaths "by oak, ash, and thorn" survive. A curious old fancy is that, when the butter will not "come" promptly in the churn, the dairy maid must stir the cream with a twig of the mountain ash, or rowan, which will correct the trouble. Hawthorn branches suspended in houses were formerly deemed effective protection against witchcraft.

The oak was regarded as a sacred tree by the druids, and many curious beliefs in its power to bring good fortune are current. Among the Kentucky mountaineers, it is said that washing in water that stands in an oak stump will remove freckles. It is deemed lucky for a miner to skin his back against an oak board.

Omens and Signs. Among primitive peoples there has always flourished a belief in the prophetic nature of certain events and natural appearances. The ancient nations developed an elaborate system of foretelling the course of both public and private enterprises. Among the signs observed were the flight of birds, the behavior of animals, the growth of vegetation, and the condition of the entrails of slaughtered beasts.

The advance of human knowledge has largely done away with belief in signs having no rational connection with events in question. Many curious sayings persist, however, which still command more or less acceptance among the credulous. For example, many people deem it unlucky to pass beneath a standing ladder. Others are dismayed at the breaking of a mirror, while the hoot of an owl or the howling of a dog is affirmed to presage evil and death.

There are, however, lucky as well as unlucky omens. Thus, seeing the new moon for the first time over one's left shoulder is said to be lucky, though it is also affirmed by some that over the right shoulder is the lucky way to view the moon. The possession of a black cat with no white in its fur is fortunate. In some districts of England, the first person in a neighborhood to hear the cuckoo's song in the spring is regarded as lucky. Such a saying as this last may have arisen as a way of expressing the joy that men feel at the coming of spring. Somewhat similarly, the saying that full saltcellars on New Year's Day are omens of a lucky year may be traced to times when salt was a precious thing in the household. If it was present in plenty, the house would probably be well supplied with other things.

Palmistry. The so-called art of reading character and personal fortune by inspection of the elevations, or "mounts," and the lines on the palm of a person's hand. The elaborate principles and rules that, since the middle ages, have been developed for the practice of this type of fortune telling form a conspicuous example of a pseudo science.

Prayer Wheel. A wheel or cylinder used among Buddhists of Tibet and Mongolia for the purpose of offering up prayer. Lengthy strips of paper with seemingly interminable prayers inscribed thereon are wound around these cylinders. When a Buddhist feels piously inclined, all he has to do is to set the cylinder in motion with his hand or by some artificial means. Thus is a blessing brought down on the head of the ingenious devotee.

Rain of Toads. Because small toads or frogs are seen hopping about in great numbers after heavy rain, many people think they have dropped from the sky as an effect of the rainstorm. The simple truth is that toads go through a tadpole existence in stagnant pools or ponds, which overflow with the rain, leaving the young toads high and dry on the grass or sedgy banks.

Shoe-Throwing at Weddings. The custom of throwing an old shoe after the bride and bridegroom as they leave the church or as they start on their honeymoon is of exceedingly ancient date, though of uncertain origin. It is nevertheless strongly reminiscent of what took place among the Jews of old, who were wont to give a shoe in witness of a covenant. For instance, when property or land changed ownership, the original possessor untied his shoe and gave it to the new purchaser or inheritor in token of complete abandonment of all present and future claim. It is said that in early Anglo-Saxon marriages the father of the bride delivered one of her shoes to the bridegroom, who touched her head with it, as a symbol of his authority. Today, only the idea of luck is associated with the custom, particularly at the beginning of a journey.

Tabu or **Taboo.** Among the South Sea Islanders, from whose language this word is derived, tabu signifies a kind of consecration of objects or persons. It involves a prohibition against touching certain things or approaching certain persons except in prescribed attitudes. In its original use, the term has a distinct religious meaning, but it is commonly used in English to signify similar customs found among many primitive peoples. The hunters of some American Indian tribes, for example, were forbidden to kill the animal represented in their tribal totem. The superstitious reverence for the tabu, cultivated by savage priests and chiefs, made it a very effective instrument of tribal discipline and control.

Tar Water. A cold infusion of tar in water, used as a drug. In 1739, Bishop Berkeley, Protestant bishop of Cloyne in Ireland, found during a visit to America that the Indians of Narragansett made lavish use of tar in concocting their medical nostrums. The people of his diocese at this period were stricken with violent dysentery, and he became obsessed with the idea of the efficacy of tar water for all maladies. He wrote a treatise on the virtues of tar water, which, together with his insistent advocacy of the drug, drew down upon him the indignation of medical men and the ridicule of the American and British newspapers of the time.

Telling the Bees. A very old superstitious fancy is that, when a death occurs in a family, some one must go to the hives and tell the bees of it, else the bees will become spiteful and hard to manage. A further phase of this belief is that just before the funeral of one who owns bees the hives must be turned around. It has been suggested that these fancies had their origin in a superstitious reverence for the extraordinary intelligence of the bees. Whittier, in his verses "Telling the Bees," beautifully described the custom.

Thirteen, Unlucky. In nearly all civilized countries, this number is regarded as unlucky, not only by the simple and unlettered, but by many persons of education. By many authorities this superstitious dread is said to have had its origin in the fact that Christ and his disciples made a total of thirteen and that he was betrayed by one of them. Traces of the superstition are found, however, in the traditions of many ancient peoples as widely separated as the Norsemen and the Hindus. Among the Turks, aversion to the number thirteen is strongly marked. The French and Italians and Latin races, in general, have a distinct horror of this number. In many streets of Paris there is no house to be found bearing the number thirteen.

In America there are hotels in which the number thirteen is applied to no floor and to no rooms. Imposing lists of eminent people who were superstitious on this point have been drawn up. Equal numbers could be cited who found good luck rather than ill in thirteen. Nevertheless, the belief still lingers as one of the ancient human follies that have resisted the attacks of satire and the admonitions of reason.

Vampire. A word of uncertain origin, used to signify a kind of spectral being with a human body, which, according to a very ancient superstition, leaves the grave at night and preys upon sleeping men and women. It is said that the vampires are the ghosts of dead wizards and people of evil life, and that, by sucking the blood of their victims, they maintain in their buried bodies a semblance of life.

Witchcraft. The delivery of the modern Western world from the terrible delusion of witchcraft is one of the great triumphs of the type of scientific thought which began to exercise wide influence in the 17th century. The superstition is very ancient and widespread among untutored and savage peoples, and it assumed persistent forms in the cultures of ancient nations. The witch was supposed to be a woman leagued with evil spirits and therefore equipped with supernatural powers, not only to foretell events, but to work evil by magical means. However, among primitive folk, the terror inspired by the witch operated to protect her from harm.

In the 16th and 17th centuries in Europe, both Catholics and Protestants engaged in a systematic persecution of supposed witches. The literal enforcement of certain ancient laws of the Old Testament intensified the movement. Hundreds of old women, who had incurred the ill will of their neighbors, were executed in Europe, and the practice found an echo in New England. Stimulated by Cotton Mather and other ministers of his party, the witchcraft craze reached its climax at Salem in 1692. During the continuance of the craze, numerous persons were tortured, 19 were hanged, and one victim was pressed to death.

The growth of rational, liberal thought during the late 17th and the 18th century put an effectual check upon the continuance of this cruel delusion.

Yule Log. A great log of wood, sometimes the root of a tree, which, preparatory to the old English Christmas festivities, was brought into the house with great ceremony on Christmas Eve, laid in the fireplace, and lighted with the brand of last year's log. While it lasted, there was great drinking, singing, and telling of tales. Sometimes it was accompanied by Christmas candles, but in the cottages the only light was from the ruddy blaze of the great wood fire. The Yule log was to burn all night; if it went out, it was considered a sign of ill luck that would govern the ensuing year.

NOTABLE ACCIDENTS AND DISASTERS

APART from the ravages of famine and disease and the fatalities incident to war, astonishing toll of human life is taken by violent natural cataclysms,—earthquakes, volcanic eruptions, storms, and floods,—as well as by fire and explosions occasioned in the course of human industry. In addition to the loss of life from these causes, the accompanying destruction of economic resources is such as to challenge attention. Only within recent years has the advance of science demonstrated how large a portion of this human and economic waste is preventable.

Sanitary engineering is today accomplishing much toward the checking of great epidemics of disease. In America, particularly in the Mississippi and Ohio valleys, the danger from floods has already been decreased through scientific construction of dams and levees. In the great river valleys of China, however, where in some years loss of life mounts into the millions, only small beginnings have been made toward flood control. The destruction of life and property by forest fires in the United States is being checked through the vigilance of the rangers in the forest service.

Fires and explosions still hold great threats to life and property. Fire losses in the United States, declined from $501,980,624 in 1930 to $285,878,697 in 1940, but during the next decade more than doubled. Losses in 1950 were $688,460,000; in 1955, $885,218,000. The national board of fire underwriters estimated that a large part of this loss was due to preventable causes. The cost of all this waste must be borne by all the people. It must be paid in the form of increased taxes and higher insurance rates as well as in depletion of resources. Economic reasons, therefore, prompt the co-operation of all citizens in safety movements.

MOTOR VEHICLE ACCIDENTS

Of the various kinds of accidental death or injury in the United States, those having to do with motor vehicles are by far the most numerous and important. In a typical post-war year, 1946, for example, the total for deaths from this source was 33,700; for injuries, 1,200,000. The economic loss resulting from these accidents was set at $2,200,000 of which $900,000 was property damage. The remaining $1,300,000 was the estimated cost of medical care and the value of services lost.

A breakdown of the foregoing accident statistics, as given by the National Safety Council in the pamphlet Accident Facts, shows the following distribution by location and time of occurrence.

Urban, comprising two divisions: cities of ten thousand or more inhabitants, 8,750; and smaller cities and incorporated towns, 3,750. The total for *urban* areas is 12,500; for *rural* areas, 21,200, divided as follows:

	Day	Night	Pedestrian	Non-pedestrian
Urban	4,300	8,200	7,600	4,900
Rural	9,700	11,500	4,200	17,000

In a table giving seasonal occurrence of motor vehicle accidents, the traffic deaths for December are shown to be 30 per cent higher than the average for all the other months.

A breakdown in terms of passenger-miles for 1946 shows a total of 620,000,000,000. Traffic deaths for this division totaled 24,700. This figure includes pedestrians as well as operators and passengers for both automobiles and taxis. The death rate per 100,000,000 passenger-miles was 4.0. For buses, traveling 72,000,000 miles, the total deaths was 1,000, and the rate, 1.4. In the same period the rate for motor truck fatalities was given as 10.9.

In January 1957 the National Safety Council estimated traffic accident fatalities for 1956 at a record total 40,200. The highest previous total was 39,969 in 1941.

FIRES, EARTHQUAKES, MINING AND MARINE DISASTERS

The following lists exhibit in some detail the most notable disasters of recent times, arranged according to causes. All figures representing property losses must be regarded as approximate. Estimates of numbers killed and injured are from the best available data.

GREAT FIRES

1794	London, Eng. . .	650 houses; $5,000,000 loss.
1812	Moscow, Russia .	Set on fire at the approach of Napoleon I and the French; 12,000 houses burned, besides palaces and churches; $150,000,000 loss.
1835	New York City .	600 buildings; loss $20,000,000.
1842	Hamburg, Germany	$35,000,000 loss.
1845	New York City .	$7,500,000 loss.
1845	Pittsburgh, Pa. .	1000 buildings; loss $6,000,000.
1848	Istanbul, Turkey . . .	3000 shops and houses; $15,000,000 loss.
1850	Philadelphia, Pa.	39 killed, 100 injured; 400 buildings burned.
1851	Saint Louis, Mo..	Large part of city burned; $15,000,000 loss.
1851	San Francisco, Cal.	2500 buildings destroyed; property loss $6,500,000; many deaths.
1861	London, Eng. . .	Tooley Street fire; $10,000,000 loss.
1863	Santiago, Chile .	Church of the Campania burned, with loss of 2000 lives, mostly women.
1870	Istanbul, Turkey . . .	7000 buildings; loss $25,000,000.
1871	Chicago, Ill. . .	3½ miles laid waste; over 200 persons killed; nearly 100,000 made homeless; 17,450 buildings destroyed; loss $290,000,000.
1871	Wisconsin . . .	Forest fires; 1500 lives lost.
1872	Boston, Mass. .	600 buildings; loss $73,000,000.
1877	Saint John, N. B.	12 churches, 25 public buildings; thousands homeless, about 20 killed; $15,000,000 loss.
1889	Seattle, Wash. .	Business district almost entirely destroyed; loss $10 000,000.
1894	Minnesota . . .	Forest fires; $25,000,000 damage; 418 lives lost.
1900	Hoboken, N. J. .	215 lives; $4,627,000 loss.
1900	Hull and Ottawa, Canada . . .	$10,000,000 loss; 18,000 homeless.
1901	Jacksonville, Fla.	$10,000,000 loss; 148 blocks burned; several deaths.
1904	Baltimore, Md. .	75 city blocks covering 140 acres; $85,000,000 damage.
1904	Toronto, Ont. .	130 business buildings destroyed; $12,000,000 loss.
1906	San Francisco, Cal.	Fire following earthquake; 4 square miles burned; loss $350,000,000; 452 deaths.
1908	Chelsea, Mass. .	Manufacturing and business
1911	Coney Island, N. Y.	section; $17,000,000 loss. Amusement parks; $2,225,000 loss.
1911	Porcupine Dist., Ont.	Mining property, lumber mills, etc.; loss $3,500,000.
1912	Houston, Texas .	Business district; $4,500,000 loss.
1914	Salem, Mass. . .	1700 buildings destroyed; $14,000,000 loss.
1916	Jersey City, N. J.	Railroad terminal warehouses and steamers; $11,000,000 loss.
1916	New York harbor	Black Tom Island explosion and fire; $11,000,000 loss.
1916	Ottawa, Ont. . .	Parliament buildings of Canada: $3,000,000 loss.
1917	Halifax, N. S. .	Explosion of war materials and fire; 1158 killed, 4000 injured, 20,000 homeless; property loss $50,000,000.

GREAT FIRES—Con.

1917	Kingsland, N. J.	Munition factory; $12,000,000 loss.
1918	Minnesota . . .	Forest fires; $35,000,000 loss.
1918	Minnesota and Wisconsin . .	Forest fires; 1000 dead; $100,000,000 property damage.
1918	Morgan Station, N. J.	Munition plant; $20,000,000 loss.
1919	Long Island City, N. Y.	Oil works and other plants; $4,250,000 loss.
1919	Savannah, Ga. .	Fertilizer factory, cotton and railroad terminals; $4,000,000 loss.
1920	Galveston, Texas	Morgan line piers and warehouses; loss $3,250,000.
1921	Hoboken, N. J. .	4 piers: 20 lighters; loss $6,000 000 to $10,000,000.
1922	Smyrna, Asia Minor	City almost completely destroyed on eve of Turkish occupation; great loss of life; 100,000 homeless; $200,000,000 property loss.
1923	Berkeley, Cal. . .	600 residences, covering 35 blocks; $5,000,000 loss.
1923	Mexicali, Mexico	Fire starting in movie theater; 30 lives lost; $5,000,000 property damage.
1926	Lake Denmark, N. J.	Naval arsenal struck by lightning; 22 lives lost; property loss $47,000,000.
1930	Columbus, Ohio	State Penitentiary; 320 convicts killed.
1934	Chicago, Ill.	Union Stock Yards; $10,000,000 property damage; thousands homeless.
1937	New London, Tex.	Natural gas explosion in Consolidated Public School; 427 lives lost.
1946	Atlanta, Ga. . .	Winecoff Hotel, 121 dead.
1947	Bar Harbor, Me.	Property damage, $25,000,000.
1947	Texas City, Tex.	Fire and other damage started by explosion of nitrate-laden French freighter. Known dead, 468; missing, 302; injured, 2000.

THEATER FIRES

1811	Richmond, Va. .	75 dead.
1836	Leningrad, Russia	Lehman's theater 700 lives lost.
1845	Canton, China .	1670 lives lost.
1846	Quebec, Que. . .	200 lives lost.
1847	Leningrad, Russia	Carlsruhe theater, 200 lives lost.
1871	Shanghai, China.	120 lives lost.
1872	Trenton, N. J. .	600 lives lost.
1876	Brooklyn, N. Y.	Conway's theater, 295 lives lost.
1881	Nice, France . .	70 lives lost.
1881	Vienna, Austria .	Ring theater, 640 lives lost.
1883	Berdichef, Russia	268 lives lost.
1887	Exeter, Eng. . .	200 lives lost.
1887	Paris, France . .	Opera Comique, 100 lives lost.
1888	Oporto, Portugal	Banquet theater, 200 lives lost.
1892	Philadelphia, Pa.	Central theater. 6 lives lost.
1895	Baltimore, Md. .	Front Street theater, 23 lives lost.
1903	Chicago, Ill. . .	Iroquois theater, 575 lives lost.
1908	Boyertown, Pa. .	Rhode's opera house, 170 lives lost.
1909	Acapulco, Mexico	Flores theater, 250 lives lost.
1911	Bologoe, Russia .	120 lives lost.
1911	Canonsburg, Pa..	Opera house, 26 lives lost.
1912	Villarreal, Spain	80 lives lost.
1913	Calumet, Mich. .	Italian hall, 72 lives lost.
1913	Vervins, France .	10 lives lost.
1914	Java, Netherland India	Surabaya theater, 75 lives lost.
1919	Mayaguez, Puerto Rico	60 lives lost.
1919	Valence sur Rhone, France	80 lives lost.
1921	Milan, Italy . .	31 lives lost.
1922	Washington, D. C.	Knickerbocker theater, 97 dead.*
1923	Cleveland, S. C.	Schoolhouse hall, 77 lives lost.
1942	Boston, Mass.. .	Cocoanut Grove†, 493 dead.

*Roof collapsed from weight of snow. †Night club

EARTHQUAKES AND VOLCANIC ERUPTIONS

1755	Lisbon	About 40,000 people killed; many cities damaged.
1783	Calabria and Messina . . .	100,000 lives lost.
1797	Quito and Cuzco, Peru	40,000 lives lost.
1812	Caracas, Venezuela	12,000 lives lost.
1822	Aleppo, Syria . .	22,000 lives lost.
1857	Calabria, Italy .	Great Neapolitan earthquake more than 10,000 lives lost.
1859	Quito, Peru . .	5000 lives lost.
1861	Mendoza, Argentine Republic .	7000 lives lost.
1861	Peru and Ecuador	25,000 lives lost.
1880	Manila, Philippine Islands. .	3000 lives lost.
1883	Mount Krakatoa, Strait of Sunda	35,000 lives lost.
1886	Charleston, S. C.	About 100 lives lost; $8,000,000 property damage.
1902	Mont Pelée, Martinique, W. I. .	Volcanic eruption annihilated the town of Saint Pierre, caused death of 30,000.
1905	Northern India .	Shock felt over area of 1,600,000 sq. mi.; about 20,000 lives lost.
1906	Chile.	Large area affected, especially in Valparaiso and Santiago; 5000 lives lost; property loss $100,000,000.
1907	Kingston, Jamaica	Earthquake and fire; 1100 lives lost, 2000 persons injured; $25,000,000 property loss.
1907	Turkestan . . .	14,000 lives lost.
1908	Sicily and Calabria	Messina and Reggio destroyed; 96,000 dead, 95 injured.
1910	Cartago, Costa Rica	1500 lives lost.
1912	Guadalajara, Mexico . . .	Great part of the city destroyed; many deaths
1912	Turkey	3000 lives lost, 6000 persons injured, 40,000 persons homeless.
1914	Sakura, Japan. .	Earthquake and eruption; 43 lives lost; 855 houses destroyed; 20,000 persons made destitute.
1914	Sicily	200 lives lost, 1000 persons injured.
1915	Avezzano, Italy .	30,000 killed; many towns ruined.
1915	Central Italy . .	29,978 lives lost; 372 communes damaged; Aquila, Caserta, and Rome affected; Avezzano, largest city destroyed.
1917	Guatemala . .	2500 lives lost.
1918	Puerto Rico. . .	$34,000,000 property damage; 100 killed, 300 injured; tidal wave following earthquake.
1919	Java, Netherland India	Eruption of Mount Kalut; 5000 lives lost.
1919	Mugello valley, Italy	100 lives lost; many towns damaged.
1919	San Salvador, Salvador . . .	Nearly all houses in the city destroyed.
1920	Giarre, Sicily . .	Both Giarre and Codadivople destroyed.
1920	Kansu province, China	100,000 lives lost; area of several hundred sq. mi. affected; 10 cities destroyed.
1920	Mendoza province, Argentina	150 persons killed in village of La Valle.
1920	Orizaba district, Mexico . . .	3000 lives lost.
1921	Elbassan, Albania	City almost obliterated; 14 persons killed, 300 injured, 10,000 made homeless.
1922	Chile.	Shocks felt over a distance of 1100 miles north and south; 1800 deaths.
1923	Japan	200,000 killed, 125,000 injured; property loss over $900,000,000.
1933	Southern California	116 persons killed, 4000 injured.
1939	Chile	30,000 lives lost.
	Turkey	Over 40,000 lives lost.
1951	New Guinea . .	Mt. Lamington erupted; 4000 killed and injured.

FLOODS

1811	Hungary	Overflow of Danube; 24 villages swept away.
1813	Austria, Hungary, Poland, and Prussian Silesia	4000 perished in Poland; 6000, in Silesia.
1874	Mill River valley, Mass.	Inundated by bursting of dam; 144 drowned.
1874	Western Pennsylvania	River floods; 220 drowned.
1881	Mississippi; Ohio	$15,000,000 loss; 138 lives lost.
1883	Java and Sumatra	Earthquake wave; 30,000 dead; many villages destroyed.
1887	China	Overflow of Hwang river in Honan; 900,000 lives lost.
1889	Johnstown, Pa. .	Reservoir burst; 2200 dead.
1891	Consuegra, Spain	1781 lives lost.
1896	Japan	Earthquake wave; 27,000 lives lost; 60,000 made homeless.
1900	Galveston, Texas	4500 lives lost; 3000 buildings destroyed; $30,000,000 property damage.
1903	Kansas City, Mo., and Mississippi River towns .	Millions of dollars in property destroyed; many lives lost.
1906	Hongkong, China	Typhoon; 10,000 lives lost.
1912	Mississippi valley	River floods; 200 lives lost, 200,000 homeless; property loss $45,000,000.
1913	Dayton, Ohio . .	Nearly destroyed; damage $128,000,000; 400 lives lost.
1913	Ohio and Indiana	River floods; 730 lives lost; $180,873,000 property loss; 60,000 buildings destroyed.
1915	China, prov. of Kiangsi, Kwangsi, and Kwangtung	Several thousand lives lost; $90,000,000 damage.
1915	Gulf coast . . .	300 lives lost; $20,000,000 property damage.
1915	Shanghai, China	500 dead; $5,000,000 damage.
1916	Cabin Creek valley, W. Va. . .	About 100 dead, 5000 homeless; $5,000,000 damage.
1916	South Atlantic coast	50 killed; $15,000,000 property damage.
1917	Tientsin, China .	15,000 sq. mi. inundated; millions homeless; $50,000,000 loss.
1919	Puerto Rico. . .	116 killed, 241 injured; $3,500,000 property loss.
1921	Pueblo, Colo. . .	120 dead, 140 missing; $20,000,000 property loss.
1927	Mississippi valley	About 310 dead; 700,000 homeless; damage $300,000,000.
1927	New England . .	88 lives lost; damage over $40,000,000.
1928	St. Francis dam, near Los Angeles	Dam failure; over 250 dead; 15,000 homeless.
1928	Lake Okeechobee, Florida	Rain and hurricane; 2000 lives lost.
1931	Central China . .	200,000 dead; property damage $140,000,000.
1934	Japan	Typhoon; 2064 dead; 13,335 injured; damage $90,000,000.
1935	Eastern United States	250 lives lost; $130,000,000 property damage.
1937	Mississippi valley	Over 500 dead; 1 million homeless; $500,000,000 damage.
1947	Mississippi river	Highest crest in 104 years; damage, $12,000,000.
1948	Columbia river .	In Idaho, Washington, Oregon; 48,000 homeless; damage to agricultural property, $21,000,000; Vanport, Oregon practically wiped out.
1950	Red river . . .	Winnipeg, Manitoba; heavy property damage.
1951	Missouri river .	In Kansas and Missouri; property damage enormous.
1953	Netherlands . .	Sea breaches dikes; 1800 lost.

MINE DISASTERS

1906. Courriere, France; explosion; 1060 dead.
1907. Jacobs Creek, Pa.; explosion; 239 dead.
1907. Monongah, W. Va.; explosion; 361 dead.
1907. Toyooka, Japan; 400 dead.
1909. Cherry, Ill.; fire; 259 killed.
1910. Bolton, Eng.; 300 dead.
1913. Dawson, N. Mex.; explosion; 263 killed.
1924. Castlegate, Utah; 175 dead.
1928. Mather, Pa.; 195 killed.
1930. Millfield, Ohio; 79 dead.
1932. Moweaqua, Ill.; 54 killed.
1934. Wrexham, Wales; explosion; 265 dead.
1947. Centralia, Ill.; 111 killed.
1951. West Frankfort, Ill.; 119 killed.
1957. Bishop, Va.; explosion; 37 killed.

MARINE DISASTERS

1800. U. S. frigate *Insurgent* sailed from Hampton Roads and never heard from; 380 lives lost.
1831. Immigrant vessel *Lady Sherbrooke*, bound from England to Quebec, wrecked off Cape Ray; 273 lives lost.
1837. British transport *Albuuria*, foundered in Gulf of Saint Lawrence; regiment from garrison at Quebec on board; 525 lives lost.
1847. Immigrant vessel *Exmouth*, bound to Quebec from Londonderry; 200 lives lost.
1850. Steamer *Royal Adelaide*, wrecked off Margate, England; 400 lives lost.
1850. Steamer *Griffith*, burned on Lake Erie; 300 lives lost.
1852. Troopship *Birkenhead*, bound from Queenstown to Cape of Good Hope, wrecked; 454 lives lost.
1854. Steamer *City of Glasgow*, Liverpool to Philadelphia; never heard from; 450 lives lost.
1854. Troopship *Lady Nugent*, from Madras, foundered in a storm; 400 lives lost.
1857. Steamer *Central America*, Havana to New York, sunk; 400 lives lost.
1858. Steamer *Austria*, Hamburg to New York, burned in mid-ocean; 471 lives lost.
1859. American ship *Pomona*, Liverpool to New York, wrecked; 400 lives lost.
1859. Steamer *Royal Charter*, wrecked on the Anglesey coast; 446 lives lost.
1865. Steamboat *Sultana* with exchanged Union prisoners of war aboard, destroyed on Mississippi river, above Memphis, by boiler explosion; 1400 lives lost.
1867. Royal mail steamers *Rhone* and *Rye* and numerous smaller vessels, wrecked near Saint Thomas, W. I.; 1000 lives lost.
1870. British warship *Captain*, foundered off Finisterre; 472 lives lost.
1873. White Star steamer *Atlantic*, wrecked off Nova Scotia; 547 lives lost.
1878. British steamer *Princess Alice*, sunk in collision in the Thames; 700 lives lost.
1880. British training ship *Atlanta* left Bermuda with 290 men; never heard from.
1887. British steamer *Wah Yeung*, burned; 400 lives lost.
1889. U. S. warships *Trenton*, *Vandalia*, and *Mipsic*, and German ships *Adler* and *Eber*, wrecked off Samoa by hurricane; 147 lives lost.
1890. British steamer *Duburg*, wrecked in China Sea; 400 lives lost.
1891. British steamer *Utopia*; collision off Gibraltar; 574 lives lost.
1893. British battleship *Victoria*, sunk by collision with her sister ship *Camperdown* off Tripoli; 350 lives lost.
1894. Steamer *Norge*, wrecked on Rockall Reef in the North Atlantic; 600 lives lost.
1895. Spanish cruiser *Reina Regenta*, foundered in the Atlantic near Gibraltar; 400 lives lost.
1898. French liner *La Bourgogne*; collision off Sable island; 560 lives lost.
1898. U. S. battleship *Maine*, blown up in Havana harbor; 260 lives lost.
1904. Steamer *Norge*, wrecked off Scotland; 646 lost.
1904. Excursion boat *General Slocum*, burned in East river; more than 1000 lives lost.
1912. White Star liner *Titanic*; collision with iceberg off the Grand Banks, Newfoundland; 1517 lives lost.
1912. Japanese steamer *Kickermaru*, sunk off Japanese coast; 1000 lives lost.
1914. Canadian Pacific liner *Empress of Ireland*, in collision with the Danish liner *Storstad*, in Saint Lawrence river; 1024 lives lost.
1915. *Lusitania*, sunk off coast of Ireland by German submarine; 1154 lives lost.
1915. Steamboat *Eastland*, capsized at wharf on Chicago river; 812 lives lost.
1916. *Provence II*, torpedoed in Mediterranean; 3100 lost.
1916. Chinese ship *Hsin Yu*, sunk off China; 1000 lost.
1917. The British warship *Vanguard*, blown up at her dock in a British port; 800 lives lost.
1919. French steamer *Chaonia*, lost in Straits of Messina; 460 lives lost.
1921. Steamer *Hongkong* hit rock near Swatow, China; 1000 lives lost.
1928. British liner *Vestris* disabled by storm, sinks off eastern U. S. coast; 111 lives lost. S. O. S. call delayed.
1934. Ward liner *Morro Castle* burned off New Jersey coast; 125 lives lost. S. O. S. call delayed.
1942. French steamer *La Moriciere* broke up in a storm off the Balearic islands; 290 lost.
1949. Canadian steamer *Noronic* burned at Toronto on vacation cruise to the Thousand Islands; 132 lives lost.
1954. Explosion and fire aboard U.S. carrier *Bennington* killed over 100.
1956. Italian liner *Andrea Doria* sinks off Nantucket after collision with Swedish liner *Stockholm*; 50 lives lost.

DISCOVERIES, BEGINNINGS, AND FIRST USES

Aberration of light discovered by Bradley, 1725.
Adrenaline prepared by Takamine, 1901.
Agricultural chemistry founded by Liebig, 1840.
Airplane, first transoceanic non-stop flight, America to Europe in 1919; Captain John Alcock, pilot; Lieut. W. Brown, navigator.
Airplane mail service, first regular transcontinental trip, New York to San Francisco, Sept. 8–11, 1920.
Antiseptic surgery introduced by Dr. Lister, 1867.
Armor plate for steel vessels made in U. S., 1889.
Atomic numbers determined by means of X-ray spectrums, Moseley, 1914.
Atomic pile, first one giving a self-maintaining chain reaction put into operation at Stagg Field Stadium, Chicago, December 2, 1942.
Atomic structure, concentric shell theory presented by Langmuir, 1919.
Atoms of other elements are shown by Rowley to consist of multiples of a reduced hydrogen atom, 1922.
Automobile, first steam-driven, Bridgeport, Conn., 1866.

Bacteria discovered by van Leeuwenhoek, 1680.
Baldwin locomotive, first, 1832.
Bath, Public, first free, established in Chicago, Ill., 1904.
Bathtub, first in the United States, installed, 1842, by Adam Thompson in his home at Cincinnati, Ohio. Tub encased in mahogany and lined with sheet steel, weight 1750 pounds.
Benzene ring theory devised by Kekulé, 1865.
Brick, first made in America, Virginia, 1612.

Carrel-Dakin antiseptic treatment of infected wounds, first used, 1915.
Cast-iron bridge in America, first, over Erie canal at Frankfort, N. Y., 1840.
Cell theory of organic structure formulated by Schwann, 1839.
Cholera bacillus discovered by Koch, 1884.
Coal first mined in America, Virginia coal mine, on James river, Chesterfield county, 1750.
  Anthracite first successfully used in American blast furnace at Pottsville and at Catasauqua, Pa., 1839.
Coal-tar dye, mauve, discovered by Perkin, 1856.
Coke, manufacture of Connellsville, begun, 1841.
Cotton manufacturing begun in South, about 1870.
  Cotton spinning mill, first complete, in U. S., built by Samuel Slater for Moses Brown at Pawtucket, R. I.
  Cotton spinning and weaving mill, first complete, built at Waltham, Mass., by Francis Cabot Lowell, 1814.
Cottonseed oil, produced by Dr. Otto, Bethlehem, Pa., 1768.

Diamond, atomic structure determined by Bragg by means of the X-ray, 1913.
Diphtheria antitoxin discovered by Behring, 1889.
Diphtheria germs discovered by Klebs, 1883.
Dynamo, first to give continuous current, constructed by Charles Wheatstone, 1841.

Electron, charge of an, measured, by Millikan, 1909.
Expansion of gases, law of, announced by Charles, 1787.

Fertilization, artificial, of eggs of sea urchin by means of chemicals, Jacques Loeb, 1910.
Fire department, first one established by Peter Stuyvesant, New Amsterdam (New York), 1659.
Fixed stars, Halley discovers the proper motions of, 1718.
Friction matches, first made in England by John Walker, 1827.

Gas, Coal, first used by William Murdoch, Cornwall, 1792.
  First used for street lighting in America, Baltimore, 1821.
Germ plasm, Weismann announces his theory of, 1892.
Gold, first nugget discovered in Sutter's mill race, Sacramento river, California, 1848.

Horseshoes, first machine-made, Henry Burden, Troy, N. Y., 1835.
Hydrophobia, Pasteur introduced antitoxin treatment, 1885.

Ice, Artificial, first plant, New Orleans, La., 1866.
Ice, Dry, first manufactured commercially, 1925.
Incandescent lamp, first commercially successful, made by Thomas A. Edison, 1879.
Insulin, an internal secretion of the pancreas, is proved by Banting and coworkers to be specific for relief of diabetes, 1922.
Iron.
  Angle iron, first rolled in U. S., Pittsburgh, 1819.
  Blast furnace, first in Pennsylvania, Colebrookdale, near Pottstown, Thomas Rutter and others, 1720.
  Blast furnace, first in Pittsburgh, 1811.
  Iron discovered in North Carolina, 1585.
  First exported from America, Virginia Company, 1608.
  Ironworks, first successful in colonies, Lynn, Mass., 1644.
  Ironworks, first in Pennsylvania, 1692.
  Ore discovered in Lake Superior region, by Wm. A. Burt, government surveyor, 1844; first shipment, to Pennsylvania, 1850.
  Rolling mill, first in Pittsburgh, 1811.
  Shot for use of Continental army, made at Durham, Bucks county, Pa.,—shipped Aug. 25, 1775, by George Taylor, a signer of Declaration of Independence.
  T rails, rolled in U. S., Allegany county, Md., 1844.

Lavoisier, relation of metals to oxides discovered by, 1782.
Light, velocity proved by Majorana to be independent of the velocity of its source, 1919.
Logarithms invented by Napier, 1614.

Malaria, parasites discovered by Laveran in 1880.
Motion, Kepler published his three laws of, 1609–19.
Motion picture, first with regular plot and story, "The Great Train Robbery," produced by the Edison Company, 1903.
Motion Picture Theater, first to be opened, in Los Angeles, Cal., 1902. Admission 10 cents.
Mutation theory published by De Vries, 1901–03.

Nail machine, first for making cut nails, made by Ezekiel Reed, Bridgewater, Mass., 1786.
Neanderthal man skeleton found, 1856.
Newspaper, first in America, *News Letter*, Boston, Mass., April 1704.
Newspaper, first daily in London, *Daily Courant*, 1702.
Newspaper, first Sunday, London, *British Gazette and Sunday Monitor*, 1780.
Newton's famous *Principia*, in which he demonstrated the law of gravity, published, 1687.
Nitrogen atom decomposed with emission of hydrogen, when subject to action of alpha rays, Rutherford, 1919.

Paper mill, first one in the United States built at Germantown, Pennsylvania, 1690.
Phosphorus, first used in matches, in England, 1833.
Pig iron produced in U. S. first exceeded that of Great Britain, 1889.
Plague bacillus discovered by Kitasato and Yersin, 1894.
Polio vaccine developed by Jonas Salk. First mass test 1954.
Porcelain, first true (hard paste) made in Europe by J. F. Böttger, about 1709; in U. S., at Philadelphia, 1825.
Printing press, first in New England, 1639.

Quantum theory of energy developed by Planck, 1901.

Radio broadcasting station, first one, "KDKA," operated at Pittsburgh, 1920, by the Westinghouse Company.
Refrigerator car, first, 1869.
Relativity theory enunciated by Einstein, 1905.

Savings Bank, first in U. S., Philadelphia Savings Fund Society, 1816.
Skyscraper, first, Home Insurance building, Chicago, 1885.
Sleeping sickness shown by Bruce to be transmitted by the tsetse fly, 1903.
Steamboat, first on Great Lakes, launched at Buffalo, 1819.
Steam engine, first entirely constructed in America, Belleville, N. J., 1794.
Steam power first used for printing, London *Times*, 1814.
Steel, first made in America, Hartford county, Conn., 1728.
  Basic open hearth, first made in U. S., Homestead, Pa., 1888.
  Bessemer steel, first produced in U. S., Wyandotte, Mich., Kelly pneumatic process, 1864.
  Bessemer steel rails, first rolled, Chicago, 1865.
  Open-hearth furnace, first in U. S., Trenton, N. J., 1868.
Steel screws, first in U. S., Cleveland, Ohio, 1871.
Steel wire nails, first made by Father Goebel, Covington, Ky., 1875.
Sun proved to be a magnetized sphere, 1912–13.
Sun's atmosphere analyzed by means of the spectroscope, Kirchhoff, 1860.

Technical school first in English-speaking country, except West Point, Rensselaer Polytechnic Inst.,Troy,N.Y.,1824.
Tetanus germs discovered by Nicolaier, 1884.
Transatlantic radio-telephone service inaugurated, 1927.
Tubercle bacillus discovered by Robert Koch, 1882.
Typhoid bacillus discovered by Eberth, 1880.
Typhus fever shown by doctors Rickets and Wilder to be transmitted by body lice, 1910; the germs were first discovered by Dr. H. Plotz, 1915.

Vaccination; Dr. Jenner makes his first inoculation, 1796
Vaccination first performed in America, 1801.
Velocity of light determined by Roemer, 1675.

Wire suspension bridge, first in world, over Schuylkill river, near Philadelphia, 1816.
Wool fulling mill, first in America, John Pearson, Rowley, Mass., 1643.
Wool spinning machine in a factory, Peace Dale, R. I., 1804.

X-rays used to show molecular structure of crystals, Max von Laue, 1912.

DRAWING AND DESIGN

DRAWING may be defined as the expression of ideas or the representation of objects by means of line or color. For conveying emotion or thought, drawing is as essential to human beings as is song or speech or writing. Much of our knowledge of the customs and history of primitive peoples is derived from the study of the forms and shapes of their dwellings and utensils and the designs and pictures with which they decorated their pottery and even the walls of their cave dwellings.

An interest in the various phases of applied art is characteristic of our present-day civilization. A growing sentiment insists that there is no excuse for unsightliness in the plans of our towns and cities and in the designs of public or of private buildings. In a democratic state, beauty of dwelling and environment should be within reach of every citizen. On the other hand, citizens should feel their responsibility for maintaining standards of civic beauty. These enthusiasms call for wider diffusion of knowledge of the principles of design. To this end, the public schools and many special schools of applied art are contributing.

The subject of drawing may be divided roughly into two classes,—free-hand and mechanical. Free-hand drawing is done without the guidance of drawing instruments. Free-hand work includes the great mass of pictures and studies, etchings, engravings, and illustrations and cartoons in papers and magazines. Mechanical drawing is the applied art, growing out of free-hand drawing, which is used in industry for purely mechanical and practical working drawings.

Free-Hand Drawing. Free-hand drawings are done in charcoal, pencil, litho pencil, crayon, pastel, pen and ink, "wash," or in any combination of these mediums. In etching, engraving, and lithography, special tools are employed. Charcoal is probably the simplest medium, since it is inexpensive, easy to apply and to erase, and is, besides, susceptible of great variety of treatment. With it, many varying effects are possible, ranging from that of plain line to the highly modeled effect of oil painting, the latter being produced when the charcoal is rubbed down with the fingers or with a kneaded eraser.

The pencil ranks with charcoal for convenience as a medium of expression in drawing. It requires a harder, smoother surface than does charcoal, but it may be used on virtually any material. It does not require "fixing," and, though requiring greater skill than charcoal, since it cannot be worked over, it is better adapted to fine sketching. Its effect is brilliant and rather harsh—more positive than charcoal.

Crayon, which is a colored chalky substance, and pastel, which is a crayon of a finer texture, give the same range of effects as charcoal, but they are difficult to erase. Work in wax crayons, such as are used in architectural free-hand sketches, has great brilliancy and is impossible to erase. Pen and ink resembles the pencil as a medium, but it is more difficult of application and removal. It is the harshest medium, requiring a hard, glazed paper. "Wash" drawings are made in one tone of water color with a brush. Drawings intended for reproduction in print are generally done in black wash.

Mechanical Drawing; Design. Strictly used, the term mechanical drawing applies only to drawing done with the aid of the T square and the compass. A broader description is "drawing with the emotion left out," that is, done as if by a machine. In this wider use, it signifies the application of free-hand drawing to industry. When thus applied, the art is known as design.

The development of a design may be illustrated by the following example: An artist sketches free-hand a cluster of narcissuses, as he sees the flowers growing. A manufacturer of metal book ends, for which designs in applied silver are desired, tells the artist to *conventionalize* the form of the flower and make a drawing from which the working blue prints are to be taken. The artist then, studying the stiff character of the narcissus blossom, decides that straight lines and triangles will best represent the flower. Upon this plan, he builds up a design of triangular flower forms, draws it to a scale to fit the book ends, using his T square and triangle to make the drawing mechanically perfect, traces the design on glazed tracing linen in waterproof, nontransparent ink, and sends it to be blue-printed.

Harmony and Rhythm. The theory of design embraces those laws of harmony in line, shape, proportion, and tone, acquaintance with which is necessary to the critic or the maker of designs. Harmony is the result of a combination of elements properly related to each other by some common factor. Take, for example, a still life study, drawn within a frame form, of a group of five books, some standing, and others lying, on a table top. The books are the elements of the composition, and they are related to each other by their straight-line structure or by a common background line, such as the line marking the edge of the table. Their relation may be apparent because of a rectangular plane that is common to all of them; or they may show some pleasing direct proportional relation in size,—as 2 to 3 or 3 to 5. Certain color values in the scale from black through gray to white may be repeated on the covers of the books and on the table top to indicate a relation of the elements.

Again, if the books were done in color, certain common colors might serve as relating factors to unify the composition. For instance, we may suppose the scheme to be black, gray, and white, with the addition of one color—red. If the first book of the five, lying on the table, has a red binding, and the third, standing upright, has a small design of the same red on the cover, while the fifth has a large quantity of red showing on the edges of the pages, the eye will be carried through the composition by the three spots of color, which thus relate the book elements in harmony.

If there is harmony in a drawing, *rhythm* also will surely be present. The repetition of line, space, shape, or color will carry the eye through the details of the composition, and this directing of the eye, step by step, or from color spot to color spot, to the center of interest, constitutes rhythmical movement.

The steps may be regular, as in a repeated border design of wild geese, in which every third goose is a repetition in line, shape, and color. Or the steps through which the eye is led may occur at varying intervals in an unconventional composition,—such as a design of flamingos in a circular frame. The eye may be directed from the first flamingo to the fourth, from the fourth to the fifth, and thence to the ninth, which last holds the center of the picture stage. If the observer feels a definite arrangement in these steps that the eye has taken, then the design has rhythm.

Values. The term values refers to degrees of light and shade or of color intensity. In *chiaroscuro*, or representation in black and white, if one takes black as a unit of value, the highest values are the shades nearest to black, and the lowest values are the shades farthest removed from black.

Values in colors are spoken of in the same sense as values in the black and white scale. To determine the value of a certain object in a design,—for example, a red tomato,—one should make a set of five or six 2-inch squares ranging from black to light gray. Then, with the eyes partly closed, one can shut out from view the brightness of the red in the tomato, so that he will be able to compare its black and white value with the degrees in the black and white scale furnished by the little squares. He will find that it matches in degree of darkness one of the gray squares near black. Similarly, in the

scale from deep red to pale pink, the pink will correspond to one of the lighter gray squares, some degrees removed from white.

Applications of Design. In proportion as our state of culture develops, the range of design expands. Progressive city governments are applying the principles of design to city planning. By means of building laws, many cities are seeking to secure harmonious relations between streets, between buildings, and between streets and buildings. Some cities are attempting to make their water fronts pleasing to the eye, and to place buildings in such relations that the city sky line will be harmonious. A special problem is that of planning streets which will afford pleasing vistas, in which parks, fountains, and other decorative features may be seen to advantage.

Individuals are showing more and more interest today in landscape gardening about their own homes. The old-fashioned method of making disconnected, unrelated flower beds wherever fancy led is giving place to well planned exterior decoration. This takes into account the relation between house and grounds and makes evident the relation between one flower bed and another by their shape or location or by the color arrangement of the flowers.

The same simple, fundamental laws of harmony and rhythm which are applicable to city planning and to laying out flower beds apply to home building. One cannot depend upon the ornamentation of the entrance or upon the style of blinds to secure beauty in a house. The safe principle to apply is the test of the laws of design, by which one will secure the right proportion of roof to the entire house, of window surface to plain surface, and of masses of color to each other.

Decoration of the interior of a home affords the greatest opportunities for producing good effects. Here the laws of design can be applied to every detail. The colors and values of the walls and ceilings and floors must bear definite relations to one another. The pictures on the walls must hang in such relations of height, color, and interest as will readily direct and please the eye. It is well to let one point of interest dominate, so that the eye can find repose. A safe rule to follow in hanging pictures is to let the upper edges of the frames fall on a common horizontal line about the room, so that the centers will be at about the level of the eye when the observer is standing. A more effective method is to determine the point of interest in every picture and let those points fall upon a common line. The wall spaces between pictures should bear a harmonious relation to each other and to the pictures. The spaces should not be uniform in area, because regularity would detract from the interest of the whole arrangement.

In seeking a pleasing relation in the intervals between three paintings to be hung on one wall of a living room, the safest proportion to observe is that of 2 to 3. If two of the pictures are similar in size and the other is considerably larger, the two small ones might be hung four feet apart, the large one at a distance of six feet from the second. If, however, the larger picture and one of the small pictures are dominantly blue, while the other small one has touches of brilliant red and orange color, let the two dull blues hang together, and place the small brilliant picture at a distance, to balance the blue group in space and in color intensity.

The window treatment in line and color is important. If one has a long, narrow room with plain, unrelieved gray walls and a row of small windows across the end, the room can be made or marred by the draperies at those windows. Floor-length overdrapes of a soft material in old rose or some other one tone, presenting no horizontal lines in color, will impart to the room the appearance of a long hall, the contrast between the solid color and gray intensifying the perpendicular effect of the curtains. If, however, one introduces a starched material in a brilliant, spotty pattern, preferably with a horizontal line effect in strong color or in black, and also runs a lambrequin across the top of the windows, the room will appear wider by several feet.

Furniture should harmonize with the style of the room in which it is used. If the room has long French windows and a high ceiling, with paneled walls and gilt molding and a tapestry or two, it fairly demands furniture designed according to the style of one of the Louis periods. A delicate, gate-leg dining set would be lost in a long, severely heavy, beamed and paneled dining room. Such a room requires the massive, plain monastic type of table and benches or chairs. For a room that is frankly of the modern American type, however, harmony is secured by variety in styles of furniture; no one predominating period style would be desirable.

These same principles apply to costume design. In this art there is quite as much opportunity to make lines harmonize as there is in decorating a room. For example, an unusual cut to the line of the neck of a costume may be repeated in the sleeves and thus greatly enhance the artistic effect of the whole. The following color rule applies to the designing of a costume as well as to the decoration of a room,—let the darkest color be lowest in position and the lightest color be highest.

Color Balance. In the most carefully planned buildings, rooms, and garments, the effect of their beautiful proportions may be obliterated by ill-judged use of color. For a color scheme, the safest course is to use one color with black and cream or with gray and soft ivory. If more than one color is desired, a color chart should be consulted with regard to complementary colors and color intensity. The greater the number of colors introduced into a scheme, the more difficult it is to arrive at a color balance, that is, to have enough of each primary color represented to satisfy the eye.

Red, yellow, and blue are called primary colors, because by combinations of these the other colors may be produced. Orange, green, and violet are secondary colors. The following chart exhibits the relations of these colors and supplies a guide for their use in design and decoration. Two colors marked with the same superior letter are complementary, that is, taken together they make a neutral gray. The primary colors are printed in boldface; the secondary colors, in italics.

	Yellow[a]
Yellow-Orange[f]	Yellow-Green[b]
Orange[e]	*Green*[c]
Red-Orange[d]	Green-Blue[d]
Red[c]	**Blue**[e]
Red-Violet[b]	Blue-Violet[f]
	Violet[a]

Two-color schemes may be carried out by using two complementary colors, in combination with some values of black. One of the colors should be given greater intensity than the other. If a three-color scheme is desired, correct combinations may be discovered by starting with any color in the chart and counting around the list, in either direction. The fifth and the eighth color in the count will harmonize with the first one chosen. One of the three should be used full strength; one, half strength; one, reduced very nearly to a neutral tone.

Good taste is, in large part, the ability to appreciate relations of harmony and rhythm of line and color. In design applied to furniture and other objects of use, good taste requires that an article, beautiful in itself, shall be appropriate to its purpose and its surroundings. One may enhance his power of appreciation by a study of the art principles outlined in these paragraphs. These principles apply to the appreciation as well as to the creation of beauty. They govern both the critic and the artist, not only in the arts already outlined, but also in those of pottery, jewelry, and textiles, and in all other forms of artistic design.

FURNITURE

FURNITURE, called "movables" in the European languages (French, *meubles*; German, *möbel*; Italian, *mobiglio*), includes those articles of convenience or decoration that are used by man to make his dwelling places more comfortable. As these articles are produced in order to satisfy certain recognized needs, the furniture of any race or country is usually indicative of the customs, skill, and degree of civilization of the people who used it.

The furniture used by royalty in ancient Egypt was well made, beautifully carved, and decorated with gold, ivory, and veneering. Chairs were frequently upholstered or covered with leather; the legs were carved to resemble those of animals. Neither the Greeks nor the Romans used a great variety of furniture. But their chairs, tables, beds, and couches were generally of pleasing form, and were frequently decorated with magnificent inlays of ivory, tortoise shell, and precious metals.

From the early period of classical antiquity to the beginning of the Renaissance in Italy, very little change or improvement took place in furniture. Beds, couches, tables, chairs, and stools were the customary pieces used by all of the civilized nations. In the great houses of medieval England, the dining table was customarily formed of boards placed on trestles. For the lord of a manor and for his lady, there were usually placed beside the table large, high-backed, covered chairs. An honored guest might be seated upon a stool, but all the common folk, those who sat "below the salt," occupied simple benches.

Gothic Style. During the late medieval period, the decorations used upon the characteristic, large, heavy furniture of the time followed closely the prevalent Gothic style of architecture. Forms were massive and rectangular; lines were predominatingly straight, usually capped by a pointed arch. Characteristic ornamental details were the trefoil and quatrefoil, together with religious figures. Wrought iron bands were frequently placed upon chests and cupboards.

Renaissance Period. During the Renaissance, as in the Gothic period, styles of furniture closely followed those of architecture. Pieces were massive, well proportioned, and elaborately carved with ornamentation suggested by the classical art of Greece and Rome. In Italy, the most characteristic domestic piece of the period was the ornamental bride's-chest, or *cassone*. As a rule, Renaissance furniture, whether of Italian, French, or English origin, is of palatial rather than of domestic character. It is, therefore, more suitable for use in public buildings or theaters than in the home. Nevertheless, the Renaissance marks the beginning of the development of modern furniture. From Italy the influence of the Renaissance spread to France and to England.

French Periods. In France the chief periods which were marked by characteristic styles of furniture were those of Louis XIV, Louis XV, Louis XVI, and the Empire under Napoleon I.

Louis Quatorze.—The magnificence of the reign of Louis XIV was reflected in the massive size, elaborate ornamentation, and lavish decoration of his furniture. The structural lines were generally rectangular; the woods used were oak, walnut, and ebony. Upholstering was commonly of tapestry or brocades with large patterns. Especially notable was the type of ornamentation known as buhlwork, after its originator André Charles Boulle. This consisted of a veneer of tortoise shell inlaid with elaborate patterns of brass. Decorative motifs included cupids, satyrs, the acanthus leaf, and the shell. The feet of chairs frequently had the form of doe's hoofs, *pieds de biche*. Marble tops were used on tables and commodes.

Louis Quinze.—At the court of Louis XV, gayety replaced formality, and the pleasure-loving, extravagant luxury of the king and his favorites, Countess du Barry and Madame Pompadour, found expression in the more graceful curved lines and the greater comfort of the furniture.

The workmanship was of the finest, and all exposed surfaces were covered with carving, gilding, inlay, metal mounts, or porcelain plaques. Interest in Chinese art, which began about 1720, resulted in Robert Martin's invention of *vernis martin*, a lacquer-like finish which was extensively used in red, brown, gold, bronze, and black. Pastoral scenes by Watteau and Boucher were often painted upon the lacquered surfaces.

Carving was most elaborate, with scrolls, shells (rococo), the curled endive leaf, flowers, ribbons, and musical instruments exhibited as predominating motifs. A distinguishing characteristic was due to what may be termed unbalanced symmetry. While masses of decoration were applied so as to appear symmetrical, the details of each mass differed from those within the others. Chairs usually exhibited the cabriole leg, with dolphin-head or leaf-scroll feet, and with no stretchers to hold the legs together. The fronts of cabinets and commodes were generally convex.

Louis Seize.—During the reign of Louis XVI, furniture design was marked by a change from extremely elaborate decoration and curved lines to a more classical straight line style, with delicate and simple ornamentation.

This change may be credited to a general reaction from the preceding period; to the refined taste of Marie Antoinette; and, most important of all, to the popular interest in classic art aroused by the discoveries of the buried cities of Herculaneum and Pompeii. By those who have seen how quickly the introduction of Egyptian motifs into current forms of personal decoration followed the discovery and opening of Tutankhamen's tomb, the effect produced upon popular fancy by the uncovering of two ancient cities can readily be comprehended.

The structural lines of the Louis Seize furniture were generally rectangular. Straight legs were fluted and tapered. Classic details formed the basis of ornamentation, the Greek band replaced rococo, and laurel or oak leaves were used instead of acanthus and endive patterns. Decorative paintings on wall panels or on furniture represented cupids, garlands of flowers, and classical subjects, rather than the pastoral scenes of the preceding period or the armor, victor's palm, and martial decorations of Louis Quatorze.

The Empire.—The styles of the First Empire, under the dominating personality of Napoleon I, also had their source in ancient times. But it was the Roman rather than the Greek that appealed to the emperor, and the motifs selected were those which suggested the imperial power of the Cæsars,—the Roman eagle, wreath, torch, fasces, and winged victory. After the expedition to Egypt, the figure of the sphinx was extensively employed. A notable characteristic of the period was the use of carved brass decorations applied to plain surfaces.

Beds changed from heavy, overdraped affairs to an uncovered, couchlike form. Chairs were comfortable, with convex backs which often prolonged the curve of the arms. The arm supports frequently were carved in the form of swans or sphinxes.

Considered as a whole, the Empire style was rich and impressive, but also rather stiff, cold, and formal. It is not extensively copied today.

English Furniture. The three great periods of English furniture making which have exerted marked influence on modern styles are the Jacobean and Restoration, the Anglo-Dutch, and the Georgian. The Jacobean, 1603–49, was separated from the Restoration by the Cromwellian period of the

Commonwealth, during which the styles acquired a Puritan sternness and severity. With the Restoration, King Charles II brought back to England a taste that had been influenced by the Flemish Renaissance and the styles of Louis XIV, so that this period was marked by an increase in ornateness and grace.

Jacobean.—Furniture of this period was chiefly of oak, with straight line structure, and a sturdy, somewhat heavy, appearance. Chairs had flat seats, and the straight, turned legs were strengthened by heavy stretchers placed near the floor. Carving was cut into flat surfaces. Characteristic ornamental designs were the running figure 8, semicircles filled with petals, a conventionalized tulip, the Tudor rose, and geometrical figures. Typical pieces were the chests and cupboards, the high-backed wainscot chairs, tables, and tall clocks.

Anglo-Dutch.—Furniture of this style is divided between the William and Mary and Queen Anne periods. The predominating Dutch influence was due to the elevation of William, stadholder of the Netherlands, to the English throne. French influence was also noticeable, because of the immigration of Huguenot refugees who left France after the revocation of the Edict of Nantes. The new styles were more suitable to comfortable, domestic use than any of those preceding. Walnut was the favorite wood; inlay, the characteristic form of ornament. Straight lines gave place to delicate curves. Legs of typical chairs were straight, with inverted cup turning, curved underbracing, and bun-shaped feet. The backs and seats were usually upholstered. Cabinets, cupboards, chests on chests, and chests on stands were characteristic pieces.

Queen Anne.—During this period the Dutch and French influences were assimilated and developed into a more national type. The structural lines were those of slender, graceful curves. Walnut was the principal wood. The turned leg was replaced by the undecorated cabriole, and the bun foot by the hoof or the claw and ball. Typical pieces were the splat-back chairs, wing chairs, gate-leg tables, chests of drawers, highboys, lowboys, cabinets, and the tall, well proportioned mirror with an elongated S-curve at the upper side. Chair backs, high and comfortably curved, were outlined by a rather narrow rim and supported by a wide fiddle-back or lyre-shaped splat. Seats were upholstered. Underframing was gradually discarded.

Georgian Furniture. The Georgian period is known as the Golden Age of English furniture. It was marked, not by the influence of the sovereign, but by that of great designers and cabinetmakers. Most notable of these were Thomas Chippendale (1705–79); Robert and James Adam, architects who designed furniture to harmonize with the interiors of their houses; George Hepplewhite (?–1786), who executed many of the Adam designs and developed characteristic types of his own; and Thomas Sheraton (1750–1806), designer and "master of inlay."

Chippendale.—The characteristic style of this master designer is best shown in his graceful, beautifully proportioned chairs. The lines of the back usually taper gracefully from top to feet, and, from a bow-shaped curve at the top, a carved, pierced splat extends to the seat frame. The seat is widest at the front. The legs are cabriole with ball-and-claw feet or straight and square. The ladder-back chair with four or five horizontal bow-shaped pieces instead of the splat is also typical. Carving is the principal method of decoration; mahogany is the preferred wood. Chinese influence is shown by fretwork in the arms and backs of some chairs. Chippendale originated the pie crust table with scalloped edged, tilting top.

Hepplewhite.—The obvious characteristic of a Hepplewhite chair is its shield-, oval-, or heart-shaped back, which does not join the seat frame, together with square tapering legs and spade feet. The top curve of the back was usually bow-shaped and smooth. A carved, three-feathered prince of Wales plume, used in the design of the back was sometimes a distinguishing feature. The structural lines were usually curved; the general appearance, slender and delicate.

Adam.—The Adam brothers designed graceful, very delicate furniture in a manner which was inspired by the classic decoration of Pompeii. The backs of Adam chairs were narrow and rather low; the legs were straight and tapered or round and fluted. Wedgewood plaques were used as inserts, and raised ornaments of plaster composition were applied. Ornamental details included the urn, vase, lyre, and acanthus, together with rosettes, festoons, and delicate fluting.

Sheraton.—Thomas Sheraton is considered by many to have been the greatest of the famous Georgian designers of furniture. The lines of his creations were usually rectangular, the general appearance graceful, dignified, and rather fragile. His principal method of decoration was inlay work. The typical rectangular back of a Sheraton chair ended with a horizontal bar above the seat frame. The top line was not regular, but broken. This use of the broken curve at the top frequently serves to distinguish one of Sheraton's shield-shaped chair backs from those of Hepplewhite. Typical chair legs, whether round or square, were tapered, frequently with fluting or reeding.

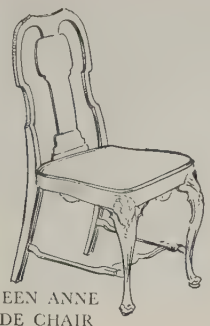
Colonial Furniture. The term Colonial, as applied to early American furniture, is properly employed to indicate furniture used in the colonies before they became states. When it is remembered that the Dutch settled in New York, the English in New England and Virginia, and the French in Louisiana, it becomes obvious that the best Colonial furniture was of three different styles. There were many good cabinetmakers in the colonies, and their products were based on the current modes of the mother countries. The Colonial style, as such, resulted chiefly from simplification, omission of ornament, and adaptation of the best European practice. That a blending of styles occurred is evident in some of the chairs of early New York, in which may be found a typical Dutch fiddle-back, Jacobean legs, and Spanish feet.

The comfortable Windsor chair, with its bow-shaped, spindle filled back, shaped seat, and turned legs set at an angle, was of English origin, but was greatly improved upon in America. The rocking-chair was an American product, but the date of its introduction is unknown.

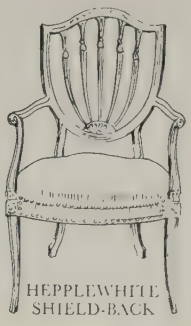
Most important of the early cabinetwork was that of Duncan Phyfe, a Scotchman who came to America about 1784 and, after establishing himself at his trade in New York, produced, between the years 1795 and 1830, work equal in quality to that of the best European designers. Phyfe's lyre-backed chair was a characteristic piece. From 1830 to 1847 his work was not of so high a standard, he himself classifying his overdecorated mahogany as "butcher furniture."

Modern Furniture. Since furniture is part of our equipment for living, its development is closely connected with changes in our way of life and thought. New materials and processes, coupled with today's different living conditions, have in recent years brought about radical innovations in furniture design. Furnishings in extreme modern and compromise styles have become increasingly available. Because of the demand for the new forms, many manufacturers of traditional pieces are now also making furniture of modern design. What the esthetic results of these developments will be is difficult to foresee.

Meanwhile, most of the furniture made in the United States continues to follow the historic styles which have been described. There is also widespread interest in genuine old furniture, and collectors of antiques were never more numerous than they are today.



QUEEN ANNE
SIDE CHAIR



HEPPLEWHITE
SHIELD-BACK

DUNCAN PHYFE
SIDE CHAIR

SHERATON
GRECIAN CHAIR

CHIPPENDALE
LADDER-BACK

CHIPPENDALE
SPLAT-BACK

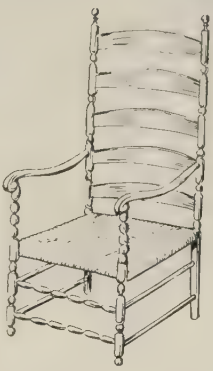
HITCHCOCK
CHAIR

HISTORIC FURNITURE STYLES

EMPIRE
FIDDLE-BACK

NEW ENGLAND
WINDSOR CHAIR

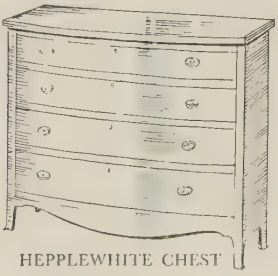
BOSTON ROCKER



SLAT-BACK CHAIR

CHIPPENDALE HIGHBOY

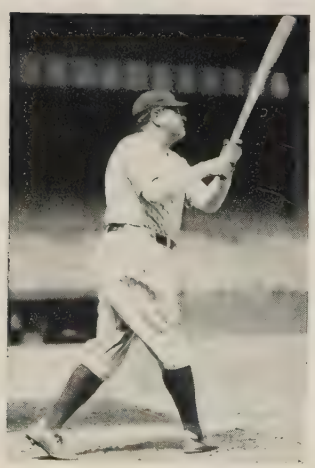
QUEEN ANNE LOWBOY



HEPPLEWHITE CHEST

Upper left Sam Snead, a leading golfer in the past decade. Winner of the Professional Golfers' Association, the Western Open, British Open and the Canadian Open.

Jim Thorpe, outstanding track star and football player. Winner of both decathlon and pentathlon in the 1912 Olympic Games.



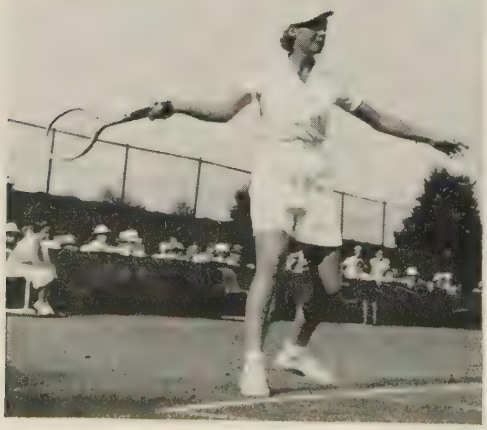
Above Jack Dempsey, professional boxer. Won boxing's heavyweight title in 1919 by defeating Jess Willard and held the title until defeated by Gene Tunney in 1926.

STARS OF SPORT

Left George Herman (Babe) Ruth, slugging outfielder of the New York Yankees. Holder of numerous records of baseball achievement.

Lower left Alice Marble, great tennis player. Won the National Women's Singles title and the National Women's Doubles title for many years.

Lower right Jesse Owens, track star. Co-holder of the world's 100 meter record and three event winner in the 1936 Olympic Games.



GAMES AND SPORTS

FROM the earliest times, men have engaged in various forms of more or less highly organized play activity. Athletic contests, whether for amusement and recreation, or as a means of training for the serious pursuits of life, have always been highly valued. Games of chance and of intellectual skill are also of very ancient origin. The following section presents briefly outlines of the history and important features of a number of the most popular games of the present day. The many special principles and rules under which the athletic games are played may be found in various rule books, such as those published in Spalding's Athletic Library.

Baseball. A field game played with a round wooden bat and a hard, leather-covered ball which weighs 5 ounces and is 9 inches in circumference. The game derives its name from the circuit of four bases which the batter must make in order to score after striking the ball. The bases,—home, first, second, and third,—are located at the corners of a 90-foot square, called the diamond. The pitcher stands between home and 2d base, 60½ feet from the batter. The area enclosed by the lines connecting the bases is called the *infield*. The *outfield* is the space outside the diamond and between the extensions of the lines connecting home base with first and third base respectively.

A baseball team consists of 9 players, and a game regularly continues through 9 innings. An inning is completed when each team has succeeded in "putting out" three of the opposing batters. A batter is out under the following principal conditions: if he fails three times in succession to hit a fairly pitched ball, provided that the third ball is retained by the catcher; if he hits the ball and it is caught before it strikes the ground; if the struck ball is in the hands of the first-baseman before he can run to that base; or if, when between bases, he is touched by the ball in the hands of an opponent. A score of 1 is given for each run, or completed circuit of the bases, by a player.

This national game of the United States was first played in something like its present form at Cooperstown, N. Y., in 1839, where resided its inventor, Maj. Gen. Abner Doubleday. The earliest organized clubs date from 1843; at about this time, the first code of rules was drawn up by the Knickerbocker club of New York City. The ball used was of lively rubber, covered with yarn and leather, 10½ inches in circumference and weighing 6½ ounces.

A national association was formed in 1858. The first strictly professional club was the Red Stockings of Cincinnati. In their famous tour of 1869, they won all games. The first college circuit, including Harvard, Princeton, Amherst, Brown, and Dartmouth, was formed in 1879. The National League was organized in 1876, an American association in 1882, and the American League in 1900.

Basketball. The invention of this popular game, in 1892, is credited to Dr. James Naismith, at the Y. M. C. A. training school in Springfield, Mass. Designed first as a boys' game, it was soon adopted in a modified form by girls' schools. It is usually played indoors upon a rectangular court, which must not exceed 4000 sq. ft. in area. The goals are elevated "baskets," 18 inches in diameter, placed on the center line, 10 feet above the floor, one at each end of the court. The restricted number of players, 5 on each side, and the small area of the court make basketball a practicable sport for many clubs of small membership and resources.

At the beginning of the game, an inflated leather ball, 30 to 32 inches in circumference, is tossed up between two opposing players at the center of the court. A score of 2 points results when the ball is thrown into the basket guarded by the opponents. A game is usually divided into two periods of 20 minutes each.

Billiards. A game of very ancient origin. It is known to have been played before the Christian era. Saint Augustine mentions billiards in his *Confessions*, written in the 5th century, and both Shakspere and Spenser speak of the game in the 16th century. The earliest full description of billiards is found in Cotton's *Complete Gamester*, 1674.

The modern American game of billiards is played with 3 ivory balls, on a table, the bed of which is formed of a heavy slab of slate and is surrounded by rubber cushions. Both the slate and cushions are covered with fine green cloth. A regulation table is 10 ft. long by half as wide, but smaller sizes are frequently used, especially in homes. Standard balls are 2⅜ inches in diameter; one is red, the others white, but one white ball is marked by a small black spot. The object of the game is to strike one of the white balls with the small, leather-tipped end of a tapering stick or cue, in such a manner as to cause the cue ball to strike in succession each of the two other balls, thus making a billiard, or carom.

In order to prevent the high scores that may be obtained when the two object balls are close together in a corner, "balk" lines are frequently drawn on the table at a distance of 14, 18, or 22 inches from the sides. When playing balk-line billiards, every second or every third shot must be made sufficiently hard to drive one of the object balls outside of the rectangle in which they lay when the shot was made.

Pool or pocket-billiards is played with 15 object balls and a single cue ball on a table provided with 6 pockets, the object of the game being to drive into the pockets as many of the object balls as possible.

Bowling. Outdoor bowling or bowls is one of the oldest of games, and its ancient form was closely similar to that of the present day. The early balls were of stone, one half spherical, the other oval, a shape adapted to give the course of the ball a curve. In outdoor bowling, cones were first used for marks, later being displaced by the round balls or jacks. The game was introduced in America early in the 18th century, and the Bowling Green, in the locality still known by that name, was laid out by the City of New York in 1732.

Indoor bowling probably originated in various games in which clubs were hurled at groups of bone pins. The first recorded indoor game on a covered alley took place in London in the 12th century. In America, the first recorded match game was played on the Knickerbocker alleys in New York City on January 1, 1840, and the first general code of rules was adopted in 1875.

The American indoor game is played upon a smooth board floor or alley, 42 in. wide and 60 ft. from the foul line, which the player must not cross, to the center of the first pin. The ten wooden, bottle-shaped pins, 15 in. high, are arranged in a triangle with the apex toward the bowler. Pins must weigh at least 50 ounces each, and are placed 12 inches apart from center to center. The balls may not exceed 16½ pounds in weight or 27 inches in circumference.

The object of the game is to bowl down all of the pins with one shot, the result being called a *strike*. A maximum of two shots is allowed in a *frame*, there being ten frames to a game. If the pins are all down after the second shot, the result is a *spare*. After a strike, the number of pins bowled down by the next two balls is added to the ten already scored; after a spare, the number falling from the next ball is added to the score. If, in the tenth frame, the player achieves a strike, he is allowed two additional shots; and if a spare, one additional shot. The maximum score possible for a single player is, therefore, 300. In 1954, 20 million American bowlers rolled balls on 85,000 alleys in 12,500 bowling establishments.

Cards, Playing. Cards for playing games of chance probably had their origin in the East, and are

certainly of extreme antiquity. They were known to the Egyptians as well as to the Jews, and were in common use among the Hindus and Chinese long before they were introduced into Europe by the crusaders. Toward the end of the 14th century, the game of cards was in common vogue in Italy, Germany, France, and Spain, and, by the middle of the 15th, cards were even being manufactured in England. They were introduced into America by the Spaniards.

In the modern pack of playing cards, there are four suits of thirteen cards each; clubs and spades are printed black; hearts and diamonds, red. It is supposed that the figures in the various suits were originally intended as symbols of the different classes of men. Hearts represented the *gens de chœur*, that is, the ecclesiastics, or choir men; *espada*, a Spanish word for sword and indicating nobility, has become spade. Clubs represented the trefoil and symbolized the peasantry, while diamonds represented square tiles, symbolical of the merchants. This symbolism is, of course, lost today in the great variety of games of skill and chance in which cards are employed. Among these games, the following are today widely popular: auction bridge, contract bridge, five hundred, cribbage, pedro, solitaire, hearts, pinochle, and poker.

Checkers. A game played on a board like that used in chess. Each of the two players has 12 pieces, or men, which are placed on the first three rows of squares of the same color. Each piece is moved forward one space at a time in a diagonal direction. The object of the game is to capture all the opposing pieces, capture being effected by "jumping," or passing over the opponent's piece to the first space beyond it, which must be unoccupied. When a man reaches the row of squares farthest from his side of the board, he becomes a king and may then move backward as well as forward.

Checkers is called draughts in England and *les dames*, "the women," in France. It is a very ancient game. Homer refers to it, and an ancient Egyptian vase shows a lion and an antelope playing checkers, with the lion winning and seizing the prize.

Chess. The origin of chess is lost in remote antiquity. The name is a corruption of the Persian *shah*, "king." Chess is the most intellectual and the most cosmopolitan of all games of skill. National and international contests have been held regularly in the course of the past several centuries. Benjamin Franklin brought it into prominence in America.

The game is played on a chessboard divided into 64 squares colored, as a rule, alternately black and white. Each of the two players has a set of 16 pieces, or men, placed on the two rows of squares nearest the player. The two groups thus appear in opposing array, like two armies, one black and the other white. Each player has a king, a queen, 2 bishops, 2 knights, 2 rooks, or castles, and 8 pawns. Each kind of piece moves according to special rules, the object of each player being to take the men of his opponent in order to checkmate the latter's king. Checkmate is accomplished when the king cannot move without being open to attack from an opposing man. The word checkmate is derived from the Persian *Shah mat*, "The king is dead."

Cricket. In Great Britain, cricket occupies the place held by baseball in America. It is the popular game played by school and college, as well as by professional teams. The cricket ball is a hard, leather-covered ball, of about the size and weight of a baseball. The bat, usually of willow, is about 36 inches long, with a flat blade 4½ inches wide and 22 inches in length.

Cricket is played by opposing teams of 11 men each, on a turf field, in the middle of which are placed two wickets facing each other at a distance of 22 yards. Each wicket consists of three round sticks, called "stumps," standing 27 inches high, with a distance of 8 inches between the two outer stumps. In grooves upon the top of the stumps lie two light pieces of wood called "bails."

The team at bat has a batsman at each wicket. The opposing team has a bowler at one wicket and a wicket keeper behind the other, with fielders in positions surrounding both wickets. The wicket keeper corresponds to the catcher in baseball.

The bowler pitches, or "bowls," the ball, trying to place it so that, on a first bounce, it will strike the opposite wicket and dislodge a bail, so putting the batsman out. The object of the batsman at this wicket is to protect it by striking the ball. If he hits the ball, he and the other batsman run to exchange places. If they succeed, without being put out, a run is scored. Not more than six runs may be made on one hit. During an attempted run, if the bail of a wicket is displaced by a fielder holding the ball, the batsman nearest that wicket is out. The batsman striking the ball is out if the ball is caught by a fielder before it touches the ground.

When a bowler has thrown six times, another bowler takes the ball and pitches from the opposite wicket. An inning lasts until ten men of one side have been put out. A game usually allows two innings for each team. Matches frequently last for two or three days.

Football. American Intercollegiate football is played by opposing teams of 11 men each, on a field measuring 160 feet in width and 300 feet in length between goal lines. The field is marked with cross-lines at intervals of 5 yards; to the resulting appearance is due the popular name of "gridiron." A goal 18 feet, 6 inches wide is marked in the middle of each end of the field by goal posts, with a crossbar 10 feet from the ground.

The principal object of play is to carry the ball over the goal line of the opposing team. Scores are given for thus making the goal and for kicking the ball over the crossbar between the goal posts. A game is divided into 4 periods of 15 minutes each.

Although the ancient Greeks and Romans had games of a nature similar to football, the modern game is of English origin. As early as the 12th century, whole villages played a game of football, in which the ball was kicked and carried through the streets. The game was first organized in the English public schools. When introduced into America, it appeared in two forms, Association football, or soccer, in which carrying the ball is forbidden, and Rugby football. The rules of the latter game were adopted by Harvard and Yale in the early 1870's. After years of great independence and confusion as to methods of play, a general committee of colleges, united with a former committee of the University Athletic Club, formulated the rules for 1906. These rules, with some modifications tending to more open play, now govern the American Intercollegiate game.

Golf. This open-air game consists in driving a small, solid, resilient ball successively into each of a series of 9 or 18 holes arranged at varying intervals over a course, or links. The holes are placed in smooth areas, called putting greens, between which hazards, such as pits, mounds, clumps of trees, and similar natural or artificial obstacles, are placed. The object of play is to make the round of all the holes in the least possible number of shots. A great variety of clubs, with heads especially adapted to the conditions under which they are to be employed, are used to drive the ball.

The origin of the game of golf is obscure, though an ancient game of Holland and Belgium, played usually on the ice and called *Kolf*, may be its progenitor. The Scotch were among the earliest golf players, although the game was popular in England in the 15th century. The most famous Scottish links are those of Saint Andrews and of Leith. The Royal and Ancient Golf Club of Saint Andrews was established in 1754. Toward the close of the 19th century, the game was introduced into America, where at the present time both private and public links are patronized by increasing numbers.

Handball. A very ancient game, probably of Celtic origin, now played in America chiefly for the vigorous exercise it provides. The game requires a firm floor with a smooth front wall and side walls. A small, solid rubber ball is used. It is batted against the wall with the player's hand, and on rebound must strike the floor in front of a crossline called the "ace line." Each player tries to make the ball rebound from the wall in such a way that it cannot be successfully returned by his opponent. The server scores 1 point, or "ace," when his opponent fails to return the ball. Usually, a score of 21 aces wins the game.

Hockey. The ancestry of this game includes the Irish game of "shinty" and the Scottish "hurley." The Scottish game was played on hard sea beaches, with 200 or 300 players on a side. A hard knob of wood was used as a puck, and the players were armed with roots of trees. The world's first organized hockey clubs were established at Montreal in 1881.

Two games under this name are played at present—field hockey and ice hockey. Field hockey is played on a field 100 yards long and 60 yards wide, with a goal 12 feet wide and 7 feet high at each end. In this game a ball is used, and a team consists of 11 players.

In ice hockey, a hard rubber disk, called the puck, is used instead of a ball. The game, lasting through three 20-minute periods, is played on skates, a team consisting of 6 players. Goal posts are set 6 feet apart and at least 10 feet from the ends of the ice field or rink.

In both games a hook-shaped stick is used, the crooked end having flat faces. A score is made when the puck, or the ball, is driven between the opponents' goal posts.

Lacrosse. A game which probably originated among the North American Indians, and which was a favorite sport among many tribes. It is said that sometimes several hundred men would participate in a match. Before a game, the players went through a course of rigorous training. Tribes were often pitted against each other, old medicine men acting as umpires. A game might be continued for days. The sport even took on a ceremonial character. A ball of hide stuffed with hair was commonly employed. The shape of the stick used, crooked at one end like a crosier, suggested to the French explorers the name *la crosse*.

About 1840, white men adopted the game, and in Canada it rapidly grew in popularity. In 1867, rules were formulated, and the National Lacrosse Association of Canada was formed. A little later the game was introduced into the United States.

The modern game is played upon a field about 120 yards long, with a goal 6 feet square at each end. There are 12 players on a side, and the object of play is to send a small solid rubber ball into the opponents' goal. The ball is carried or thrown with the *crosse*, or stick, 3 or 4 feet long, shaped like a shepherd's crook, from the broad, curved end of which a netting of rawhide or catgut extends about halfway up the handle.

Polo. This thrilling field game is played by two teams of four players each, mounted on ponies. The field is turf, 300 yards long by 150 to 200 yards wide. The object of play is to drive a light wooden ball through the opponents' goal. A long-handled mallet is used to drive the ball. The goals are 8 yards wide between goal posts. A game commonly consists of 8 periods of 7½ minutes each.

The Persians were among the earliest players of this ancient game, as they were among the first of ancient horsemen. A definite record of a game much like the modern sport is found in China in the 6th century A. D. English officers adopted the game as they found it in India, and brought it to England, where, in 1877, the first definite rules were adopted.

Pugilism and Boxing. The sport of fighting with the fists. When gloves are used, the term boxing is applied. Sometimes the sport is known as prize-fighting, from the fact that contestants fought for money in England from the early 18th century.

The historical origin of pugilism goes back to Greece. It became a part of the Olympic games in 880 B. C. A species of weighted glove (cestus) was worn. Its purpose was to magnify the effect of blows and not soften them, as with modern gloves. The sport was popular in Rome until near the end of the empire. Then it died out for more than a milennium.

Boxing was revived in England at the end of the 17th century, about 200 years before it was taken up by other nations. The first use of the glove, beginning in practice bouts, is ascribed to Jack Broughton, who was undisputed champion from 1734 to 1750. He is looked on also as the father of the sport as an art rather than as an endurance contest. As an art, it may be defined as hitting without getting hit.

The boxing ring under American rules is a roped-off square, each side being from 16 to 24 feet long. Unless one contestant is knocked out, that is, unable to rise within ten seconds, or is unable to respond to the call of the bell, the match is decided on points. These include hits delivered and also adroit action in avoiding them. It is classed as a foul to hit below the belt, kick, wrestle, or, of course, bite and gouge. Earlier boxers made a point of keeping the left arm always extended as a guard, but recent practice is to keep both hands ready to attack while relying for defense on avoiding the adversary's blows by slipping the head, ducking, or pulling away.

Rowing. This is the oldest of organized college sports. From 1841 Oxford and Cambridge have competed in annual contests over a 4¼-mile course. The first American college boat club was organized at Yale in 1843. Harvard followed the next year. Their first meet was a 2-mile race on Lake Winnepesaukee, New Hampshire. Since 1878 the annual Yale-Harvard race has been rowed on the Thames River at New London, Conn.

The Hudson River at Poughkeepsie was from 1895 the scene of the famous Poughkeepsie Regatta of the Intercollegiate Rowing Association; but in 1950 and 1951 the regatta was held on the Ohio River at Marietta, Ohio, and in 1952, 1953, and 1954 on Onondaga Lake, Syracuse, New York. There are other annual crew racing regattas, and single rowing contests between amateur oarsmen.

Tennis, Lawn. A game usually played by 2 or 4 players upon an outdoor court. The court is 78 feet long and 27 feet wide, with an extra 9 feet of width when 4 are playing. A light racket and a small inflated ball are used.

The game consists in driving the ball back and forth over a net stretched across the court midway of its length. Each player tries to direct, or place, the ball within his opponent's court, so that it cannot be returned. His first successful attempt gives him a score of 15; the second makes the score 30; the third, 40; and the fourth wins the game, unless the opponent also has made 40. In this case, the score is deuce, and the winning of two successive points is necessary to win the match. Games are usually played in sets; the player who first wins 6 games wins the set unless his opponent ties the score at 5 all, in which case the winning of two successive games is necessary to win the set.

Before 1870, tennis as an indoor game, now called court tennis, had been first played in modern times by the French. The name is by some authorities derived from the word *tenez*, meaning "seize it" or "play." Modern lawn tennis, however, was patented by Major Wingfield in England in 1874. The present great popularity of the game dates from about 1880.

Volley Ball. A game, usually played indoors, in which 5 or more players on a side may engage. A spherical, leather-covered ball is used. The object of play is to volley the ball, striking it with the hand, back and forth over an elevated net. The failure of one side to return the ball scores a point for their opponents.

PUBLIC HEALTH STATISTICS

THE study of the conditions governing the physical well-being of communities has taken its rightful place within recent years, not only as an activity of government, but as a function of various private organizations, and as a subject of instruction in universities.

In 1953, the Public Health Service of the United States government was incorporated in the new Federal department of Health, Education, and Welfare. Established by Congress in 1798 for the management of hospitals, the Public Health Service developed as a bureau of the Treasury department. As part of its varied activities, the service provides medical examinations for immigrants, investigates problems of sanitary engineering, cooperates with local authorities in the control of epidemics, and conducts public health instructions throughout the United States.

To a large extent the science of public health is dependent for its practical service upon accurate records regarding distribution of population, births and deaths, prevalence of diseases, and causes of deaths. These facts are now collected under the title, *Vital Statistics*.

Beginning in 1880, the bureau of the census recognized a "registration area" within which death figures were collected suitable for the bureau's purposes. Birth figures were added in 1915. By 1933, all states were included in the registration area for both deaths and births.

BIRTHS AND DEATHS IN UNITED STATES

1952–1953

State*	Births		Deaths	
	1953	1952	1953	1952
Alabama	82,751	83,403	27,033	27,304
Arizona	26,223	25,474	8,104	7,854
Arkansas	44,086	43,388	15,933	15,464
California	296,707	258,629	109,410	103,033
Colorado	38,647	38,112	13,365	13,112
Connecticut	47,186	45,408	20,454	19,889
Delaware	9,223	8,952	3,756	3,655
D. of Columbia	31,637	30,617	9,211	9,160
Florida	80,015	73,886	32,154	30,702
Georgia	99,785	98,180	30,908	30,801
Idaho	16,511	16,406	4,904	4,722
Illinois	202,689	202,294	95,216	92,988
Indiana	104,583	103,907	40,866	40,749
Iowa	63,455	65,121	26,811	26,757
Kansas	49,640	48,005	19,315	19,744
Kentucky	73,528	74,546	27,551	28,302
Louisiana	83,195	79,579	25,298	24,809
Maine	21,317	21,290	9,979	9,784
Maryland	59,545	57,320	23,797	24,153
Michigan	181,998	175,849	61,806	59,094
Minnesota	77,996	78,533	29,726	28,205
Mississippi	66,367	65,431	20,343	20,458
Missouri	97,645	92,189	45,862	44,823
Montana	16,901	16,150	6,114	5,989
Nebraska	32,252	33,692	13,403	13,166
Nevada	5,040	4,473	2,076	1,878
New Hampshire	11,736	12,137	6,282	6,279
New Jersey	107,999	105,863	51,546	50,573
New Mexico	25,011	24,245	5,696	5,520
New York	327,236	326,654	164,183	160,781
North Carolina	114,729	113,993	32,278	32,686
North Dakota	17,005	17,111	5,130	4,942
Ohio	210,918	207,031	85,765	83,891
Oklahoma	51,685	49,645	19,307	19,119
Oregon	39,601	39,589	14,667	14,566
Pennsylvania	239,375	240,116	112,414	110,481
Rhode Island	18,871	18,767	8,170	8,239
South Carolina	61,667	62,347	17,316	18,077
South Dakota	18,073	19,579	5,852	5,895
Tennessee	84,573	82,715	30,757	30,206
Texas	234,778	226,022	66,433	64,852
Utah	24,138	24,239	5,395	5,495
Vermont	9,078	8,938	4,106	4,160
Virginia	87,689	86,403	29,970	30,142
Washington	62,840	63,142	23,489	23,355
West Virginia	47,426	50,037	16,790	17,205
Wisconsin	88,389	89,263	34,939	34,034
Wyoming	8,709	8,311	2,372	2,497
Total	3,503,741	3,458,352	1,356,842	1,336,557

Source: Public Health Service, Department of Health, Education, and Welfare. *Massachusetts not reporting.

CAUSES OF DEATHS IN THE UNITED STATES

Source: Public Health Service, Department of Health, Education, and Welfare, 1955.

Cause	Number	Rate per 100,000
Tuberculosis, all forms	15,580	9.5
Syphilis and its sequelae	3,750	2.3
Typhoid fever	50	0.0
Dysentery, all forms	470	0.3
Diphtheria	140	0.1
Whooping cough	479	0.3
Meningococcal infections	950	0.6
Acute poliomyelitis	930	0.6
Measles	360	0.2
All other infective and parasitic diseases	4,320	2.6
Malignant neoplasms, etc.	242,430	147.6
Diabetes mellitus	25,000	15.2
Major cardiovascular-renal diseases	826,890	503.3
Diseases of cardiovascular system	810,200	493.2
Vascular lesions of central nervous system	175,120	106.6
Rheumatic fever	1,220	0.7
Diseases of heart	578,270	352.0
Hypertension without mention of heart	11,260	6.9
General arteriosclerosis	31,860	19.4
Other diseases of circulatory system	12,470	7.6
Chronic nephritis, etc.	16,690	10.2
Influenza and pneumonia, etc.	45,140	27.5
Ulcer of stomach and duodenum	10,390	6.3
Gastritis, duodenitis, enteritis, etc.	7,970	4.9
Cirrhosis of liver	17,710	10.8
Acute nephritis, etc.	2,320	1.4
Complications of pregnancy, etc.	1,950	1.2
Congenital malformations	19,520	11.9
Senility, etc., and ill-defined conditions	20,190	12.3
Motor vehicle accidents	37,580	22.9
All other accidents	53,690	32.7
Suicide	16,200	9.9
Homicide	7,480	4.6
Other causes	100,210	61.0
All deaths	1,527,000	929.5

BIRTH AND DEATH RATE

By Countries
Per 1000 Inhabitants

Source: Statistical Office of the United Nations

Country	1939		1950	
	Births	Deaths	Births	Deaths
Australia	17.6	9.9	23.3	9.6
Austria	20.7	15.3	15.1	12.1
Belgium	15.5	13.9	16.5	12.4
Canada[1]	20.4	9.7	26.5	9.0
Ceylon	36.0	21.8	40.2	12.6
Chile	33.3	23.3	32.4	15.7
Costa Rica	42.8	18.5	46.5	....
Czechoslovakia	18.6	13.3	22.9	11.4
Denmark	17.8	10.1	18.6	9.2
El Salvador	41.6	18.3	48.7	14.8
Finland	21.2	14.7	24.0	10.2
France	14.8	15.6	20.4	12.6
Germany, Western	....	....	16.2	10.4
India	32.7	21.6	25.9	16.5
Ireland	19.1	14.2	21.0	12.6
Israel	....	....	32.9	6.5
Italy	23.6	13.4	19.6	9.8
Japan[2]	26.6	17.8	28.3	10.9
Luxemburg	15.0	12.7	14.8	11.6
Mexico	44.6	28.0	45.7	16.4
Netherlands	20.6	8.6	22.7	7.5
New Zealand[3]	18.7	9.2	24.6	9.3
Nicaragua	32.5	11.9	41.4	10.9
Norway	15.9	10.2	19.3	8.9
Panama	27.9	11.4	33.4	9.9
Peru	27.5	13.8	32.3	12.5
Portugal	26.2	15.3	23.8	11.9
Puerto Rico	39.6	17.7	38.6	9.9
South Africa, U. of[4]	25.3	9.4	25.7	9.1
Spain	16.6	18.5	19.9	10.8
Sweden	15.4	11.5	16.4	10.0
Switzerland	15.2	11.8	18.1	10.1
United Kingdom	15.2	12.2	16.1	11.7
United States	17.3	10.6	23.4	9.6
Venezuela	35.9	18.7	43.0	11.0

[1]. Excluding Yukon, Northwest Territories, and Newfoundland. [2]. Japanese Nationals only in 4 principal islands. [3]. Excluding Maoris. [4]. European population only.

Academy. This name was applied originally to an olive grove of ancient Athens used as a gymnasium. The name was given also to the estate of Plato, which was situated near by, and to the school which he founded at his house. In later times, the name has been used as a common noun to designate either an institution of learning or an association of scholars or artists.

Among the earliest of the innumerable academies, in the sense of associations of scholars, were the academy of Alcuin and other friends of Charlemagne about 800 A. D., one at Constantinople in the 11th century, and the Platonic academy at Florence in the 15th century. In 1635, Richelieu organized the French academy, which survives to the present day as one of the constituent societies which went to form the institute of France. The American Academy of Arts and Letters is the most notable society of this type in America. The name academy has also been frequently used in America to designate a certain type of high school or preparatory school.

According to Hoyle. Edmond Hoyle, an Englishman who lived from 1672 to 1769, was the first to systematize the laws of whist, and he was considered the highest authority on the game until 1862, when the modernized form of play was introduced by Cavendish. Now applied colloquially in any field, and meaning "according to the strict rules" obtaining in that field.

Alchemy. The chemistry of the middle ages. It most frequently took the form of a search for the "philosopher's stone," which should transform all baser metals into gold, cure all diseases, and restore youth. For this last property, it was sometimes called the elixir of youth. The search for this philosopher's stone led to many important practical discoveries in chemistry. They were long unavailable for classification and general use, however, because the alchemists kept them as profound secrets.

Almanacs. In modern times, almanacs have been books, pamphlets, or tables containing a calendar showing the days, weeks, and months of the year, various festivals, and astronomical facts.

The first almanac in America is said to have been *Bradford's*, issued in Philadelphia. Benjamin Franklin's *Poor Richard's Almanac*, published for about 25 years from 1732, became famous for its wit and wisdom. At the present time, several famous almanacs that are really useful handbooks of current information are issued annually in Europe and America. The *Almanach de Gotha*, which was published first in 1763, is devoted to political information about the countries of the world. *Whitaker's Almanack*, published in England, and several American almanacs issued by newspapers, such as the *World Almanac*, are compact summaries of current events.

America's Cup Race. This famous yachting race derives its name from a schooner yacht *America*, built in 1851 for Commodore Stephens of the New York yacht club. On Aug. 22 of the same year, the *America* won a race open to all comers, over a course around the Isle of Wight, near England, her owner receiving the prize cup valued at $2500. In the numerous races since that date, the cup has been successfully defended against the English challengers. From 1899, Sir Thomas Lipton sponsored 15 attempts to recapture the coveted prize.

Animism (*ăn'i-mĭz'm*). In its recent modern use the term animism, from *anima*, "soul," is widely employed to denote the most primitive or superstitious forms of religion. In this sense the term was popularized by E. B. Tylor, who defined it as "the doctrine of souls and other spiritual beings generally."

But when so employed animism has come to have at least three distinct meanings. Of these, the first is belief which ascribes conscious life to all objects or to all nature in general, without assuming, however, the existence of separate souls. This embraces many superstitions, of which fetishism may be cited as a typical example. The second meaning is the belief that all material bodies are inhabited by souls; that these souls may be either material or immaterial, and that they may exist in a separate, disembodied state. Such souls are ascribed not only to men, but also to plants, animals, mountains, rocks, implements, weapons, and to other objects. The third meaning which animism is employed to signify is belief in the activity of the spirits of those recently deceased and in the possession of persons or things by ghosts or by benign and evil spirits.

Animistic beliefs, such as the foregoing, are extensively found among savage, barbaric, and semi-civilized peoples. To a greater or less degree, they persist also in the most advanced races. Although animism is commonly described as the most primitive form of religion, the view is also widely held that, in a true sense, animism is not a religion. Those who maintain this position emphasize that while religion implies some form of emotion, animism is simply an attempted explanation of puzzling phenomena and is not an attitude of mind toward the cause of them.

Antibiotics and the Corticosteroids. Antibiotics are chemical substances produced by microorganisms which have the capacity in dilute solutions to inhibit and even destroy bacteria and other microorganisms.

Since the advent of penicillin, new antibiotics have been introduced with bewildering rapidity—completely revolutionizing the treatment of infectious diseases. At present, the majority of bacterial diseases, all the known rickettsial diseases (Rocky Mountain spotted fever, typhus fever, scrub typhus, etc.) and a number of virus and fungus infections can be successfully treated with antibiotics.

The fungus penicillium had been known previously, but it remained for Dr. Alexander Fleming in 1929 to observe that this mold contained an active anti-bacterial substance which he named *penicillin*. In 1941 penicillin was first employed in the treatment of human disease, and by 1943 its clinical value was fully established. There are several varieties of penicillin, but the most widely used are penicillin G, procaine penicillin, benzathine penicillin, and the most recent variety, penicillin V. Penicillin is the antibiotic of choice in the treatment of pneumococcal and streptococcal infections, gonorrhea and syphilis. Toxic reactions, when they occur, are due chiefly to allergic sensitivity to the drug.

Streptomycin was the second important antibiotic to be discovered, being first isolated in 1944 by Dr. Selman A. Waksman and his co-workers. Streptomycin, though effective against the same group of bacteria as penicillin, is not as widely used because of the ease with which bacteria develop resistance to this antibiotic. It has a second disadvantage in that prolonged use may cause vertigo and deafness due to the toxic effects of the drug on the vestibular apparatus and the auditory nerve. *Dihydrostreptomycin* is produced from streptomycin and is less toxic to the auditory nerve, but unfortunately bacteria develop resistance to this antibiotic as quickly as they do to streptomycin. Today the chief use of streptomycin and dihydrostreptomycin is in the treatment of tuberculosis.

The next important antibiotic to be extensively used was *chlorotetracycline*, better known by its commercial trade-mark name, *Aureomycin*. The discovery of chlorotetracycline ushered in the era of broad spectrum antibiotics—antibiotics that are effective against a wide range of microorganisms. A second closely related antibiotic—*oxytetracycline* was brought out in 1950. In 1953, a third antibiotic

of this same group—*tetracycline*, marketed under the various trade-mark names of Achromycin, Panmycin, and Tetracyn, was made commercially available. Recently a new phosphate complex salt of tetracycline—marketed under the trade-mark names of V Achromycin and Tetrex—was found to be more rapidly and efficiently absorbed into the blood stream and thus was more clinically effective. All the above antibiotics are usually listed together because their action against microorganisms are practically identical. They have been used successfully in the treatment of many infections and diseases, including pneumonia, acute brucellosis, tularemia, the rickettsial diseases, and psittacosis.

Chloramphenicol, marketed under the trade-mark name of Chloromycetin, is another broad spectrum antibiotic that is widely used today. It has the same range of usefulness as the tetracyclines but is the drug of choice in the treatment of typhoid and para-typhoid fever.

Erythromycin, another widely used antibiotic, was made commercially available in 1952 under the trade-mark names of Iliotycin and Erythrocin. It is as effective as penicillin in the treatment of streptococcal infections, and therefore was a welcome adjunct in the treatment of patients who had developed a sensitivity to penicillin. It is also especially useful in staphylococcal infections that are resistant to penicillin and the tetracyclines.

Antibiotic drugs have been responsible for the saving of untold lives, but unfortunately their widespread use has resulted in the development of strains of bacteria resistant to the antibacterial activity of these important drugs. The development of bacteria resistant to certain antibiotics has made it necessary to search continually for and isolate new antibiotics. The newest antibiotics at this writing are *novobiocin* and *oleandomycin*.

Today a major trend to combat the problem of resistant bacteria is the use of combinations of antibiotics or antibiotics combined with other drugs in order to attack more effectively bacteria which have become resistant to single antibiotics. Notable examples are the combined use of streptomycin with isoniazid or para-aminosalicylic acid in the treatment of tuberculosis; streptomycin with one of the tetracyclines in undulant fever; and olean-domycin and tetracycline for better control of staphylococcal infections.

Another problem encountered in the use of antibiotics is the overgrowth of certain fungi in the intestinal tract, mouth, and other body orifices when the bacteria which are natural habitats of these areas are virtually eliminated by antibiotics. The most notorious offenders are the fungi of the monilia group, which are not particularly dangerous in themselves but become important infections in diabetics, and debilitated and chronically ill persons. A relatively new antibiotic—*nystatin*—has come into prominent use chiefly because of its effectiveness against monilia infections.

The corticosteroid hormones, *cortisone*, *hydrocortisone* and *ACTH* (adrenocorticotrophic hormone), unlike antibiotics, are not antibacterial but produce therapeutic results by some unknown alteration of the body's glandular balance. Cortisone was discovered several years prior to its recognition as a therapeutic agent and was first used in 1948 at the Mayo Clinic by Dr. Philip S. Hench in rheumatoid arthritis. In 1950 Hench shared the Nobel prize in medicine with Dr. Edward C. Kendall of the Mayo Foundation and Dr. Tadeus Reichstein of Switzerland for their work in isolating the hormone from the adrenal cortex. ACTH, which is extracted commercially from animal pituitary glands, stimulates the adrenal cortex to produce its own cortisone or cortisone-like substance. ACTH, cortisone, and the closely allied hydrocortisone all have similar clinical effects, but cortisone and hydrocortisone have had wider clinical application.

Cortisone and hydrocortisone possess certain undesirable characteristics, chiefly their ability to cause retention of sodium in the body, and increased excretion of potassium. Many attempts were made to improve on cortisone and hydrocortisone, but it was not until 1954 that this was accomplished with the introduction of prednisone and prednisolone, which at present are the drugs of choice.

The corticosteroids are employed in the treatment of many diseases. They have proved valuable in the treatment of rheumatoid arthritis, rheumatic fever, bronchial asthma, inflammatory and allergic skin and eye disorders, nephrosis, pulmonary emphysema, and systemic lupus erythematosis. They have demonstrated promising results in such diseases as gout, polyarteritis nodosa, scleroderma, regional enteritis, sprue, and certain blood disorders.

Barber's Pole. A pole striped slantingly with alternate bands of red and white and placed as a sign outside the door of a barber's shop. In former times, barbers practiced bleeding and leeching. The red striping on the pole symbolized the blood; the white, bandages.

Benefit of Clergy. By an ordinance enacted in 1087 in England, any man sentenced to death could save his life if he could prove that he was a clerk, or man of learning. This might be done by reading a certain verse of Scripture proposed to him. The privilege was known as the benefit of clergy. It was officially withdrawn in the 18th century.

Bessemer Steel, Invention of. Bessemer steel is produced by blowing air through a mass of molten pig iron. During the process of blowing, the carbon and silicon, together with some of the other impurities contained in the iron, are burned to forms which pass away as gases or are retained in the slag so that they may be separated from the liquid metal. The heat formed by the combustion of these impurities, especially the silicon, is so great that, instead of being cooled by the blast of air, the liquid actually becomes hotter.

The product which remains after the treatment with air is not steel but is in many respects similar to wrought iron. In order to obtain steel, a certain amount of spiegeleisen, containing known percentages of iron, manganese, and carbon, is added to the molten iron. See *Steel*, page 977.

This process of removing the carbon and silicon from pig iron was invented by the great English ironmaster, Henry Bessemer, who received his patent in 1855. The process of recarburizing the molten iron and removing oxygen by means of spiegeleisen was patented by Robert Mushet.

When, in 1856, Bessemer took out patents for his process in the United States, his claims were immediately contested in the courts by William Kelly. It then developed that Kelly, who operated an iron refinery and foundry at Eddyville, Ky., had during the years 1846-47 independently invented the pneumatic process of refining pig iron. The United States courts decided that Kelly was the prior inventor, and he received a patent which was later renewed. Bessemer's patents were not renewed.

Bible, Modern Translations of. No manuscript of the Old Testament in Hebrew is extant that dates before the 9th century, and none of the New Testament in the Greek is earlier than the 4th; but critics are agreed that we possess the text of the 1st century substantially entire. Of the versions in modern languages, among the earliest was an Italian version prepared by the Waldenses in the 13th century. The first printed Bible in Italian was issued at Venice in 1471. A printed Bible in Spanish appeared at Valencia, Spain, in 1478. The New Testament in French was first printed in 1477, at Lyon; in 1487, a large edition of the whole Bible was issued. The Louvain Bible, 1550, became the popular French Catholic version; the translation by Olivetan, 1535, was the corresponding Protestant version. Eighteen printed editions of the Bible had

been issued in Germany before Luther's translation appeared in 1534.

The first complete English translation was made from the Vulgate, or Latin version. It was issued about 1382, and is known as the Wiclif translation because John Wiclif did much of the work and sponsored the version. His friend, John Purvey, revised this version within the next few years, producing what is known as the Wiclif-Purvey Bible. William Tyndale issued (1525-26) the first printed English New Testament translated from the Greek. Between this date and 1536, he translated from the Hebrew the Pentateuch and other parts of the Old Testament.

Miles Coverdale published the first complete printed English Bible in 1535. Subsequent important English versions are: Matthew's Bible, 1537; the Great Bible, 1539; Cranmer's Bible, 1540; the Genevan Bible, so called because prepared by English exiles at Geneva, Switzerland, 1560; the Bishops' Bible, 1568; the Authorized Version, or King James Bible, 1611; the Reims New Testament (Catholic), 1582; the Douai Bible (Catholic), 1609; the Revised Version, 1881 and 1885; American Revised Version, 1901. A new American Revised Version was published in 1952. A new and complete version of the Bible is at present in the course of preparation at Rome. The first eight books of the Old Testament were published in 1952. An excellent English version of the Jewish scriptures was issued in 1917. Notable modern translations of the Bible are those of James Moffat (Protestant) and Ronald Knox (Roman Catholic). Several versions of the New Testament in modern English have appeared in recent years. See *English Literature.*

Capital Punishment. In the United States, capital punishment, as the extreme penalty for crime, prevails throughout the Union except in Maine, Michigan, Minnesota, North Dakota, Rhode Island, and Wisconsin. A number of states have abolished, and later restored, capital punishment. These include Arizona, Colorado, Iowa, Missouri, Oregon, South Dakota, Tennessee, and Washington. Hanging is the mode of execution in 10 states. In 23 others, electrocution is the legal method. In Arizona, California, Colorado, Missouri, Nevada, North Carolina, Oregon, and Wyoming, lethal gas is used. The first execution by this method took place in 1924. In Utah, condemned persons may elect to be shot by a firing squad.

CEMETERIES IN EUROPE, (AMERICAN WAR)

Name	Location	Interments
Aisne-Marne	Belleau, Aisne, France	2,288
Brookwood	Brookwood, Surrey, England	468
Flanders Field	Waereghem, Belgium	368
Meuse-Argonne	Romagne-sous-Montfaucon (Meuse), France	14,240
Oise-Aisne	Seringes-et-Nesles, Aisne, France	6,012
St. Mihiel	Thiaucourt, Meurthe-et-Moselle, France	4,152
Somme	Bony, Aisne, France	1,833
Suresnes	Suresnes, Seine, France	1,541
	Total	30,902

CEMETERIES AND MEMORIALS—World War II

Location	Interments
Neuville-en-Condroz, Belgium	5,192
St. James-Manche, Brittany	4,410
Cambridge, England	3,811
Epinal, Vosges-France	5,255
Florence, Italy	4,400
Henri-Chappelle, Belgium	7,989
St. Avold-Moselle, Lorraine	10,488
Hamm, Luxembourg	5,074
Manila, Philippines	17,191
Margraten, Netherlands	8,299
St. Laurent-Calvados, Normandy	9,386
Carthage, Tunisia	2,840
Draguignan-Var, France	861

CEMETERIES AND MEMORIALS—World War II
Continued

Location	Interments
Nettuno, Italy	7,862
Suresnes, Seine-France	24
Hato Tejas, Puerto Rico	69
Honolulu, Hawaii	13,376
Sitka, Alaska	77
Total	106,604

CEMETERIES, NATIONAL

Name and Location	Area Acres	Interments
Alexandria (Pineville), La.	8.24	4,936
Alexandria, Va.	5.50	3,586
Andersonville, Ga.	117.06	13,752
Andrew Johnson (Greeneville), Tenn.	15.00	122
Annapolis, Md.	4.125	2,583
Antietam (Sharpsburg), Md.	11.00	4,809
Arlington (Ft. Myer), Va.	408.33	49,601
Balls Bluff (Leesburg), Va.	.057	54
Baltimore, Md.	72.227	774
Barrancas, Fla.	7.07	2,513
Baton Rouge, La.	7.50	3,598
Battle Ground, Dist. of Columbia	1.033	45
Beaufort, S. C.	28.92	9,826
Beverly, N. J.	7.20	386
Camp Butler (Springfield), Ill.	6.02	1,759
Camp Nelson (Nicholasville), Ky.	9.70	3,724
Cave Hill (Louisville), Ky.	4.33	5,680
Chattanooga, Tenn.	129.53	15,157
City Point (Hopewell), Va.	8.19	5,233
Cold Harbor (Richmond), Va.	2.17	1,981
Corinth, Miss.	20.00	5,774
Crown Hill (Indianapolis), Ind.	1.37	1,100
Culpeper, Va.	6.37	1,386
Custer Battlefield, Mont.	640.00	1,759
Cypress Hills (Brooklyn), N. Y.	18.14	17,786
Danville, Ky.	.31	371
Danville, Va.	3.50	1,377
Fayetteville, Ark.	6.01	1,509
Finns Point (Salem), N. J.	2.50	2,677
Florence, S. C.	3.76	3,042
Fort Bliss, Texas	15.00	648
Fort Donelson (Dover), Tenn.	15.34	688
Fort Gibson, Okla.	6.83	2,830
Fort Harrison (Richmond), Va.	1.55	821
Fort Leavenworth, Kans.	14.60	4,867
Fort McPherson (Maxwell), Nebr.	20.00	1,175
Fort Rosecrans, Calif.	8.01	1,525
Fort Sam Houston, Texas	60.11	1,326
Fort Scott, Kans.	10.26	1,178
Fort Smith, Ark.	15.83	2,767
Fort Snelling, Minn.	178.56	914
Fredericksburg, Va.	12.005	15,294
Gettysburg, Pa.	14.87	3,818
Glendale (Richmond), Va.	2.12	1,205
Golden Gate (San Bruno), Calif.	161.547	0
Grafton, W. Va.	3.21	1,386
Hampton, Va.	26.531	14,530
Jefferson Barracks, Mo.	29.00	16,896
Jefferson City, Mo.	2.00	967
Keokuk, Iowa	2.75	1,095
Knoxville, Tenn.	9.83	4,201
Lebanon, Ky.	2.83	883
Lexington, Ky.	.75	1,383
Little Rock, Ark.	23.12	7,849
Long Island (Farmingdale), N. Y.	175.00	2,956
Loudon Park (Baltimore), Md.	5.60	6,218
Marietta, Ga.	24.56	10,952
Memphis, Tenn.	43.91	15,919
Mexico City, Mexico	2.00	1,563
Mill Springs (West Somerset), Ky.	3.50	759
Mobile, Ala.	6.91	2,772
Mound City, Ill.	10.50	5,658
Nashville (Madison), Tenn.	65.00	17,088
Natchez, Miss.	11.07	3,790
New Albany, Ind.	5.46	3,509
New Bern, N. C.	7.69	3,543
Perryville, Ky.	4.39	0
Philadelphia (Germantown), Pa.	13.32	7,438
Poplar Grove (Petersburg), Va.	8.65	6,281
Port Hudson (Zachary), La.	8.00	3,862
Quincy, Ill.	.459	327
Raleigh, N. C.	7.83	1,307
Richmond, Va.	9.74	6,849
Rock Island, Ill.	7.12	1,086
Salisbury, N. C.	6.00	12,279
San Antonio, Texas	3.63	3,880
San Francisco (Presidio Sta.), Calif.	28.34	19,573

CEMETERIES, NATIONAL—*Continued*

Name and Location	Area Acres	Interments
Santa Fe, New Mexico	9.63	1,796
Seven Pines (Richmond), Va.	1.90	1,408
Shiloh (Pittsburg Landing), Tenn.	10.05	3,652
Sitka, Alaska	1.19	132
Soldiers Home, D. C.	15.89	9,836
Springfield, Mo.	11.03	2,990
St. Augustine, Fla.	1.36	2,024
Staunton, Va.	1.15	777
Stone River (Murfreesboro), Tenn.	20.10	6,197
Vicksburg, Miss.	40.00	17,551
Wilmington, N. C.	5.00	2,489
Winchester, Va.	5.00	4,583
Woodlawn (Elmira), N. Y.	7.36	3,405
Yorktown, Va.	3.00	2,204
Zachary Taylor (Matthews), Ky.	16.43	473
Total	2,799.584	452,272

Chemical Warfare. The use of poisonous, asphyxiating, or irritating chemicals in warfare was attempted as early as 425 B. C., when the Spartans burned sulphur near the walls of besieged Athenian cities with the intention of driving the defenders from their positions. In modern warfare, employment of poisons or poisonous weapons was expressly forbidden by the rules of the Hague Congress of 1907. The Allied armies were therefore totally unprepared when, at the battle of Ypres on April 22, 1915, the Germans let loose a dense cloud of greenish yellow chlorine gas upon the junction of the French and the British lines.

This first onset was followed by others, and a race began to improve this new weapon and to develop protective devices. The principal gases used were mustard, or blistering gas, lachrymators, or tear gases, chloropicrin, or vomiting gas, and chloro arsine, or sneezing gas. The chief defense was by masks, which permitted breathing through a canister filled with chemicals and absorbent charcoal.

In a protocol signed at Geneva in 1925, thirty-nine member countries of the League of Nations renounced the use of "asphyxiating, poisonous and other gases and all analagous liquids, materials, and devices." However, because it was known that Germany had built up reserves of chemicals that could be used in poison gas warfare, Great Britain and other countries, including the United States, made extensive preparations with improved gas masks and other protective devices.

Also, while refraining from initiating the use of gas as a weapon, they perfected deadly gases with which to retaliate in kind if their Axis enemies should begin this form of warfare. Either foreknowledge of this preparation or some other cause prevented the Axis powers from resorting to the use of poison gas, so that World War II was fought without chemical weapons being employed by armies in the field. Yet the contribution of chemistry to military effectiveness was extremely important. In the development and manufacture of insecticides like DDT, of drugs like atabrine, of incendiary substances and of industrial materials like synthetic rubber, to say nothing of its aid in preparing and preserving food products, chemical science showed great progress.

Chronology. The science of determining historical dates and the correct arrangement of the records of events in order of time. The development of this branch of knowledge, so necessary to the modern writing of history and in the conduct of affairs, involves, first, a material means of keeping records and, secondly, a definite unit of time measurement. A third factor has proved to be necessary in practice, that is, a definite date or epoch from which to reckon intervals of time. For the historian, problems of chronology arise, particularly in the ancient and medieval periods, from the prevalence of different methods of reckoning, as well as from inaccuracies of record.

Ancient Eras. Perhaps as early as the 8th century B. C., the Babylonians adopted the year of the accession of Nabonassar as the epoch from which to reckon time. The beginning of the Babylonian era falls, therefore, in 747 B. C. It is interesting that the other two generally accepted eras of antiquity are both dated from years within the 8th century B. C. The Greeks reckoned in olympiads, counting from the accepted date of the first Olympic games, 776 B. C., while the Romans counted from the supposed date of the founding of Rome, 753 B. C. However, the Greek olympiad was four years in length, while there was a discrepancy in length between the Babylonian and the Roman year. Besides, both the Greek and the Roman system were introduced several centuries after the epochs taken as their beginnings.

The Christian Era. It is evident that the task of synchronizing dates in the history of the ancient world, where records were kept according to these varying systems, would not be easy. These and several other modes of reckoning periods longer than a year were in general use when, in 533 A. D., Dionysius Exiguus, a Roman abbot, introduced into Italy the system of the Christian era, according to which dates are reckoned forward and backward from the birth of Christ. This method of chronology came into use in France and England in the 8th century. There were still, however, considerable variations in the fixing of dates.

Dionysius used the year 754 A. U. C. as the year of the birth of Christ, and fixed the beginning of the Christian era at March 25 of the preceding year, dating from the Annunciation. Subsequently throughout the middle ages, in church and secular records, various dates for the beginning of the year,—March 25, March 1, Easter, and Christmas, for example,—were in use. Not until 1752 was the present date of January 1 in general use as the first day of the year. The fact that Dionysius placed the birth of Christ in 754 A. U. C., instead of 750, the commonly accepted year among early Christians, accounts in part for the necessity of reckoning that Christ was born in 4 B. C., instead of 1 A. D.

Modern chronology has been further complicated by the use of different calendars. The calendar having a year of 365 days, authorized by Julius Cæsar and known as the Julian calendar, was corrected by a council of astronomers summoned by Pope Gregory XIII in 1582. The new Gregorian calendar gradually came into use in western Europe, being finally adopted in England in 1752 and in the American colonies about the same time.

In eastern Europe, however, where the Greek Church was dominant, the Julian reckoning was retained. In 1917, Turkey adopted the Gregorian calendar; Russia followed in 1918; and, in 1923, a congress of the Eastern Orthodox Church decreed the adoption of the reckoning used by the rest of the world. Bulgaria and Greece accepted the change. The Nationalist Government of China adopted the same calendar in 1928, thus making its use uniform throughout the civilized world. See *Calendar*.

Several attempts have been made to construct, by the use of the Old Testament records, a Creation era. The best-known of these is that which was computed by Archbishop Ussher (1650), in which the date of creation of the world is fixed as 4004 B. C. Other assumed dates of the creation vary from 3483 B. C. to 6984 B. C.

The eras mentioned above, as well as others that have been widely used in the Western world, are given in the following table.

Era	Beginning B. C.
Era of Constantinople	Sept. 1, 5508
Alexandrian Era	Aug. 29, 5502
Mundane Era of Antioch	Sept. 1, 5492
Julian Period	Jan. 1, 4713
Mundane Era of Ussher	Oct. 19, 4004
Jewish Mundane Era	Oct. 3761
Era of Abraham	Oct. 1, 2015
Era of the Olympiads	July 1, 776

Era	Beginning
	B. C.
Roman Era (A. U. C.)	April 24, 753
Grecian or Syro-Macedonian Era	Sept. 1, 312
Era of Maccabees	Nov. 24, 166
Tyrian Era	126
Sidonian Era	Oct. 110
Spanish Era	Jan. 1, 38
Augustan Era	Feb. 14, 27
	A. D.
Christian Era	Jan. 1, 1
Mohammedan Era	July 16, 622

Oriental Reckoning. In both Hindu and Chinese chronology, the cycle of 60 years is employed. The Hindus assume four ages, three of which elapsed before the beginning of the present age, called *kali-yug*, 3101 B. C. Various eras, dating from different reigns or events, are used in different parts of India. The Chinese cycles of 60 years begin with 2277 B. C. However, since 163 B. C., Chinese writers have followed the practice of dating events according to periods beginning with the accession of some emperor.

Mayan Calendar, The. The ancient Mayas of Central America developed a remarkably elaborate and accurate system of chronology. Their inscriptions which archeologists have examined appear to have been almost exclusively devoted to the reckoning of periods of time. In the Mayan system, the day is the basal unit. Cycles of about 52 years were employed, and, at intervals of approximately 5 years (1800 days), monuments were erected. The inscriptions on each set of monuments appear to constitute a 5-year almanac. So complete was the Mayan reckoning that it is said to be capable of locating any date in a range of 370,000 years.

Codes. Messages written by means of a secret arrangement of letters or figures so that such communications may not be deciphered by a third party. This device is widely used in diplomacy, war, and business. One of the commonest ways of forming these codes is to make an arbitrary sentence containing 26 letters, each letter of the alphabet occurring once, and to use these in their order as the ordinary alphabet. Thus if c were the 14th letter of the key sentence, it would be employed in the code writing for n, the 14th letter of the alphabet.

Communistic Societies. Most primitive tribes held much of their property in common. In more advanced stages of civilization, private ownership has played a much larger rôle. At the same time, idealists and religious leaders have looked toward a communistic organization as an escape from the evils that accompany private ownership of property. One of the most notable exponents of the common possession of property was Plato, who advocated communism in wives and husbands also.

In the United States, there have been numerous experiments of this order. Among the first were the communities of Shakers, who derived their inspiration from the religious leader Ann Lee. She came to America in 1774 and founded several societies, the members of which were celibates. Fifteen of these societies are said to exist to the present day. The Harmony Society, or Harmonists, practiced communism and celibacy, beginning in 1805. They were located first in Butler county, Pa.; in 1814, they founded New Harmony, Ind., whence, in 1824, they removed to Economy, Pa., where the society continued until formally dissolved in 1906.

The most famous of American communistic societies was that called the Brook Farm at West Roxbury, Mass. It was actively supported by such prominent figures as Hawthorne, Emerson, and Horace Greeley. Founded in 1841, it was later modeled on the views of the French writer Fourier. Waning enthusiasm and a disastrous fire hastened its dissolution in 1856.

The Amana community originated in 1842. Its members were German and Swiss immigrants who represented an organization going back almost to 1700. They still survive in Iowa. Their manner of life is ascetic and forbidding.

The Oneida community was founded in 1848 by J. H. Noyes. Communism in it extended not only to property but also to sex relationships. It later became a commercial organization. See *Noyes, John Humphrey*. The Icarian community, founded in 1848, owed its origin to Cabot, the author of the utopian work entitled *Icaria*. It lacked the rigid regulations of most of the others. Located in Illinois for some time, it later moved to Iowa.

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Cross. The chief symbol of Christianity. As a sacred symbol, however, the cross is of much earlier origin and of much wider diffusion, being found in its more primitive forms in every part of the world. The Spanish conquerors of South America were astonished to find the cross an object of worship there. The swastika, , and the *crux ansata*, "handle-shaped cross," , are the principal early forms, the latter being still found among the Copts of Egypt as a symbol of Christianity. Among most early peoples, the cross symbolized the life-giving principle in nature.

The cross was also used as an instrument of torture and execution from early times, particularly among the Romans as a penalty inflicted on slaves and others who could not claim citizenship. From the fact that Jesus was put to death in this manner, the cross, already an object of religious veneration, assumed a new significance for the Christiams.

Crusades, The. The several religious and military expeditions undertaken by European powers in the middle ages to rescue the holy places of Pales-

tine from the Mohammedans. Below the dates, leaders, and results of the seven chief crusades are summarized. See also *Children's Crusade*, page 560.

1096–1099. Chief leaders, Godfrey of Bouillon and Robert, duke of Normandy. Established kingdom of Jerusalem.

1147–1149. Chief leaders, Conrad III of Germany and Louis VII of France. No result.

1189–1192. Chief leaders, Emperor Frederick I, Richard the Lion-hearted, and Philip II of France. Capture of Acre.

1202–1204. Chief leaders, Baldwin, count of Flanders, and Boniface, marquis of Montferrat. Latin empire founded.

1228–1229. Chief leader, Frederick II, emperor. Jerusalem regained.

1248–1254. Chief leader, Louis IX of France. No result.

1270. Chief leader, Louis IX of France. Fruitless.

Date Line, International. A line, following approximately the 180th meridian, on opposite sides of which the reckoning of the date differs by one day. As one travels from west to east, standard time advances one hour for each 15°, that is, each twenty-fourth of a circle of longitude about the earth. In passing completely around the earth, therefore, one gains twenty-four hours, or one complete day. The 180th meridian is chosen as the one at which this change of date should be made because it is farthest from the first, or Greenwich, meridian and because, passing near the center of the Pacific Ocean, it avoids inhabited lands, where it might cause serious confusion. The date line departs from the 180th meridian sufficiently to pass through Bering strait, west of the Aleutian islands, and east of certain British islands near New Zealand. The date on the American side of the line is one day behind the date on the Asiatic side.

Dead Sea Scrolls. The most remarkable archaeological find of modern times was made by some Bedouin tribesmen in 1947, when they discovered in a cliff cave at Qumran in the Holy Land, near the Dead Sea, some ancient scrolls and fragments of scrolls inscribed in Hebrew, Greek, and in Aramic, the language of Jesus. This and subsequent discoveries in neighboring caves in the same vicinity have brought to light the oldest biblical manuscripts known, some of them dating back to 200 B.C. Included among the scrolls, some of which are inscribed on parchment, others on leather, and still others on copper, are parts of every book of the Old Testament, with the exception of Esther, and substantially all of the Book of Isaiah, together with a number of hitherto unknown works.

The importance of the finds is apparent immediately it is remembered that no original copy of the Bible is known to exist. Written between 1300 B.C. and 100 A.D., the earliest complete manuscripts of the New Testament date from the fourth century A.D., while for the text of the Old Testament scholars have heretofore had to rely on Hebrew manuscripts dating from the ninth to the eleventh century A.D. An international group of scholars is now at work on the Dead Sea Scrolls, but it will probably be years before their investigation is completed. Meanwhile, much new information of the world of biblical times has already been gained.

Dictionaries. The modern dictionary is the result of a long evolution. The earliest work of the kind mentioned was made at Nineveh in the 7th century B. C. and was impressed in cuneiform letters on clay tablets.

The earliest Greek and Latin dictionaries were not meant to contain all the words in the language but embraced only more difficult words and phrases, which needed explanation. Some were confined to words in special fields, such as those of Homeric expressions, of words used in cooking, or Zenodotus' dictionary of the cries of animals. Only in modern times have attempts been made to compile explanations of all the words used by the Greeks and Romans.

The first dictionary aiming to give a complete collection of English words was published in 1721 by Nathan Bailey, and was called *The Universal Etymological English Dictionary*. This work was also the first in English to trace on a large scale the derivation of words and to mark accents as an aid in pronunciation. It was the standard until the famous dictionary of Dr. Samuel Johnson appeared in 1755. This latter work began the custom of illustrating the use of words by quotations from the best writers. The most scholarly and authoritative work today is the *New English*, or *Oxford Dictionary*.

The greatest American lexicographer was Noah Webster. His *American Dictionary of the English Language*, published in 1828, has been repeatedly revised. Under its present name, *Webster's New International Dictionary*, it is provided with many features not included in the older dictionaries, such as illustrations, synonyms, sections containing biographical and geographical information, lists of abbreviations, and numerous other useful additions. Other notable American dictionaries in English are *Funk and Wagnalls New Standard Dictionary* and the *Century Dictionary and Cyclopedia*.

Dollar Mark. This mark has been traced through early manuscripts back to the old Mexican abbreviation for peso, Ps. During the spread of the sign in commercial relations between the West Indies, New York, the Mississippi, and other regions, the "S" was placed over the "P" and evolved in the form $. The use of two vertical lines instead of one arose later and gave rise to the mistaken idea that the sign was a corruption of an "S" placed over a "U" and was an abbreviation for United States.

Espionage. The first organized systems for procuring by secret means information likely to give the government procuring it an advantage over countries from which it was procured date back to Richelieu and Cromwell. Among the most efficient modern systems were the Russian OGPU and the German Gestapo, these being used for social revolutionary purposes as well as national ends. Most countries have their secret services. Counter-espionage, or spying on enemy spies, results in agents often being in the pay of opposing systems at the same time. Death is the usual penalty for espionage in time of war, and in 1954 Congress passed a law permitting the death penalty or up to life imprisonment for espionage in peacetime. If diplomats are involved, their recall may be asked.

FAMOUS SIEGES

Acre. Besieged for 2 years by the Crusaders. Surrendered July 1191.

Alesia, Gaul. Besieged for a month by the Romans under Julius Cæsar. Surrendered, 51 B. C.

Antwerp. Besieged for 14 months by Spaniards. Belgians surrendered, 1585.
Besieged for 15 months by populace. Dutch garrison surrendered, Dec. 23, 1832.
Besieged for 10 days by Germans. Belgians surrendered, October 9, 1914.

Arcot. Besieged for 50 days by French and Sepoys. Siege raised, 1751.

Boston, Mass. Besieged by American forces for 8 months. Evacuated by British, March 17, 1776.

Candia, Crete. Besieged for 2 years by Turks. Venetians surrendered, September 1669.

Carthage. Besieged for 2 years by Romans; fell 146 B. C.

Constantinople. Besieged by Saracens for 5 years. Siege raised, 677.
Besieged by Saracens for 1 year. Siege raised, 718.
Besieged by Turks for 54 days. City surrendered, May 29, 1453.

Delhi. Besieged by British for 131 days. Indian mutineers surrendered, Sept. 20, 1857.

Gibraltar. Besieged by Spaniards 3 years, 7 months, 12 days. Siege raised, Sept. 13, 1782.

Jerusalem. Besieged by Mohammedans for 4 months. Byzantine garrison surrendered, 637.

Kimberley. Besieged by Boers for 126 days. British garrison relieved, Feb. 15, 1900.

Kut-el-Amara. Besieged by Turks for 144 days. British surrendered, April 29, 1916.

Ladysmith. Besieged by Boers for 118 days. British garrison relieved, Feb. 28, 1900.

La Rochelle. Besieged by forces of Richelieu for 14 months. Huguenots surrendered, October 28, 1628.

Leiden. Besieged by Spaniards for 4 months. Dutch cut dikes. Siege raised, Oct. 3, 1574.

Leningrad. Besieged by Germans for 30 months during World War II. Russians successfully defend city.

Lucknow. Besieged by Indian mutineers for 149 days. City relieved finally, Nov. 25, 1857.

Mafeking. Besieged by Boers for 217 days. City relieved, May 17, 1900.

Mantua. Besieged by Napoleon for 8 months. Austrians surrendered, Feb. 2, 1797.

Orleans. Besieged by English for 10 months. City relieved by Joan of Arc, May 8, 1429.

Ostend. Besieged by Spanish for 3 years. Flemish garrison surrendered, Sept. 28, 1604.

Paris. Besieged by Germans 135 days. City surrendered, Jan. 28, 1871.
Besieged by French national troops for 46 days. Communist insurrection suppressed, May 28, 1871.

Peking. Foreign legations besieged by Boxers for 55 days. Relieved, August 14, 1900.

Plevna. Besieged by Russians and Rumanians for 144 days. Turks surrendered, Dec. 10, 1877.

Port Arthur. Besieged by Japanese for 241 days. Russian garrison surrendered, Jan. 2, 1905.

Przemysl. Besieged by Russians for 182 days. Austrians surrendered, March 22, 1915.

Richmond. Besieged by Federal troops for 287 days. Evacuated by Confederates, April 3, 1865.

Saragossa. Besieged by French troops for 62 days. Siege raised, August 15, 1808.
Besieged by French a second time for 62 days. City capitulated, Feb. 20, 1809.

Sebastopol. Besieged by allies for 355 days. The city fell, Sept. 8, 1855.

Syracuse. Besieged by Romans for 2 years; fell 212 B. C.

Troy. Besieged by Greeks for 10 years; captured 1184 B. C.

Tyre. Besieged by Nebuchadnezzar for 13 years. Siege raised, 572 B. C.
Besieged by Alexander for 7 months; captured 332 B. C.

Vicksburg. Besieged by Federal troops for 186 days. City surrendered, July 4, 1863.

Vienna. Besieged by Turks. Siege raised, 1529.
Besieged by Turks. City relieved, Sept. 12, 1683.

Yorktown. Besieged by American and French forces for 20 days. British surrendered, Oct. 19, 1781.

Federal Bureau of Investigation (F.B.I.). This bureau in the Department of Justice was established in 1908 by order of Attorney General Charles J. Bonaparte. Special Agents investigate violations of Federal laws, collect evidence in cases in which the United States is or may be a party in interest, and perform other duties prescribed by law. To be a Special Agent, the applicant must be at least 25 years old and not more than 41. He must also be a graduate of an accredited law school or school of accounting. If accepted, he is given 16 weeks' training, during which he learns to handle firearms.

One of J. Edgar Hoover's first steps when he became director of the F.B.I. in 1924 was to start a centralized collection of fingerprints. The F.B.I. Identification Bureau now has more than 130 million fingerprint cards. The F.B.I. Laboratory, established in 1932, carries out scientific studies of evidence in criminal cases. In 1935 the F.B.I. National Academy was created. Selected police officers from all states and some foreign countries attend this school. See *Hoover, J. Edgar.*

Fire, Methods of Making. One of the most important steps in the development of civilization was man's discovery of a means of producing fire.

One of the earliest methods of kindling fire was to rub together two pieces of dry wood until the violent friction caused the emission of sparks. This device was much more laborious than the so-called bowstring method, which is now often used by boy scouts in fire lighting competitions. A bowstring is looped once about a notch in a hard, sharpened stick. This stick is held with the sharp end pressing against a piece of softer wood surrounded by tinder. As the bow is drawn back and forth, the stick revolves rapidly, and the heat so developed causes the tinder to ignite. A boy scout record of 7⅕ seconds was made for producing fire in this way.

A later means of making fire was to strike together two pieces of flint or a piece of flint and a piece of steel. This method was used as late as the beginning of the 19th century. See *Match.*

Geiger Counters (*Geiger-Mueller Counters*). A Geiger counter is a device used for the detection of ionizing particles such as those emitted by radioactive materials. Basically the Geiger counter consists of a hollow conducting cylinder along the axis of which, and insulated from it, is mounted a fine wire. This structure is enclosed in a glass envelope which can be evacuated of air and filled to any desired pressure with other gases. A mixture of argon and alcohol vapor at a pressure of from one-tenth to one-fifth of an atmosphere is commonly used. The insulation between the cylinder and the wire is such that a high electric potential (800 to 1200 volts) can be applied between them without producing appreciable flow of charge from cylinder to wire. However, any ionizing particle traversing the counter will initiate an electrical discharge causing a surge of current lasting for about one one hundred thousandth of a second. This current surge can, by the use of the proper electronic circuits, be made to produce a click in a headphone or operate a recording device.

The credit for making the first counters of this type is given to Hans Geiger and Walther Mueller, who produced such counters in 1928. As early as 1908, however, E. Rutherford and Geiger had produced a counter similar in operation to the present-day counters.

Geophysical Year. The International Geophysical Year will extend from July 1, 1957 to December 31, 1958. During that period, 50 nations will co-operate in scientific observations of natural phenomena affecting the whole world.

The subjects on which data will be collected and studied include meteorology, temperature, humidity, and wind in the upper air; ozone measurement; solar and atmospheric radiation; geomagnetism; aurora and air glow; the ionosphere, including its absorbing power, atmospheric noise, and drift over the earth's surface by the winds; solar activity; cosmic rays; variations affecting time signals; glaciology; seismology; gravity measurements, and oceanography.

Observations will be made at stations in all parts of the world, including the arctic and antarctic. Each month throughout the period about 3 "world days" will be observed on which an exceptional number of measurements will be made. Two will be made at the full moon and one near the quarter moon. Four other days for which exceptional meteoric activity is predicted have been designated for special study.

Three world data centers will handle the information collected, one in the U.S., another in the U.S.S.R., and a third divided between Western Europe and Japan.

Earth Satellite. One aspect of the program that has attracted much attention is the launching by the United States of the first of a series of earth satellites from Patrick Air Force Base in Florida during the latter part of 1957. It will be sent aloft by the world's first three-stage rocket, which will measure 72 feet in length and 42 inches in diameter. It will weigh 11 tons when loaded.

The satellite itself or man-made moon will be located in the nose of the rocket. It will be a small sphere packed with instruments approximately 21 inches across and weighing 21⅕ pounds. It is believed that, in its first stage, it will rise 300 miles at a speed of more than 25,000 feet a second. Since

its path around the world will be elliptical rather than circular, it is expected that it will come as close as 200 miles to the earth and recede as much as 800 miles. Traveling at about 18,000 miles an hour, it will be able to circle the earth in 90 minutes. Eventually it will be slowed down by atmospheric resistance, gradually lose altitude, and burn away in the denser levels of the atmosphere.

Ghetto. In the middle ages, when the Jews were obliged to live apart from the rest of the community, the quarter of the city in which they dwelt was known by the name of *ghetto*. The earliest is said to have been instituted at Venice in 1516.

The ghetto at Rome was instituted by Pope Paul IV in 1556, who assigned to the Jews a distinct quarter along the banks of the Tiber and forbade them to appear outside it unless the men wore yellow hats and the women yellow veils. This allotment was enclosed by walls, and guards were set at various gates. It was not until the time of Pius IX, about 1875, that the walls of the Roman ghetto were pulled down and the Jews were allowed to live how and where they pleased. The ghetto was restored in Warsaw in 1940 after Germany conquered Poland.

Guided Missiles. Ever since the last days of World War II, when parts of England, especially London, were ravaged by the German vengeance weapons, the V-1 and the V-2, the leading nations of the world have been experimenting with guided missiles. The V-1 was a robot bomb, a small jet-propelled pilotless airplane with a gyroscope steering system; while the V-2 was a rocket which could ascend to a height of over 60 miles and descend at supersonic speed. The United States carefully studied captured specimens of both types, and has since made great progress in developing new missiles. Although information concerning the research and actual production of these weapons is largely secret, some facts about them have been disclosed.

Guided missiles may be divided into four main groups:

Surface-to-surface. These missiles can be fired from the sea or from the land against targets on land or sea at relatively close or extremely long range. Like the German V-1's and V-2's, they have great speed and terrific blasting power. They can be equipped with atomic warheads or those carrying orthodox explosives.

Surface-to-air. These are anti-aircraft weapons for defense against enemy atom bombers and guided missiles, the type that will be used to guard our cities. The *Nike*, developed by the army, can reach an altitude of over 75,000 feet and score a hit on a target 25 or 30 miles distant.

Air-to-surface. These are launched from aircraft, and are actually guided aerial bombs which can seek out a target on land or sea, no matter how obscured it may be by atmospheric conditions. It is descended from the radar-guided type of missile successfully developed during World War II.

Air-to-air. These guided missiles are for bomber defense against speedy fighting planes, and also for use by interceptors in breaking up enemy bomber attacks. The greatly increased speed of planes has rendered machine guns and cannon far less effective than they were in air combat.

Experts agree that it is only a matter of time before guided missiles will replace manned bomber and fighter aircraft. Viewed as a purely technical problem, it is considered likely that 1957 and 1958 will see the production of guided missiles that can do most of the things the modern fighter can do, and, within three to five years, intermediate and long-range weapons, including the Intercontinental Ballistic Missile, will make medium and long-range bombers obsolete.

Hall of Fame. A hall erected on University heights, New York, in 1900 for use as a memorial to great Americans. It is a semicircular colonnade 500 feet in length at New York university. Within it is provided space for 150 panels, which are to contain bronze tablets bearing the names of such Americans as shall be judged most famous in their respective fields by an electorate of eminent American citizens appointed by the senate of the university. Above each name is placed, on a parapet, a bust or statue of the honored person. Beneath the colonnade is a museum for a permanent exhibition of portraits and other memorials. The hall is a gift of Helen Gould.

Only persons who shall have been dead 25 or more years are eligible to be chosen. Fifty names were to be inscribed on the tablets at the beginning, and five additional names every fifth year thereafter until the year 2000, when the 150 inscriptions will be completed. In case of failure to fill all the panels allotted, vacancies are to be filled later. By 1955, 86 names had been chosen.

The rules prescribe that New York university shall invite nominations from the public. Every nomination seconded by a member of the university senate shall then be submitted to an electorate of one hundred eminent citizens selected by the university, and their votes determine the choice.

In 1900, 29 names were chosen. They were as follows: George Washington, Abraham Lincoln, Daniel Webster, Benjamin Franklin, Ulysses S. Grant, John Marshall, Thomas Jefferson, Ralph Waldo Emerson, Henry W. Longfellow, Robert Fulton, Washington Irving, Jonathan Edwards, Samuel F. B. Morse, David G. Farragut, Henry Clay, Nathaniel Hawthorne, George Peabody, Robert E. Lee, Peter Cooper, Eli Whitney, John J. Audubon, Horace Mann, Henry Ward Beecher, James Kent, Joseph Story, John Adams, William E. Channing, Gilbert Stuart, and Asa Gray.

In 1905, the following 8 names were added: John Quincy Adams, James Russell Lowell, William Tecumseh Sherman, James Madison, John Greenleaf Whittier, Mary Lyon, Emma Willard, and Maria Mitchell.

The third election was held in 1910, and 10 new members were elected. Their names are Harriet Beecher Stowe, Oliver Wendell Holmes, Edgar Allan Poe, James Fenimore Cooper, Phillips Brooks, William Cullen Bryant, Frances E. Willard, Andrew Jackson, George Bancroft, John Lothrop Motley.

Nine members were added in 1915: Mark Hopkins, Francis Parkman, Elias Howe, Joseph Henry, Rufus Choate, Daniel Boone, Charlotte Cushman, Alexander Hamilton, and Louis Agassiz.

The election of 1920 resulted in 7 new members: Samuel L. Clemens (Mark Twain), James B. Eads, Patrick Henry, William T. G. Morton, Alice Freeman Palmer, Augustus Saint-Gaudens, and Roger Williams. Edwin Booth and John Paul Jones were added in 1925; James McNeill Whistler, James Monroe, Matthew F. Maury, and Walt Whitman in 1930; William Penn, Simon Newcomb, and Grover Cleveland in 1935; Stephen Foster in 1940; Booker T. Washington, Thomas Paine, Walter Reed, and Sidney Lanier in 1945. Six were chosen in 1950, namely, Theodore Roosevelt, Dr. William C. Gorgas, Josiah Willard Gibbs, Alexander Graham Bell, Woodrow Wilson, and Susan B. Anthony.

In 1955, three were elected—Wilbur Wright, Thomas Jonathan (Stonewall) Jackson, and George Westinghouse.

The Hall of Fame as it is now constituted includes 18 authors, 16 statesmen, 6 teachers, 6 preachers, 10 scientists, 6 soldiers and sailors, 7 inventors, 4 jurists, 2 philanthropists, 3 artists, 2 actors, 1 composer, 2 reformers, 1 pioneer, 1 engineer, and 1 dentist.

The Hall of Fame is not to be confused with the National Hall of Statuary in the Capitol, Washington, in which each state is entitled to erect a statue to her most distinguished deceased citizen.

Hinduism. The religion of the Hindus of India. It has grown out of the more ancient Brahmanism, but contains many modifications and additions, in-

fluenced by Buddhistic and other elements. Siva, or Shiva, the third member of the Brahman trinity, has been elevated to the position of Maha-deva, the "great god," or the destroyer. Under his many aspects he bears more than 1000 titles.

A prominent feature of Hinduism has been the caste system. Originally, there were four great castes: the Brahmans, or priestly class; the Kshatriyas, or warriors; the Vaisyas, or husbandmen; and the Sudras, or servants. Each Hindu has his own place in the social system and must observe the laws peculiar to it. Formerly, the chief distinction between castes appears to have been that of occupation, but now many mixed castes have arisen. The highest law which concerns the devout Hindu is to eat correctly, to drink correctly, and to marry correctly, that is, to do these things in accordance with the rules of his caste. Hinduism embraces more than 200 million adherents, or about two-thirds of the population of India.

Hobson's Choice. A synonym for no choice at all. The phrase owes its origin to Thomas Hobson, an old carrier and livery stable keeper, who plied between Cambridge and London in the 17th century. When a man came to Hobson's stable for a horse, he found that he was obliged invariably to take the one nearest the stable door.

Hyde Park. A national shrine, the ancestral home and last resting place of the late President Franklin Delano Roosevelt. It is situated on the east bank of the Hudson river on Route 9 (Albany Post Road) between Poughkeepsie and Staatsburg, in the center of a picturesque region rich in historic interest. Near the close of his second term, the president and his mother, Sara Delano Roosevelt, deeded twelve acres to the United States Government, and the president offered to donate to the government all his official and private papers. The offer was accepted by joint resolution of the United States Senate and House of Representatives. To house the books and documents in the Roosevelt collection, the Library, costing $350,000, was built by private subscription. The building and grounds were presented to the government in 1940.

Hydrogen Bomb. In contradistinction to the fission process (see page 947), whereby very heavy nuclei break down into lighter ones with a consequent loss of mass and release of energy, there is the fusion process in which similar loss of mass and release of energy accompanies the building up of heavier nuclei from the lightest ones. In particular, hydrogen nuclei can be combined to form the nuclei of helium atoms, though for this reaction to proceed extremely high temperatures and pressures such as exist in the interior of stars are required.

The temperatures and pressures necessary to start the fusion reaction are normally not found on the earth, except in an exploding atomic bomb (see page 947). Even there it appears that the temperature is not high enough to initiate the fusion reaction with the most abundant hydrogen isotope, but the process can work with the heavier hydrogen isotopes, namely, *deuterium* and *tritium*. These isotopes are rare. Deuterium comprises only about 0.003% of normal hydrogen, and tritium, being unstable with a half-life of only about 15 years, has to be made artificially; but means are available to obtain them in quantity.

The so-called hydrogen bomb has certain advantages over the fission bomb, in that the materials are less dangerous to handle and store and can be made in any desired size. Yet the hydrogen bomb still requires the fission bomb for a primer.

Ides of March. In Shakspere's *Julius Cæsar* the soothsayer warns Cæsar to "beware the ides of March." The ides were the halfway date in the month in the Roman calendar, which in March, May, July, and October fell on the 15th; in the other months, on the 13th. Cæsar was murdered March 15, 44 B. C.

Immigration. Shortly after the World War I, immigration into the United States was definitely restricted. This move may be said to have brought to an end the era in which the population was recruited in large numbers from abroad.

Immigrants numbered over one million in 1910. Very few came during the war. By 1920, over 400,000 entered the country. Thereafter, a national policy of strict limitation was adopted. In 1922, 1924, and 1929, progressively more drastic restrictions were imposed. Immigrants were admitted only in definite quotas from each country, although those from countries of the Western Hemisphere were excepted from the quota system. In 1931 for the first time in the history of the United States, the number of immigrants entering the country was less than the number of departures. There was a net loss of 94,474 persons. See *Immigration Legislation*.

The following table shows the 1955 quotas for countries from which more than 100 immigrants were acceptable. Forty-two other countries were limited to 100 immigants each. The grand total for the year was set at 154,657, not including refugees.

UNITED STATES IMMIGRATION QUOTAS

Great Britain & Northern Ireland	65,361	Belgium	1,297
Germany	25,814	Denmark	1,175
Ireland (Eire)	17,756	Yugoslavia	933
Poland	6,488	Hungary	865
Italy	5,645	Finland	566
Sweden	3,295	Portugal	438
Netherlands	3,136	Lithuania	384
France	3,069	Greece	308
U.S.S.R.	2,697	Rumania	289
Norway	2,364	Spain	250
Switzerland	1,698	Estonia	115
Austria	1,405	China	100

Refugees and Displaced Persons. One of the great problems following World War II was the care, repatriation, and resettlement of 1,600,000 refugees and displaced persons. At first the work was in the hands of several organizations, notably the United Nations Relief and Rehabilitation Administration (UNRRA), but in 1948 the International Refugee Organization (IRO), a specialized agency of the United Nations, was established to take over the task for a limited time.

In June 1948, President Truman signed the Displaced Persons act granting asylum in the United States to 205,000 victims of European wars and persecutions. In June 1950, a new bill was passed expanding the entries to a total of 415,744. Early in 1952, IRO was disbanded. It resettled 1,043,000 persons, repatriated 73,000. On President Eisenhower's recommendation, Congress, in July 1953, authorized the entry of an additional 209,000 refugees to the United States during a three-year period. But the Immigration and Naturalization Service announced in January 1957 that only 189,967 were admitted before the expiration of the law. Failure to issue the full quota of visas was blamed on provisions that did not permit the visa allotments to be shifted. Among those who were admitted under the act were 6,500 Hungarian refugees. An additional 15,000 Hungarians, for whom no visas were available, were admitted as parolees.

Jihad or **Jehad** (*jē-häd'*). A religious war which Mohammedans are urged in the Koran to make on all infidels and in which every person that refuses to accept Islam or to pay a poll tax is to be put to the sword. Souls of the faithful who fall in such a war are taken directly to paradise. There has actually been no such holy war waged by the whole Mohammedan world since the early Moslem conquests, although an attempt was made to have one declared in the interest of the Central Powers during World War I. The term is frequently used in the wider sense of any bitter and uncompromising crusade for some belief or principle.

Liberty, Statue of. The colossal statue, representing a female figure of Liberty holding aloft an immense torch, erected on Liberty Island, New York harbor, a national monument called Statue of Liberty. The statue, which was unveiled in 1886, was a gift from the people of France to the United States in commemoration of the 100th anniversary of American independence. The cost of the pedestal was met with funds raised by popular subscription in the United States, as the statue itself, designed by M. Frédéric Bartholdi, was paid for by popular subscription in France.

Libraries and Museums. Libraries are primarily collections of books and the buildings which house them. The term includes also, however, those collections of written records assembled before the invention of books, such as clay tablets and papyrus rolls. Museums are properly collections of other objects of interest, relating either to science, to history, or to the arts.

Early Libraries. One of the earliest libraries dates from about 2500 B. C., when clay tablets began to be collected at the temple of En-Lil in Nippur, Babylonia. Some 40,000 tablets or fragments have been discovered there, consisting of temple records, textbooks, mathematical tables, and literary works. Both tablet and papyrus collections were made by Rameses II at Thebes, Egypt, about 1300 B. C. The library of Sardanapalus in Babylon, collected about 650 B. C., contained 30,000 tablets. The Ptolemies in Egypt, beginning in the 4th century B. C., collected in Alexandria the greatest ancient library of Greek literature, consisting of 700,000 rolls of papyrus. The last remnants of this library are said to have been destroyed by the Arabs in 640 A. D.

During the middle ages, rolls were superseded by parchment or vellum bound in book form. Various monasteries collected and copied manuscripts, notably those of Monte Cassino in Italy, Cluny and Corbie in France, Fulda and Saint Gall in Germany, Canterbury and York in England, and Mount Athos in Greece. The number of books in each library, however, seldom exceeded 1000.

Great Modern Libraries. With the manufacture of paper in the 12th century and the invention of the printing press in the 15th century came a rapid increase in the production of books. The Vatican library in Rome, the Laurentian library in Florence, and other libraries at Leningrad, Oxford, London, and Munich grew rapidly and now have irreplaceable collections of manuscripts and early printed books. The greatest modern libraries, in point of size, include the Library of Congress, the National library at Paris, and the British museum, each of which has over 3 million volumes. The New York Public library and Harvard University library collections exceed 2 million volumes each.

Public Libraries. The recent history of libraries is largely the story of making books easily available to all people desirous of reading or consulting them. Benjamin Franklin initiated in 1732 the first membership library—the Library Company of Philadelphia. Subscription (circulating), apprentice, mercantile, and atheneum, or culture society, libraries followed, but these were largely supplanted by tax-supported libraries, the first of which was established at Peterborough, N. H., in 1833. Library taxes were authorized by law in Massachusetts in 1848. Andrew Carnegie donated over 60 million dollars to found nearly 2000 free libraries in the United States, besides 660 in Great Britain, 156 in Canada, and 49 elsewhere.

The American Library Association. The first American library convention was held in 1853 in New York City. In 1876 at Philadelphia the American library association was organized, membership being open to libraries and individuals. Among the leading spirits were Melvil Dewey, Justin Winsor, and William F. Poole. The purpose of the organization is to foster the establishment and development of libraries and to promote the use of books. It has served as a clearing house for helpful innovations, such as a decimal system of indexing books, devised by Melvil Dewey, who also helped to found a library journal and instituted training courses for librarians. Other improvements include the institution of shelves open directly to readers, first used in Cleveland about 1890, and the adding of children's departments. Branch libraries in cities were established, and provision was made for the blind, prisoners, high school students, and other special groups of readers, including soldiers and sailors during the World Wars.

Rural and suburban readers are served by traveling libraries. There are about 500 bookmobiles in operation in the United States. Many libraries maintain collections of records and films. The American Library Association recognizes between 30 and 40 library schools offering training for librarianship.

The Association prepares advisory book lists to guide libraries in making purchases; encourages, through attractive booklets, the systematic reading of informing and educational books; and promotes the establishment of county branches in order to reach potential readers in smaller centers. It has also made extensive surveys, such as that for determining the books preferred by children and the status and possibilities of adult education.

Newbery and Caldecott Awards. The children's librarians of the American Library Association select the annual winners of the John Newbery Medal Award and the Randolph Caldecott Medal Award. The Newbery Medal is presented to the author of the most distinguished contribution to American literature for children published the previous year, the Caldecott Medal to the artist of the best American picture book for children. Established in 1921 by Frederic G. Melcher, the first Newbery Award was presented in 1922. The first award of the Caldecott Medal was made in 1938. The awards were named for John Newbery (1713–67), a London bookseller and publisher of juvenile literature, and Randolph Caldecott (1846–86), English artist, who illustrated books for children.

Museums of Art. The growth of art museums belongs mainly to the late 19th and the 20th century, although the beginnings of a number of notable art collections date from earlier periods. The National museum at Florence contains collections made by the de' Medici family at the time of the Renaissance. The art treasures of the Vatican and the Dresden museum likewise date, in part, from the 15th and 16th centuries. The Louvre in Paris contains many masterpieces taken by Louis XIV and Napoleon as prizes of war. The systematic arrangement of exhibits, however, based on research and aiming at instruction, was entirely a development of the 19th century and has been most thoroughly carried out in British, Scandinavian, and particularly in American museums.

Among the world's greatest art museums not already mentioned are the Luxembourg, Paris; the National Gallery and the Victoria and Albert Museum, London; the Hermitage, Leningrad; the Metropolitan Museum of Art, New York; the Philadelphia Academy of Fine Arts; the Boston Museum of Fine Arts; and the National Gallery of Art, Washington.

Museums of Science. In the front rank of the world's museums of science are the British Museum, London; the National Museum, Washington; the American Museum of Natural History, New York; the Carnegie Institute, Pittsburgh; and the Field Museum, Chicago.

Beginning as private collections of curiosities, science museums have become public institutions for research and popular education. In America, especially, exhibits have been arranged so as to display rock formations and composition, the habits, habitats, and evolution of plants and animals, technological processes, tribal customs and cos-

tumes, periods of civilization as reflected in implements and objects of art, as well as useful facts in sanitation and dietetics. Exhibits are frequently supplemented by public lectures and the loan of pictures, films, and records.

Little Church Around the Corner. In 1870 a clergyman declined to conduct a burial service for George Holland, comedian, and referred Holland's friend to "the little church around the corner." The church so designated was the Protestant Episcopal Church of the Transfiguration in 29th Street, New York City. The rector, Dr. Houghton, acquiesced, and the name has since clung to the church as a term of affection.

Mausoleums. From the earliest times it has been the custom among civilized nations to perpetuate the memory of the noble deeds of great men by the erection of sepulchral monuments of imposing architectural magnificence. The mausoleum of Halicarnassus erected in memory of Mausolus, king of Caria, in 353 B. C. was known as one of the "seven wonders of the world," and from the name of this king is derived the word mausoleum.

Other ancient and notable mausoleums are those of Augustus, 28 B. C.; of Hadrian, now the Castle of San Angelo; and of Cecilia Metella, on the Appian Way at Rome. The Taj Mahal, made of white marble and located at Agra in India, was built by Shah Jehan in the 17th century as a monument for his favorite wife, Mumtaz Mahal.

More modern monuments are those of the Bourbons at Dreux; of Queen Victoria and the prince consort at Frogmore, near Windsor; of Napoleon III at Farnborough; of the House of Hanover at Herrenhausen; and of Frederick William III at Charlottenburg. In America, the most striking specimens of this kind of memorial are Grant's tomb in New York City, which resembles in general outline the tomb of Cecilia Metella, and Edward Bok's Singing Tower in Florida.

AMERICAN MEMORIAL COINS

Denomination	Year authorized	Number of Pieces
Fifty-Dollar (gold):		
Panama-Pacific Exposition		
Round	1915	1510
Octagonal	1915	1509
Two-and-one-half-Dollar (gold):		
Panama-Pacific Exposition	1915	10,017
Sesquicentennial Exposition	1925	200,226
Dollar (gold):		
Louisiana Purchase Exposition	1902	250,258
Lewis and Clark Exposition	1904	60,069
Panama-Pacific Exposition	1915	25,034
McKinley Memorial	1916	30,040
Grant Memorial	1922	10,016
Dollar (silver):		
Lafayette Memorial	1899	50,026
Half-Dollar (silver):		
Columbian Exposition	1892	5,002,105
Panama-Pacific Exposition	1915	60,030
Illinois Centennial	1918	100,058
Maine Centennial	1920	50,028
Pilgrim Tercentennial	1920	300,165
Alabama Centennial	1920	70,044
Missouri Centennial	1921	50,028
Grant Memorial	1922	100,061
Monroe Doctrine Centennial	1923	274,007
Huguenot Tercentennial	1924	142,080
Stone Mountain	1924	2,314,709
Battle Lexington-Concord	1925	162,099
California Diamond Jubilee	1925	150,200
Fort Vancouver	1925	50,028
Sesquicentennial Exposition	1925	1,000,528
Battle of Bennington	1925	40,034
Oregon Trail	1926	264,250
Hawaiian Discovery	1928	10,008
Daniel Boone Bicentennial	1934	108,000
Maryland Tercentennial	1934	25,015
Texas Centennial	1934	304,000
Arkansas Centennial	1935	94,800

AMERICAN MEMORIAL COINS—Con.

Denomination	Year authorized	Number of Pieces
Spanish Trail	1935	10,008
City of Hudson, N. Y.	1935	10,008
California-Pacific Exposition	1935	430,000
Connecticut Tercentennial	1935	25,000
Providence Tercentennial	1936	50,000
Cincinnati 50th Anniversary	1936	15,016
Long Island Tercentennial	1936	100,053
Bridgeport Centennial	1936	25,000
Albany, N. Y., 250th Anniversary	1937	25,013
Battle of Gettysburg	1937	50,028
Great Lakes Exposition	1937	50,030
Columbia, S. C., Sesquicentennial	1937	25,023
Elgin, Ill., Centennial	1937	25,015
Lynchburg, Va., Sesquicentennial	1937	20,013
New Rochelle, N. Y., 250th Anniversary	1937	25,015
Roanoke Island	1937	50,030
San Francisco-Oakland Bridge	1937	100,055
Delaware Tercentennial	1937	25,015
Wisconsin Centennial	1937	25,015
York County, Me., Tercentennial	1937	25,015
Robinson (Arkansas)	1937	25,000
Norfolk	1937	25,000
Antietam	1937	50,000
Iowa Centennial	1946	100,057
Booker T. Washington	1946	1,700,938
Washington Carver	1951	*
Quarter-Dollar (silver):		
Columbian Exposition	1893	40,023

*No limit to number minted. Banks sell this coin for $2.00, with $1.50 going to Negro education.

Mint, The United States. The United States mint was established by act of Congress, April 2, 1792. It is now a bureau of the department of the treasury, and is under the supervision of the director of the mint, who is appointed by the president. The principal purpose of the mint is to coin money for the country. It frequently makes coins for other countries, notably those of South and Central America; it makes the dies and prepares the official medals issued by the army, the navy, and the marine corps, or by Congress; and it refines and sells large amounts of gold and silver bullion to be used for industrial purposes. The mint also serves the public by making, at a nominal charge, assays of ores and bullion.

Three coinage mints are now operated by the bureau. The largest, at Philadelphia, first made coins in 1793; that at San Francisco was established in 1854; and the branch at Denver was opened in 1906. Other assay offices are located at New York City, New Orleans, and Seattle. A gold bullion depository is located at Fort Knox, Ky.

The first coins officially made by the United States mint were the large copper cents of 1793. From that year to 1940 coins with a value of $6,338,742,298.96 have been turned out.

Memorial coins of special design must be authorized by an act of Congress, as the law provides that the design of standard coins may be changed only once in 25 years. The design of the current Lincoln cent was made by Victor David Brenner. Memorial coins of the United States are shown in the accompanying table entitled *American Memorial Coins.*

Months, Names of. The months of the year received their English names from corresponding Latin names. Those from September to December are so called from the numerals *septem,* "seven"; *octo,* "eight"; *novem,* "nine"; and *decem,* "ten." September was the seventh month when the year began with March. July was formerly called Quintilius, from *quintus,* "fifth"; but, when Julius Cæsar reformed the calendar, he changed the month's name to Julius in his own honor. Julius became July in English. Similarly, Sextilius, from *sextus,* "sixth," was named Augustus after the emperor of that name and became our August.

January was named from Janus, god of entrances. February is derived from *februa,* a festival of purifi-

cation held in that month by the Romans. Martius is the month of Mars, who was originally a god of agriculture, his month being the one when crops were ordinarily planted. The origin of April is not known. May is named from Maia, the mother of the Roman god Mercury. June is derived from Juno, the goddess of women and of marriage.

NATIONAL HYMNS AND ANTHEMS

Argentine Republic. *Oíd, mortales, el grito sagrado* (Hear, O Mortals, the Sacred Call). Music by D. V. Lopez.

Belgium. *La Brabançonne.* Words by Jenneval; music by F. van Campenhout.

Brazil. *Hymno da Proclamacão da Republica* (Hymn of the Proclamation of the Republic). Words by Medeiros e Albuquerque; music by Leopoldo Miguez.

Canada. "God Save the King." Also "O Canada," composed in French by A. B. Routhier and translated into English by R. S. Weir; music by C. Lavallée.

Chile. *Dulce Patria;* national air, by Carnicer.

Costa Rica. *De la Patria.* Words by J. M. Zeledón; music by M. M. Gutierrez.

Czechoslovakia. *Kde Domov Muj* (Where is My Homeland?) Words by J. R. Tyl; music by F. Skroup.

Denmark. *King Kristian stod ved höien Mast* (King Christian Stood beside the Mast). Words by Ewald; music by Hartmann.

Ecuador. *Salve, O Patria.* Words by J. L. Mera.

Egypt. *Salaam, Effendi* (March of the Khedive).

Finland. *Vårt Land* (Our Land). Words by J. L. Runeberg; music by F. Pacius.

France. *La Marseillaise.* Words and music by Rouget de Lisle.

Germany. *Deutschland über Alles* (Germany over All). Words by H. von Fallersleben; music by J. Haydn. The Nazi anthem is the *Horst Wessel* song, by Ernst Hanfstaengl.

Great Britain. "God Save the King." Composed by Henry Carey. The words were in part adapted from verses written by others; the air was adapted from the French.

Greece. "Sons of Greece, Come, Arise." The words and air date from the Greek war for independence, 1821–29.

Hungary. *Isten áld meg a Magyart* (Lord Bless the Hungarian). Music by F. Erkel.

Iran. *Salamati Shah.* Music by A. Lemaire.

Italy. Decadel Hymn. Composer, U. Giordano.

Japan. *Kimi Ga Yo Wa.* Composer, Hayashi Hironokami.

Latvia. *Dievs sveti Latviju* (God Bless Latvia).

Mexico. *Mexicanos, al grito de guerra* (Mexicans, at the Cry of War). Words by F. G. Bocanegra; music by James Nunó.

Netherlands, The. *Wilhelmus van Nassouwe* (William of Nassau) and *Wein Neerlandsch Bloed* (Old Dutch Blood), the latter by H. C. Tollens.

Nicaragua. National air, by Blas Villatas.

Norway. *Sang for Norge* (Song for Norway). Words by Björnstjerne Björnson.

Peru. *Somos libres, seámoslo siempre* (We Are Free, Let Us Be So Ever).

Poland. *Jeszcze Polska Nie Zginela* (Poland's Not Yet Dead).

Rumania. *Traeasca Regale* (Long Live the King).

Russia. "The International." Words by E. Pottier.

Salvador. *Saludemos la Patria* (Let Us Hail Our Country). Words by J. J. Canas; music by J. Aberle.

Sweden. *Ur Svenska Hjertans djup* (From the Depths of Swedish Hearts). Words by Strandberg; music by Lindblad.

Switzerland. *Dem Vaterland* (To the Fatherland). Words by J. R. Wyss. The music is that of "America."

United States, The. "Star-Spangled Banner," officially adopted in 1931. Words by Francis Scott Key. Music adapted from an old drinking song, "To Anacreon in Heaven."

"America." Words by Samuel F. Smith; music that of "God Save the King."

Uruguay. *Orientales, la patria ó la tumba* (Uruguayans, fatherland or death). Words by Juan Coppetti.

Venezuela. *Gloria al bravo pueblo* (Honor to a Brave Nation). Words by V. Salvias; music by J. Landaeta.

Yugoslavia. Combination of Serbian *Boze Pravde,* Croatian *Liepa Nasa Domovina,* and Slovene *Napred Zastava Slave.*

NEGRO POPULATION OF THE UNITED STATES

Division and State	1930	1940	1950
Alabama	944,834	983,290	979,761
Arizona	10,749	14,993	25,973
Arkansas	478,463	482,578	426,639
California	81,048	124,306	462,164
Colorado	11,828	12,176	20,210
Connecticut	29,354	32,992	53,472
Delaware	32,602	35,876	43,608
Dist. of Columbia	132,068	187,266	280,524
Florida	431,828	514,198	603,102
Georgia	1,071,125	1,084,927	1,062,755
Idaho	668	595	1,050
Illinois	328,972	387,446	645,989
Indiana	111,982	121,916	174,326
Iowa	17,380	16,694	19,683
Kansas	66,344	65,138	73,158
Kentucky	226,040	214,031	202,073
Louisiana	776,326	849,303	882,578
Maine	1,096	1,304	1,220
Maryland	276,379	301,931	385,958
Massachusetts	52,365	55,391	73,202
Michigan	169,453	208,345	442,293
Minnesota	9,445	9,928	14,035
Mississippi	1,009,718	1,074,578	986,701
Missouri	223,840	244,386	297,083
Montana	1,256	1,120	1,228
Nebraska	13,752	14,171	19,218
Nevada	516	664	4,302
New Hampshire	790	414	733
New Jersey	208,828	226,973	319,326
New Mexico	2,850	4,672	8,409
New York	412,814	571,221	918,342
North Carolina	918,647	981,298	1,047,365
North Dakota	377	201	257
Ohio	309,304	339,461	513,072
Oklahoma	172,198	168,849	145,469
Oregon	2,234	2,565	11,535
Pennsylvania	431,257	470,172	638,482
Rhode Island	9,913	11,024	13,892
South Carolina	793,681	814,164	822,078
South Dakota	646	474	663
Tennessee	477,646	508,736	530,611
Texas	854,964	924,391	977,443
Utah	1,108	1,235	2,728
Vermont	568	384	443
Virginia	650,165	661,449	734,174
Washington	6,840	7,424	30,674
West Virginia	114,893	117,754	114,866
Wisconsin	10,739	12,158	28,174
Wyoming	1,250	956	2,557
Total	11,891,143	12,865,518	15,043,598

Newspaper Press Associations. Within the past century the collection and distribution of news has become a vast organized business. While each newspaper usually maintains its own staff of editors and reporters and may employ its own special correspondents, virtually all newspapers now depend upon the service of organized news agencies. These agencies have their trained correspondents in all parts of the world and control facilities for more complete, rapid, and economical transmission of news than any one paper could enjoy alone.

The first news agency appears to have been that organized by Charles Havas in Paris in 1835. Havas began by translating articles for the French press. In 1840, he established news service by carrier pigeons between Paris, London, and Brussels. The Havas agency is now subsidized by the French government. It supplies stories and special articles as well as news to the French press.

The Reuter News Agency was organized in 1849 by Julius Reuter, a Prussian government messenger. In 1851, he established his headquarters in London, and, in 1865 and 1866, he gained control of several cable lines. Reuter's is now the greatest of European news agencies.

In the United States, there are several news service agencies. The Associated Press, which, in its present organization, dates from the year 1900, is a co-operative association of American newspapers. It has contracts for the distribution of copy through Reuter's, the Havas, and the Wolff agency in Europe. The United Press Associations is an agency which, through its connections in Europe, Asia, and Australia, supplies a world-wide service. It supplies the most extensive news service in South America. The North American newspaper alliance provides special articles and reports designed to supplement, with interpretation and explanation, the items of general news reports obtained through other channels. This association features especially a week-end service for Sunday editions.

Nobel Prizes. Five annual prizes, amounting to about $30,000 each, awarded to persons who, in different fields of activity, have made the greatest contributions to the progress and the welfare of the world. The prizes are made available by a fund of about $9,000,000 bequeathed for the purpose by Alfred Bernhard Nobel, a Swedish philanthropist and the inventor of dynamite.

The prizes are awarded for distinguished work in (1) chemistry, (2) physics, (3) physiology or medicine, (4) literature, and (5) the cause of international peace. In chemistry and physics, the awards are made by the Swedish Royal Academy of Sciences; in medicine, by the Caroline Institute of Stockholm; in literature, by the Swedish Academy; and for peace, by a committee appointed by the Norwegian Parliament.

Awards were made first in 1901 and continued through 1939, then suspended until 1944, when some of the prizes for 1943 and 1944 were awarded. The peace prize was suspended during World War II. In several years some of the prizes were not awarded; in other cases they have been divided.

The total number of awards to the end of 1956 was 298, including six awards of the peace prize to institutions: Institute of International Law; International Peace Bureau of Switzerland; International Red Cross; Nansen International Office for Refugees; American Service Committee; and Friends Service Council. The remaining 292 awards may be classified as follows according to the nationality of the recipients: United States, 67; Germany, 50; England, 48; France, 31; Sweden, 15; Switzerland, 12; The Netherlands, 10; Denmark, 8; Italy, 7; Austria, 6; Norway and Belgium, 5 each; Spain and Russia, 4 each; Hungary, and Canada, 3 each; India, Poland, Finland, Argentina, and Eire, 2 each; Chile, Portugal, Japan, and Iceland, 1 each. Of the total of 298 personal and six institutional awards, 66 have been for physics; 60 for chemistry; 70 for medicine; 51 for literature, and 51 for peace.

Ten women have won Nobel prizes. One of these, Madame Curie, is the only person who has been distinguished by more than one Nobel award. In 1903, she shared in the prize for physics, and, in 1911, she received the full prize for chemistry. See *Nobel, Alfred Bernhard*; *Nobel Prize Winners*.

Passion Play. This form of religious drama in which are portrayed the sufferings and death of the Savior originated in the ritual prescribed by the Catholic Church on Good Friday. On this day the Gospel describing minutely the happenings that led to the tragedy of Calvary is sung by three of the clergy who represent respectively the Christus, Peter, and the narrator. From this gradually evolved the passion plays of the 13th century. Between 1400 and 1515 these plays reached their highest development. Their presentation was characterized by much elaboration and splendor, the action sometimes lasting over seven days.

At the present day, passion plays may be witnessed from time to time in different parts of the world, especially in the Tyrol and in southern Bohemia. However, the most notable survival of all is that of Oberammergau in upper Bavaria. It dates back to the year 1633, and was the result of a vow made by the villagers to depict the sufferings of Christ every ten years should they be spared from the Black Death, a plague then sweeping over Europe. From the date of that vow but few interruptions have occurred in the decennial celebration.

No less than 700 villagers take part in the Oberammergau Passion Play, each one of whom must be of proved moral integrity. Tradition forbids that married women shall be participants in the sacred drama. Of the proceeds, one-fourth goes to the performers, the remainder to local charities, religious purposes, and town improvements.

Patents. A patent represents a legal right to a monopoly of the production, use, and sale of an invention. This right is granted for a limited time to the inventor by a government. In order to receive such a privilege from the government of the United States, an inventor must have produced some "*new* and *useful* art, machine, manufacture, or composition of matter, or some new and useful improvement thereof." However, such a discovery does not of itself entitle the inventor to a patent. He must, in addition, make known the details of his invention by means of specifications written so clearly and definitely that the desired result could be obtained by other skillful persons who should follow his directions. The application must be made within one year of the first public use, sale, or publication.

Thus it may be seen that the issuance of a patent implies a contract between the government and the inventor. The government gives a temporary monopoly in exchange for complete public information concerning the details of the invention. Should the inventor try to conceal his secret by omitting from his specifications some point which is vital although superficially unimportant, the patent may be declared invalid.

That the importance of patents and copyrights was recognized even in the early days of American history is shown by the fact that authority for their issuance is provided in Article I, Section 8, of the Federal Constitution. Congress created the first patent commission in 1790. The first United States patent was issued July 31, 1790, to Samuel Hopkins of Vermont, for an improved method of preparing pot- and pearl-ashes. Previous to this event patents had been issued by several of the states. The present American patent system was created in 1836.

The United States patent office, which is a branch of the department of commerce, is headed by a commissioner of patents. The commissioner is assisted by a large corps of examiners, whose principal duty is to consider applications for patents and to examine the records to determine whether or not the invention claimed is actually new.

An application for a patent, in order to be considered, must consist of the following items: A petition, addressed to the commissioner of patents and accompanied by a fee of $30; a carefully prepared specification in which are presented the claims on which a patent is asked; a drawing, if possible; and, finally, a statement under oath, that the claimant or claimants personally made the invention which they believe to be new.

Applications are considered strictly in the order in which they are received. If the examiners are satisfied that the claim is for a new and useful invention, the patent is issued after the payment of a second fee of $30. About 2.1 million patents have been issued. The life of the patent is 17 years. Patents for designs are issued for 3½, 7, or 14 years, whichever term the applicant may prefer. Unless a patented article is so marked, and also bears the number of the patent, it is not protected by law.

Patents are not granted for printed matter, for methods of doing business, or on devices for which claims contrary to natural laws are made. The chief examples of the last class are perpetual motion machines. When a patent is asked for such a device, the applicant is informed that his claims cannot be considered unless accompanied by a working model.

An inventor is free to apply personally for his patent. Nevertheless, an official publication of the patent office states that, "Every applicant is advised to employ a competent patent attorney. Great care should be exercised in his selection."

Pawnbroker's Sign. This well-known sign of three golden balls has its origin in the golden byzants, or coins, in which certain officers of the crusaders received payment. These byzants appeared later on the coats of arms of the Lombards, who were the great bankers and money lenders of Europe in the time of the Medici. In course of time the round golden disks were metamorphosed into globes and became the common sign of money lenders and pawnbrokers.

Perfumes. Fragrant flowers are the principal source of the finest perfumes. Nevertheless, the contributions of the animal kingdom and of the chemical laboratory are almost as important to the finished product of a master perfumer as are the essential oils from flowers and other parts of plants.

The principal perfumes obtained from animals are musk, ambergris, civet, and castor. *Musk* is a thick, red-brown, pasty material obtained from the scent glands of the musk deer. The best grades come from China in the original glands, but, because of the high price, adulteration is very common. Musk is sometimes dried and sold as grain musk. *Ambergris* is a soft, variously colored, waxy substance produced by the sperm whale. Whether it is a natural or a morbid secretion is still undecided. It has been taken from the intestines of captured whales, but is usually found floating on the sea or washed up on the shores of the Indian Ocean. Masses of ambergris have been found which weighed 350 pounds. *Civet* is a yellowish brown, buttery secretion from glands of the civet cat, native to Asia and northern Africa. *Castor* comes from glands of the beaver. Each of these materials possesses an intense, more or less nauseating smell. When sufficiently diluted, however, the odors become pleasant.

In perfumery, these animal secretions are valued chiefly because, when used in very small quantities, they add permanence to the lighter floral odors with which they are mixed. A most valuable vegetable fixative is the oil from clary sage.

Cultivation of flowers for the preparation of perfumes has reached its highest point in southern France, where, in the vicinity of Grasse, Cannes, and Nice, thousands of tons of blossoms are picked each year. At Grasse the average annual production includes 2200 tons of orange blossoms, 1650 tons of roses, 1320 tons of jasmine flowers, 440 tons of violets, 330 tons of tuberoses, and 165 tons of carnations. About 3500 pounds of roses are required to yield 1 pound of the attar, of which the finest quality is produced in Bulgaria.

Philately. Whoever first called stamp-collecting "the hobby of kids and kings" had an accurate notion of its strong appeal to young people as well as older ones. Evidently the pursuit of this hobby began almost immediately after Great Britain, in 1840, first issued adhesive stamps to show the prepayment of postal fees.

Philately in its simplest form satisfies the universal passion for collecting something. However, its devotees soon pass from the stage of accumulating packets or books of standard issues having bright colors but no particular value. Then they recognize the art, history, geography, and other educational elements in stamps and begin to think more about their design and significance. Later, perhaps, they become connoisseurs, with an eye to the curious interest, the scarcity, and the sales value of certain specimens. Between an ordinary stamp and the famous British Guiana one-cent stamp of 1856, valued at $32,500, there are many degrees of rarity and interest. Part of the fascination of philately lies in the future, for new stamps, especially commemorative ones, are constantly being issued.

Pidgin, or **Pigeon, English.** A mixed language used much in the ports of China between foreigners and Chinese traders and servants. It is made up of English words, mostly monosyllables, and corrupted Chinese, Portuguese, Malay, and other terms, arranged according to Chinese idiom. The endings ee or o are often added to certain consonants which Chinese find it difficult to pronounce without a following vowel sound. Thus large becomes largee; wife, wifo. The letter r is replaced by l, so that American becomes Melican. "To be or not to be! That is the question," would appear in pidgin English as "Can do, no can do! How fashion?" Pidgin is a Chinese corruption of the word business. Hence pidgin English is business English.

POPULAR NAMES OF CITIES

Aberdeen, Scotland. Granite City, from its many granite buildings.

Amsterdam, The Netherlands. Venice of the Netherlands, from its many canals.

Athens, Greece. City of the Violet Crown, in reference to beautiful effects of sunset light on the Acropolis.

Baghdad, Iraq. City of Peace, a name acquired during the reign of the Abbassides.

Baltimore, Md. Monumental City, from the fact that it was the first to erect a monument to the memory of George Washington.

Birmingham, Eng. The Midland Capital, from its central geographical position.

Boston, Mass. Athens of America; City of Notions, from the amount of "Yankee notions," so called, manufactured there; Hub of the Universe, so called by Dr. Oliver Wendell Holmes; Tri-Mountain City, from the three hills on which it was originally built.

Brighton, Eng. Queen of Watering Places, from its popularity as a seaside resort.

Brooklyn, N. Y. City of Churches, from the number of churches it contains.

Buffalo, N. Y. Queen City of the Lakes, from its importance as a lake port.

Chicago, Ill. Garden City, from the number and beauty of its private gardens; Windy City, from the prevalence of strong winds.

Cincinnati, Ohio. Queen City, so called when it was the commercial metropolis of the Middle West.

Cleveland, Ohio. Forest City, from the number of trees on its streets.

Constantinople (Istanbul), Turkey. City of the Golden Horn, from the name of its harbor.

Damascus, Syria. Pearl of the Desert, from the beauty of its situation.

Detroit, Mich. City of the Straits, from its location on the strait connecting Lake Saint Clair and Lake Erie; also Automobile City, from its primacy in the motor industry.

Duluth, Minn. Zenith City of the Unsalted Seas, from its position at the head of the Great Lakes.

Edinburgh, Scotland. Modern Athens, from its fame as a center of learning.

Foochow, China. Happy City, from meaning of name.

Halifax, N. S. Warden of the North, from its importance as a British fortified post and naval base.

Hannibal, Mo. Bluff City, from its location on the bluffs of the Mississippi river.

Hartford, Conn. Charter Oak City, in reference to the oak tree in which the charter of the colony of Connecticut is said at one time to have been concealed.

Indianapolis, Ind. Railroad City, from its prominence as a railroad center.

Jerusalem, Palestine. Holy City; City of David; City of Peace.

Keokuk, Iowa. Gate City, from its situation at the foot of the Mississippi rapids.

Lhasa, Tibet. Forbidden City, from the former rigid exclusion of foreigners.

Liverpool, Eng. The Modern Tyre, from its importance as a seaport.

Louisville, Ky. Falls City, from the falls of the Ohio River.

Lowell, Mass. Spindle City, from its large textile mills.

Manchester, Eng. Cottonopolis, because of its great cotton mills.

Milwaukee, Wis. Cream City, from cream-colored brick manufactured there.

Minneapolis, Minn. Flour City, from its great mills.

Montpelier, Vt. Green Mountain City.

Nashville, Tenn. City of Rocks, from its natural surroundings.

New Haven, Conn. Elm City, from the number of its elms.

New Orleans, La. Crescent City, from its position on a curve of the Mississippi.

New York, N. Y. Empire City, from its being the chief city of the United States; also Gotham, applied by Washington Irving in his *Salmagundi*.

Niagara Falls, N. Y. Power City, from immense amount of electric power generated there.

Paris, France. City of the Lily; City of Louis.

Philadelphia, Pa. City of Brotherly Love, from the meaning of the name; also Quaker City.

Pittsburgh, Pa. Iron City, from the extent of its iron manufactures; Smoky City, from the smoke which overhangs it.

Portland, Me. Forest City, from the number of its trees.

Portland, Oreg. Rose City, from its prolific rose gardens.

Quebec, Que. Gibraltar of America, from the almost impregnable heights upon which the city stands.

Rochester, N. Y. Flower City, from the profusion of flowers and extensive nurseries there; also Kodak City, from its extensive manufacture of photographic cameras.

Rome, Italy. City of the Seven Hills, from the seven eminences over which the city extends.

Saint Louis, Mo. Mound City, from the many ancient mounds found in the vicinity.

San Francisco, Cal. City of the Golden Gate, from its location at the entrance to San Francisco bay.

Savannah, Ga. Garden City, from its parks and gardens.

Springfield, Mass. City of Homes, from the many people of the city who own their homes.

Springfield, Ohio. Flower City, from the beauty of its surroundings.

Stockholm, Sweden. Venice of the North, from its many islands and waterways.

Venice, Italy. City of Saint Mark; City of the Seventy Isles; Queen of the Adriatic.

Washington, D. C. City of Magnificent Distances, from its being laid out on a large and regular scale; also Federal City.

Worcester, Mass. The Faithful City, so called from its motto: *Floreat Semper Civitas Fidelis.*

Rhodes Scholarships. By the will of Cecil John Rhodes, who died in 1902, a number of scholarships were founded in Oxford university, to be available for men students from the British dominions and colonies, the United States, and Germany. In 1916, the German scholarships were annulled.

Each scholarship is normally of two years' duration, with a possible third year at the discretion of the trustees. The annual value of each scholarship is about $2000. In the United States four appointments are made from each of the eight districts of six states, or a yearly total of 32 scholarships. These men are selected by a district board from a list of 12 in each district who have been previously chosen by a committee. A candidate must be unmarried, between 19 and 25 years of age, and must have completed at least the second year of a college course. The basis for selection involves four considerations: (1) scholarship; (2) character; (3) interest in outdoor sports; (4) interest in one's fellows and instinct for leadership. A candidate in the annual competition may apply from the state in which he lives or from the state in which he has completed the necessary work in a recognized college or university.

Rodeo (*rō'dĕ-ō*; *rō-dā'ō*). The rodeo had its origin in the round-up, when contests of skill were held among the cowboys present. Included were such events as roping, bronco riding, steer riding, calf roping and tying, steer wrestling, called "bulldogging," and other contests. Public exhibitions of this kind became popular toward the close of the last century, and rodeos are now annual fixtures at various places in the West and Southwest, a notable one being held at Cheyenne, Wyoming. Cowgirls as well as cowboys now participate. The cowgirls engage in pony races and trick riding. There are today numerous professional rodeo performers, who tour the country in groups, giving exhibitions reminiscent of the old Wild West shows.

Roland for an Oliver. Roland and Oliver were two of the most noted champions in the court of Charlemagne. In deeds of prowess they were equally matched. On one occasion they fought for five consecutive days. Neither gained the advantage, hence the phrase "to give a Roland for an Oliver," meaning "blow for blow." The expression is also used to signify the matching of one exaggeration by another.

Roosevelt House. The house at 28 East 20th street, New York City, the birthplace of Theodore Roosevelt, 26th president of the United States, was formally dedicated as a permanent memorial on October 27, 1923. In structure and furnishings, the house has been restored to its original conditions.

Seeing Eye. The name of an incorporated society in Morristown, N. J., which trains German shepherd dogs to act as guides to the blind. The breeding and training of dogs so they can be trusted to lead their masters safely even through the heaviest city traffic is due primarily to Mrs. Harrison Eustis, who adapted the idea from a school in Potsdam, Germany, where dogs were trained to assist soldiers blinded in World War I. Assisted by others, she established "Fortunate Fields"—a breeding, training, and research project—in Switzerland in 1924 and founded The Seeing Eye in 1929. The first dog trained by "Fortunate Fields" to be brought to the United States was purchased by Morris Frank, of Nashville, Tenn., in 1928. This dog, known as Buddy, died in 1938, by which time 361 "seeing eye" dogs were in service. It requires about four months to train a dog and an additional four weeks to train his owner to use him. A four-year course is required to make a qualified dog trainer.

Seven Wonders of the World. The seven most remarkable structures among the ancients, noted either for their beauty or for their size, were: the Great Pyramid of Cheops at Giza; the mausoleum erected by Artemisia at Halicarnassus; the Hanging Gardens of Babylon; the statue of Jupiter at Olympia made by the sculptor Phidias; the temple of Diana at Ephesus; the Colossus of Rhodes; and the Pharos, or lighthouse, at Alexandria.

Such lists are necessarily somewhat arbitrary and vary with the judgment of the persons making the selection. For the middle ages, the following are sometimes listed: the Colosseum at Rome; the catacombs at Alexandria; the great wall of China; Stonehenge in England; the leaning tower of Pisa; the porcelain tower of Nanking; and the mosque of Saint Sophia at Istanbul.

Shinto (*shĭn'tō'*) or **Shintoism.** The ancient mythology and religion of the Japanese. In early times, the religion had no dogmas, moral teachings, or sacred writings, nor did it at first receive a distinctive name. There were numerous gods, some

good and others malevolent. Some gods were wedded to women, and from one of these the emperor was descended. After the 6th century A. D., Buddhism, the chief religion of China, was united with Shinto.

In the 18th century, a group of eminent Japanese scholars attacked Buddhism, Confucianism, and all else that was of foreign origin in an endeavor to re-establish the Shinto of the ancient period. Although their efforts produced a marked effect upon literature and politics, Shintoism failed to gain a religious hold upon the people. However, when the revolution of 1865–68 overthrew the rule of the shogun and restored the emperor, Buddhism was disestablished in favor of Shintoism. But, even with this advantage, the pure Shinto could not maintain itself as a religion. Shinto now merely symbolizes the intense patriotism of the Japanese people and provides rites for ceremonials at the imperial court.

Signature of the Cross. The custom of placing the sign of a cross on deeds and documents dates back to early medieval times. With or without the name of a person, it was regarded as equivalent to an oath, and appeared either at the head or the foot of the script. Roughly drawn crosses are frequently met with on wills and contracts dating from the 10th century and later, which indubitably were meant as legal signatures. It was thus that the royal Capets of France and Henry I and Philip I of Castile signed official documents. This usage still survives in the attestation mark of those who are illiterate, and is likewise employed by all Catholic bishops in signing their names both to private and to pastoral letters.

S. O. S. The signal for distress at sea in the continental wireless telegraphy code. This code is universally used except in the overland service in the United States and Canada, where the American Morse code is employed. The signal, consisting of three dots—three dashes—three dots, is one of the easiest to send and the least easily mistaken.

Statuary Hall. A hall in the Capitol, Washington, D. C., in which the House of Representatives formerly met. In 1864, it was officially designed as a national statuary hall, and each state was invited to contribute marble or bronze statues of her two most distinguished deceased citizens. In 1934 this number was reduced to one from each state.

Suez Crisis. The Middle East crisis of 1956 came as a result of the development of conflicting international interests in that area following World War II. Among these were the growth of Arab nationalism with its intense hostility toward the new state of Israel; Israel's equally intense determination not to be destroyed; the economic importance of Mid-east oil to Western Europe and Britain; the attempts of Russia to extend its influence by exploiting the anti-colonialism of the people of the region, and the moves of the U.S. to meet the Russian menace.

Politically and economically the Middle East became of great strategic importance. When the British mandate in Palestine ended and the new state of Israel was proclaimed in 1948, armies of the Arab League from the nations immediately surrounding Israel began to invade the new country. The Arab League, with headquarters in Cairo, had been founded in 1945 by seven Arab states mainly to prevent the creation of a new Jewish state in Palestine; but in 1947 the United Nations voted to partition Palestine between the Arabs and the Jews. On the outbreak of hostilities many Arabs fled from Palestine to adjoining Arab states, and the status of these refugees has remained a major problem.

In 1949, an armistice agreement between Egypt and Israel was reached and truce boundaries were set along Israel's borders. Egypt was given the administration of the Gaza Strip, while Transjordan took over territory on the west side of the Jordan River. But border incidents continued, and in 1950 Egypt barred ships bound for Israel from using the Suez Canal. It also blockaded the Gulf of Aqaba, thus cutting off the southern Israeli port of Elath from the Red Sea. A United Nations resolution in 1951 calling for an end to the ban on Israeli shipping in the Suez Canal was rejected by Egypt. In 1952 King Farouk was forced to abdicate by a coup led by General Naguib who became premier of Egypt. Naguib was in turn ousted in 1954 by Colonel Nasser who took over control of the government. At the urging of Secretary of State Dulles, Britain agreed with Egypt to withdraw British troops stationed in the Canal zone.

Following Nasser's announcement in 1955 that Egypt would accept the Communist offer of arms, a Middle East Organization was established by the Baghdad Pact Nations—Turkey, Iran, Iraq, Britain, and Pakistan—for mutual defense and to prevent Soviet penetration of the Middle East. On December 17 the United States and Britain offered Egypt $70 million to start work on the Assuan high dam on the Nile River.

Events in 1956 moved steadily toward a climax. In January the United States said it was not ready to sell Israel the arms it requested to offset those supplied to Egypt by the Communists. In June the last British troops were evacuated from the Suez Canal zone, and Colonel Nasser was elected president of Egypt without opposition. The withdrawal on July 19 by the United States of its offer to help Egypt build the Assuan dam was followed on July 26 by President Nasser's announcement of the nationalization of the Suez Canal Company and Egyptian operation of the waterway. An 18-nation plan for international control of the canal proposed by Dulles at a London conference of canal users was rejected by Egypt on August 21. On October 29 Israel launched a major offensive against Egypt to wipe out the Gaza bases used by Egyptian commandos for raids on Israel and to open the Gulf of Aqaba. The next day Britain and France warned Egypt and Israel to cease hostilities. Egypt rejected the British-French demand to occupy Suez to protect the canal. On October 31 Britain and France began bombing Egyptian bases. Egypt blockaded the canal. On November 5 Britain and France invaded Egypt, and the United Nations voted a police force to take charge of the situation. On November 6 British Prime Minister Eden announced that Anglo-French troops would cease firing at midnight. By December 22 these forces had been withdrawn. Meanwhile, the U.N. Emergency Force had entered the Canal zone.

In 1957 Israel under U.N. pressure finally retired from invaded territory, and the U.N. Emergency Force occupied Gaza and the area at the entrance to the Gulf of Aqaba. The canal was cleared and opened to traffic in April but a number of major questions remained to be answered.

Symbolism of Flowers. The following is a brief list selected from a large number of flowers and plants to which poetry, tradition, or usage has attached particular meanings. But there is no uniformity of agreement concerning these symbolisms and no authoritative list can be presented.

Amaranth	Immortality
Anemone	Anticipation, Frailty
Apple Blossom	Admiration
Aspen Leaf	Fear
Asphodel	Death, Memorial sorrow
Bay	The poet's crown
Buttercup	Wealth
Calla	Magnificent beauty, Pride
Camellia, White	Innate worth
Candytuft	Indifference
Cardinal Flower	Distinction
Cornflower	Delicacy
Cowslip	Youthful beauty
Cyclamen	Diffidence
Cypress	Mourning
Daffodil	Unrequited love
Daisy	Simplicity, Innocence
Dandelion	Coquetry
Everlasting	Undying affection
Fern	Sincerity
Fir Tree	Time
Forget-me-not	True love

Four-leafed Clover	Good luck
Foxglove	Insincerity
Gentian	Virgin pride
Geranium	Gentility
Goldenrod	Encouragement
Heather	Loneliness
Heather, White	Good fortune
Heliotrope	Devotion
Hepatica	Anger
Hollyhock	Ambition
Honeysuckle	Friendship
Hyacinth	Sorrow
Ivy	Trustfulness, Wedded love
Laurel	Fame
Lilac	Fastidiousness
Lily, White	Purity
Lotus	Forgetfulness, Estranged love
Marigold	Contempt
Myrtle	Beauty's crown, Wedded bliss
Narcissus	Vanity
Oak Leaf	Patriotism, Hospitality
Olive Branch	Peace
Orange Blossom	Marriage
Oxalis	Pangs of regret
Palm Leaf	Victory
Pansy	Thoughts
Peony	Indignation
Poppy, White	Oblivion
Primrose	Early youth
Rose	Love
Rosemary	Remembrance
Rue	Repentance, Disdain
Scotch Thistle	Retaliation
Shamrock	Loyalty
Snowdrop	Friend in need
Sting Nettle	Slander
Sweet William	Gallantry
Tuberose	Bereavement
Tulip, Yellow	Hopeless love
Violet	Modesty
Wallflower	Faithful love
Water Lily	Purity of heart
Yellow Rose	Jealousy
Yew	Death

Talking Drums of Africa. The native drums of Africa have been used for centuries to beat out messages that have been relayed across hundreds of miles of jungle. These talking drums, which have two tones, are large hollow logs with solid ends and a long narrow slit two or three inches wide extending almost their entire length. Suspended from a tree or framework, a drum is played by beating the log near the edges of the slit, the two tones being produced because one side is more hollow and thinner-lipped than the other. The drummer, using two sticks with rubber-bound ends, beats out the syllables of the words of the message, giving each syllable its fixed tone value, which is either high or low, like the spoken language. The drum literally talks in imitation of native speech. Since more than one word may have the same number of syllables and tone value, a large number of stock phrases are used. Almost every native has a drum name, and even children understand theirs when they hear them. The talking drums can be heard afar.

Theaters. Within recent years, the art and the management of the theater have undergone some very interesting developments. In America, the more general use of dramatic representations in the form of pageants, the recognition of the value of dramatic form in education, and the systematic study of the art of the theater in schools and colleges have enlarged the place of the theater in popular culture. The consolidation of the management of theaters in the great centers and of theater circuits throughout the country has been accompanied by movements toward the establishment of local and independent playhouses under the direction of drama leagues and local organizations of amateur or semiprofessional players. Many schools and colleges also maintain small indoor and outdoor theaters for the production of plays either by students or by professional companies.

In these various recent developments there appear phases which have marked the history of the theater. The outdoor theaters of classic design, such as that erected at the University of California, recall the great unroofed theaters of ancient Athens, where the seats for spectators were ranged in tiers on sloping hillsides. The Romans, building on level land, erected the sloping tiers of seats upon arches.

When, after several centuries of neglect, the building of theaters was begun in London in the 16th century, they were at first erected without roofs, except over part of the stage and some of the stalls or boxes which were ranged around the central "pit." This form of building has been traced to the innyards surrounded by balconies, in which strolling players gave their entertainments.

The first recorded theatrical season in America was conducted in New York in 1750–51. The first play of this season was *Richard III*, in which Thomas Kean played Richard. The Southwark theater, built in Philadelphia in 1766, was the first permanent theater in the colonies. In 1800, there were only three theaters of importance in American cities; by 1850, probably 50 were in use.

Third Degree. The psychological or moral method used by the police in the United States for the purpose of forcing the truth from a suspected criminal. It consists in continuous and relentless questionings, lasting for many hours or even for days, until the prisoner, if guilty, is morally compelled to give way and confess. The system has been at times severely criticized, and charges of cruelty have been brought against the police on this account. The authorities have denied such accusations and are firm in their belief in such moral suasion. The method of the "third degree" seems to have developed imperceptibly and no fixed period can be mentioned when it originated.

Tip. A gratuity given to waiters, porters, and other servants for services rendered or expected. In this sense the term is used in America. In England it is employed, moreover, to denote a small present of money made to a relative or schoolboy by an elder. Hence the expression "a schoolboy's tip." The origin of the word is dubious, but would seem closely allied to the kindred word "tip" or tap, with the sense of touching the elbow slightly by way of private hint. One explanation is that the word was formed by placing in order the first letters of the words in the phrase "to insure promptness."

Tongs. These are Chinese benevolent protective associations in the United States. There are no tongs in China. They grew up as a means of self-protection by Chinese laborers against oppression and persecution at the hands of white communities in the period from 1848 to 1875, when many "coolies" were hired by gold mining and railroad construction companies.

The word tong refers to the living room of a Chinese house and was probably applied to the secret societies because they originally met in the houses of members. There are about 15 tongs in the United States, among the largest of which are the Hip Sings and the On Leongs. These tongs were engaged in murderous feuds, popularly known as tong wars, in 1917, 1924, and 1930. A general arbitration agreement was signed by the leading tongs in 1930.

Totem Poles. Carved wooden poles or pillars which are set up before the houses of certain Indian tribes of the northwest coast of North America, especially those of Koluschan stock in southeastern Alaska. They are used to exhibit totem figures.

A typical totem pole is fashioned from a huge log 40 or 50 feet in length. This is erected like a flagstaff in front or by the side of a low wooden dwelling and rudely carved throughout its entire length with immense grotesque figures of man, beast, and bird, the weird effect of which is heightened by daubs of blue, green, and red paint. Usually the carvings consist principally of three half human, half animal figures, seated above one another, upholding the remainder of the pole at the summit of which is a figure representing the totem. Sometimes the totem pole is only a smooth massive tree trunk with the

totem figure, usually that of a bird or of some weird animal, displayed at the top.

The totem and other signs and symbols on a pole serve to identify Indians of one particular family, group, or kindred, so closely allied that intermarriage is forbidden among them. Totem poles, although not worshipped, have a profound social and religious significance and are emblematic of family pride, veneration of ancestors, and legendary religion.

Tutankhamen (*tōōt-änk'ă-mĕn*), **Discovery of Tomb of.** In November 1922, Mr. Howard Carter, an American Egyptologist, and Lord Carnarvon of England, who for seven years had been conducting excavations in the Valley of the Kings, near Luxor, were rewarded by the discovery of the undespoiled tomb of the ancient Egyptian emperor, Tutankhamen, who reigned in the 14th century B. C. Their achievement was recognized as one of the most remarkable in the history of archeological research.

Under the Rose. (Lat., *sub rosa*) An expression of very ancient date meaning in strict secrecy or confidence. According to classic mythology, Cupid gave Harpocrates, the god of silence, a rose to bribe him not to betray the amours of Venus. Hence the flower became a symbol of secrecy. The expression is now common to all European languages, but is said to have originated in Germany. The phrase came into vogue in England about the middle of the 16th century. As a flower sacred to Freya, under which name Venus was known to the Norsemen, the rose appeared as an architectural decoration on the ceilings of banquet halls. Thus, at table, when wine flowed and tongues were loosed, words uttered beneath the flower of Freya became hallowed and could not be uttered elsewhere.

United States Money. The money of general circulation in the United States consists of silver and minor coins and three chief types of certificates or notes. Gold was called into the treasury and withdrawn from circulation in 1933. After the gold content of the dollar had been changed from 23.22 grains to 13 5/7 grains in 1934, the legal value of coins no longer conformed to face value. Coinage on the new basis has not been authorized.

Gold certificates, representing their face value in gold, are restricted to use by Federal Reserve banks as part of their reserves against note issues. They exist in denominations of $10, $20, $50, $100, $500, $5000, and $10,000.

In addition to the three chief types of certificates in general circulation, three other types are in process of being withdrawn.

The following are types of money authorized for circulation, all of them being legal tender:

Silver Dollars contain 371.25 grains of pure silver plus 41.25 grains of copper alloy. Coinage of silver dollars was discontinued in 1905 and recommenced in 1921.

Subsidiary Silver Coins in the denominations of 10, 25, and 50 cents contain 347.22 grains of silver plus 38.58 grains of alloy for each dollar of face value. They weigh about 1 gram for each four cents of value.

Minor Coins. The nickel (5 cents) and penny (1 cent).

Silver Certificates, issued against silver dollars deposited in the treasury of the United States, in denominations of $1, $2, $5, $10, $20, $50, and $100.

Federal Reserve Notes, in denominations of $5, $10, $20, $50, $100, $500, $1000, $5000, and $10,000.

United States Notes, in the same denominations as silver certificates with the addition of $500 and $1000.

Treasury Notes of 1890. Same denominations as United States notes.

National Bank Notes, in denominations of $5, $10, $20, $50, $100, $500, and $1000.

Federal Reserve Bank Notes, in values as for Federal Reserve notes up to $1000 but not above.

Issuance of the last three has been discontinued.

The seal of the United States treasury, which is placed upon each piece of paper money, bears the abbreviations of the Latin words, *Thesauri Americani Septentrionalis Sigillum*, meaning "Seal of the Treasury of North America." This is an interesting relic of those days when it was believed that Canada would become a part of the United States.

Certificates of the smaller denominations are usually worn out within three years by handling. About $1 of every $200 issued is never returned for redemption. Torn, burned, or otherwise damaged bills will be redeemed at their full face value if at least .6 of the surface is delivered at the Treasury; half of the face value will be redeemed if less than .6 but more than .4 of the surface has been saved. See *Money in the United States.*

Universal Languages. The chief obstacle to communication between people inhabiting different parts of the world is diversity of language. At various times in history, certain languages have attained sufficient prestige to be widely used as an international medium of expression. Among them have been Assyrian, Greek, Latin, Arabic, French, and English. In recent times, however, an opposite tendency has appeared; the growth of nationalism has resulted in the revival of many languages which had been dying out. One notable revival is that of Irish, which has been declared the official language of Ireland. In the meantime, closer commercial relations, the increasing popularity of travel, and the development of radiotelephony make it more and more desirable that people of all nationalities should be able to understand each other.

There have been a number of attempts to construct an artificial language which might easily be learned by people of different tongues. Those best known are Volapük and Esperanto.

Volapük was published in 1880 by J. M. Schleyer, a priest of southern Germany. It is based mainly on English, the rest of the vocabulary being drawn from Latin and the Romance languages. The name is a combination of words meaning "world" and "speak." The language spread rapidly, and, when the third Volapük congress met at Paris in 1889, there were 283 Volapük societies and the total number of students of the language was estimated at more than one million. Its popularity rapidly declined because of dissensions, the founder refusing to accept modifications desired by the Volapük academy, which, under the direction of M. Rosenberger of Petrograd, began to construct a new language entitled Idiom Neutral.

Esperanto was set forth by a Russian physician, Zamenhof, whose first publication on the subject appeared in 1887 over the signature Dr. Esperanto, "Hopeful." By means of using as roots many words common to various European languages and by adding certain prefixes and suffixes, the structure of the language is made very much simpler than that of any natural tongue. Esperanto is spelled strictly in accordance with pronunciation. The spread of the language has been remarkable in spite of the fact that several new letters have been introduced, type for which is not possessed by most printers.

Water. The fluid which falls from the clouds in rain, which forms lakes and streams in the land, and which fills the vast ocean that surrounds the land. Because of its universal presence, its multifold usefulness, and its immense extent, water is one of the most important of all substances. It covers more than five-sevenths of the earth's surface, makes up about seven-eighths of the animal body, constitutes fully nine-tenths of the bodies of many plants, and is found in numerous minerals and rocks. Moreover, it is absolutely necessary to the existence of life. Without water, the entire vegetable and animal kingdoms would quickly perish and the teeming earth would soon become as lifeless as the moon.

Occurrence and Quantity. In addition to forming streams, seas, and a large part of all plant and animal structures, water occurs throughout the soil and rocks and, as vapor, enters into the composition of the air. Water, therefore, is an important factor in the earth's lithosphere, hydrosphere, and atmosphere. It is estimated that if the water of the ocean were distributed in a layer of equal thickness over the whole earth, it would cover it to a depth of about two miles. It is computed also that if all the water on the earth were gathered to-

gether into one mass, it would form a sphere 900 miles in diameter.

Chemical Composition. Water is a chemical compound composed of oxygen and hydrogen. It is formed by the union of one volume of the former with two of the latter. By weight, water contains 88.814 per cent oxygen and 11.186 per cent hydrogen. Chemically pure water, therefore, is the oxide of hydrogen and has the formula H_2O. In the popular sense, pure water usually contains small quantities of various substances which do not impair its usefulness for practical purposes.

Physical Properties. Water occurs in nature in three states,—liquid, solid, and gaseous. Under normal atmospheric pressure, water is a liquid between 32° F., or 0° C., its freezing point, and 212° F., or 100° C., its boiling point. At the freezing point it becomes ice and at the boiling point, steam. In dry air, however, both liquid water at temperatures above freezing and solid ice at temperatures below freezing evaporate slowly. Water attains its greatest density at 39.2° F., or about 4° C.

The specific heat of water is greater than that of any other substance except hydrogen. The amount of heat required to raise the temperature of one gram of water from 18° C. to 19° C. has been adopted as the unit of heat known as the gram-calorie.

Watermark. The faintly marked letter, figure, or design, seen on paper when held to the light, is used to denote place of manufacture, size, or quality. The watermark is formed during the process of manufacture by the pressure of wires on the wet pulp. One of the earliest designs was that of a dolphin, the coat of arms of Rives, a small town in France noted for its paper factories. This mark is still used by some manufacturers to denote a good quality of paper. The names of various watermarks employed by earlier paper makers now serve to denote some of the present standard sizes of paper, as *foolscap*, *crown*, *elephant*, and *post*, the last so named because of a postman's horn used as a watermark.

White House. The name applied, both popularly and officially, to the residence of the president of the United States. The mansion is located on Pennsylvania avenue, about a mile and a half from the Capitol, upon a site selected by President Washington and Major L'Enfant in 1791. The original design of the building was made by James Hoban of Dublin, and was selected through a competition in 1792. On October 13, the corner stone was laid

The White House was occupied for the first time by President John Adams in November 1800. It was burned by the British in 1814. In rebuilding, white paint was used to cover the traces of fire. Hence it became known as the White House. This title was offically adopted by President Theodore Roosevelt in 1901. The structure, four stories in height, with a frontage of 170 feet and a depth of 86 feet, is surrounded by a park of 75 acres. The first floor is occupied mainly by the rooms for public functions, with the apartments of the president and his family above.

The White House was remodeled in 1902, and improvements were made again in 1927. In 1949, the interior was torn out in a major operation, completed in 1952.

Women, First in Public Life. The first woman to be elected to the United States House of Representatives was Jeannette Rankin (1882–) of Montana, Republican, who served 1917–19.

The first woman member of the United States Senate was Mrs. Rebecca Felton (1835–1930) of Georgia, who held office for one day in 1922 under appointment by the governor of Georgia. The first woman to be elected to the Senate was Margaret Chase Smith of Maine in 1948.

The first woman to be elected as state governor was Mrs. Nellie Tayloe Ross (1880–) of Wyoming, Democrat, who served from 1925 to 1927. She was also the first woman director of the mint, being appointed in 1933.

The first woman cabinet member in the United States was Frances Perkins (Mrs. Paul Wilson, 1882–), appointed secretary of labor in 1933.

The first woman diplomatic representative from the United States was Mrs. Ruth Bryan Rohde (1885–1954), appointed minister to Denmark, 1933.

The first woman member of the British Parliament was Nancy Langhorne, Lady Astor (1879–), Unionist, elected in 1919. The first woman member of the British cabinet was Margaret Bondfield (1873–1953), chosen minister of labor in 1929.

WORLD EXPOSITIONS

Name of Exposition	Place	Date	Area Acres	Exhibitors	Visitors (Approximate)	Cost (Approximate)	Receipts (Approximate)
Crystal Palace	London	1851	19	15,000	6,000,000	$ 1,600,000	$ 2,500,000
Dublin	Dublin	1853	12	7,000	1,000,000	400,000	230,000
New York	New York	1853	13	4,000	1,250,000	640,000	340,000
Paris International	Paris	1855	24	24,000	4,500,000	5,000,000	500,000
International	London	1862	17	26,000	6,000,000	2,000,000	2,000,000
French International	Paris	1867	119	50,000	9,000,000	6,000,000	3,000,000
Austrian International	Vienna	1873	280	55,000	7,000,000	10,000,000	2,000,000
Philadelphia Centennial	Philadelphia, Pa.	1876	236	50,000	10,000,000	8,500,000	4,000,000
French International	Paris	1878	140	52,000	16,000,000	8,000,000	2,500,000
Melbourne	Melbourne, Australia	1880	29	12,000	1,300,000	1,000,000	330,000
French International	Paris	1889	173	61,000	25,000,000	8,300,000	10,000,000
World's Columbian	Chicago, Ill.	1893	600	65,000	28,000,000	31,000,000	33,000,000
Cotton States and Industrial	Atlanta, Ga.	1895	189	.....	1,000,000	2,000,000	18,000
Tennessee Centennial	Nashville, Tenn.	1897	200	2,000	2,000,000	1,000,000	1,000,000
Trans-Mississippi	Omaha, Nebr.	1898	200	4,600	2,600,000	.....	2,000,000
French International	Paris	1900	336	80,000	47,000,000	27,000,000	22,000,000
Glasgow	Glasgow, Scotland	1901	....	.....	11,000,000	2,000,000	2,000,000
Pan-American	Buffalo, N. Y.	1901	350	.....	8,000,000	9,000,000	5,000,000
Louisiana Purchase	Saint Louis, Mo.	1904	1142	.....	20,000,000	20,000,000	12,000,000
Lewis and Clark	Portland, Oreg.	1905	406	3,000	2,500,000	7,000,000	.....
Jamestown Tercentennial	Jamestown, Va.	1907	350	2,500	2,800,000	10,000,000	7,000,000
Alaska-Yukon-Pacific	Seattle, Wash.	1909	250	.....	4,000,000	10,000,000	.....
Panama-Pacific	San Francisco, Cal.	1915	635	80,000	19,000,000	50,000,000	12,500,000
Panama-California	San Diego, Cal.	1915	618	.....	2,250,000	2,000,000	.....
Brazilian Centennial	Rio de Janeiro	1922	....	.....	.....	20,000,000	.....
British Empire	Wembly, Eng.	1924-25	220	.....	27,102,350	15,000,000	7,100,000
Sesquicentennial	Philadelphia, Pa.	1926	1500	.....	5,852,783	26,000,000	5,000,000
Century of Progress	Chicago, Ill.	1933-34	424	.....	39,052,156	33,000,000	33,000,000
California Pacific	San Diego, Cal.	1935-36	1400	.....	3,747,916	20,000,000	.....
Texas Centennial	Dallas, Texas	1936	186	170	7,000,000	25,000,000	.....
Great Lakes	Cleveland, Ohio	1936-37	150	.....	4,000,000	25,000,000	.....
Golden Gate International	San Francisco, Cal.	1939	400	.....	17,041,779	16,900,000	.....
New York World's Fair	New York, N. Y.	1939-40	1216	.....	44,932,534	156,000,000	.....
Festival of Britain	London	1951	27	.....	.....	31,000,000	.....

TEST QUESTIONS

Indicate the origin of the term parliamentary law and state its present meaning 2035
Outline the steps to be taken in adopting a constitution 2035–2036
State a reason for referring matters to committees 2040
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INDEX

THE Lincoln Library has been so built that, in some respects, an index is superfluous. The material in the various departments has been arranged in such a manner that, with a brief period of intelligent use, the reader will be able to turn directly to a required fact without the initial step of consulting the general index.

This advantage is due to the fact that related material is grouped in sections, a large proportion of it taking the form of dictionaries and carefully prepared tables, which are practically self-indexed. In the aggregate, there are some 66 separate dictionaries and 330 tables. A **representative selection** from these dictionaries and tables will be found alphabetized for quick reference on page 2114.

Advantages of Arrangement. The intelligent user will take advantage of the general plan of this volume by becoming so familiar with the location of the departments, sections, dictionaries, and tables that the mechanical consultation of the index will become less and less imperative. With practice, the driving of an automobile becomes one of the simplest of operations. Likewise, familiarity with the electric switches in a house makes the control of the lighting system easy even for a child. So in the use of this volume, a little practice will insure a surprising mastery over its resources. When the reader has learned, for example, that in the Department of Science there is a comprehensive dictionary of animals on pages 1006–1070, he will go directly to that section in order to learn the difference between a toad and a frog or to settle similar questions regarding animal life. For the geography of Japan, he will consult the Department of Geography and, in particular, the section on Asia, pages 805–814, in which the countries of that continent are treated in alphabetical order.

The extraordinary range of the facts in the text, dictionaries, and tables of this work makes it obviously inadvisable that every individual item should be entered in the general index, which would thereby become much too unwieldy for convenient and quick reference. Thus the populations of many small towns of the United States or Canada appear, not in the general index, but in the tables of populations, to which the reader will be referred under "Population" in the general index. After a brief period of use, however, he will be likely to remember the fact that these tables are on pages 741–746 and 754 respectively, and, on occasion, will turn directly to these pages, where the various entries will be found arranged in alphabetical order. In the same way, he will soon be able, almost on opening the book, to find electrical terms, points in good usage, musical terms, stories of the operas, national flags, historical topics, mythological references, and numerous other types of information, even though the great majority of the items may be located also by means of the general index.

Fullness and Simplicity of Index. Despite this surprising availability of material in a book embracing the essentials of a whole library, a general index has certain supplementary values which make its inclusion necessary in a work that is to give the greatest possible service. The Lincoln Library has, therefore, been provided with a full, simple, systematic key to its contents.

The index which follows is larger than has ever been placed in a single volume of similar scope. It contains more than 22,000 line entries, many of which include two or more page references. The following example will reveal the ease with which a specific fact may be located by means of the index.

If the reader wishes to learn the growth of Chicago's population, he will probably turn first to "Chicago" in the index. He is there referred to the article on Chicago, page 698, in the last paragraph of which, entitled History, the required facts are summarized. The index leads him also directly to the full, authentic figures desired. Under the word "Chicago" in the index, and slightly to the right, will be found the word "Population," with reference to pages 677, 742. Turning to page 677 the reader will find a table of the 25 largest American cities with their population figures from 1880 to 1950. Chicago appears second in this table. In case the user has thought first of the word population, he will turn to the index, where, subindexed under "Population," he will discover "American Cities" with a reference to page 677. He will thus be led by this route also to the desired information.

Special Values. This index does vastly more, however, than lead the reader to specific passages. It is, in the first place, a guide to the plan of the volume. If one wishes to find a synonym for "Copy" or some other word, a reference to the word "Synonyms" in the index will lead one to the dictionary of synonyms and antonyms on pages 137–171 and to the key to that dictionary on pages 172–178. Similarly, under "Plants," "Agriculture," or other general subjects, the user will be referred to these important divisions.

For gathering many items on a given topic, as for the preparation of a school theme or a club paper, the index will be found indispensable. If, for example, the user wishes to bring together as many facts as possible about the state of California, he will, by turning to "California" in the index, find no less than 24 different references to various informing passages regarding the state. These include, besides area and population, such items as agricultural statistics, farm statistics, birth rate, chief manufacturing cities, number of motor vehicles, petroleum production, state parks, and suffrage requirements.

Suggestions. In order to obtain the greatest value from this index, the reader will find it advantageous to keep in mind the following facts:

When a phrase appears in the index, its words are so arranged that the most important, usually a noun, occupies the first place. "Flowering Dogwood," for example, should be sought, not under F, but under D, in the form "Dogwood, Flowering."

In all cases where an indexed item appears in the text as a heading, as the title of a separate article in a dictionary, or as an entry in a table, only the page number is given in the index. If, however, the item cannot so readily be located on its page, a letter is added, which indicates the particular quarter page in which the word or fact occurs. The letters a and b refer respectively to the upper and the lower half of the first column, while c and d refer to the corresponding halves of the second column. Thus 218a means the upper left-hand quarter of page 218; 218d means the lower right-hand quarter of the page.

Where two or more page references appear in one index entry, the most important reference, as a rule, is given first. Under all names of people treated in the Department of Biography, the first page reference is to the biographical article.

When an entry is followed by a second entry in italics, the latter is the title under which the first subject is treated. Thus "Aspen, *Poplar* 1109" means that information regarding Aspen is to be found in the article entitled Poplar, which occurs on page 1109.

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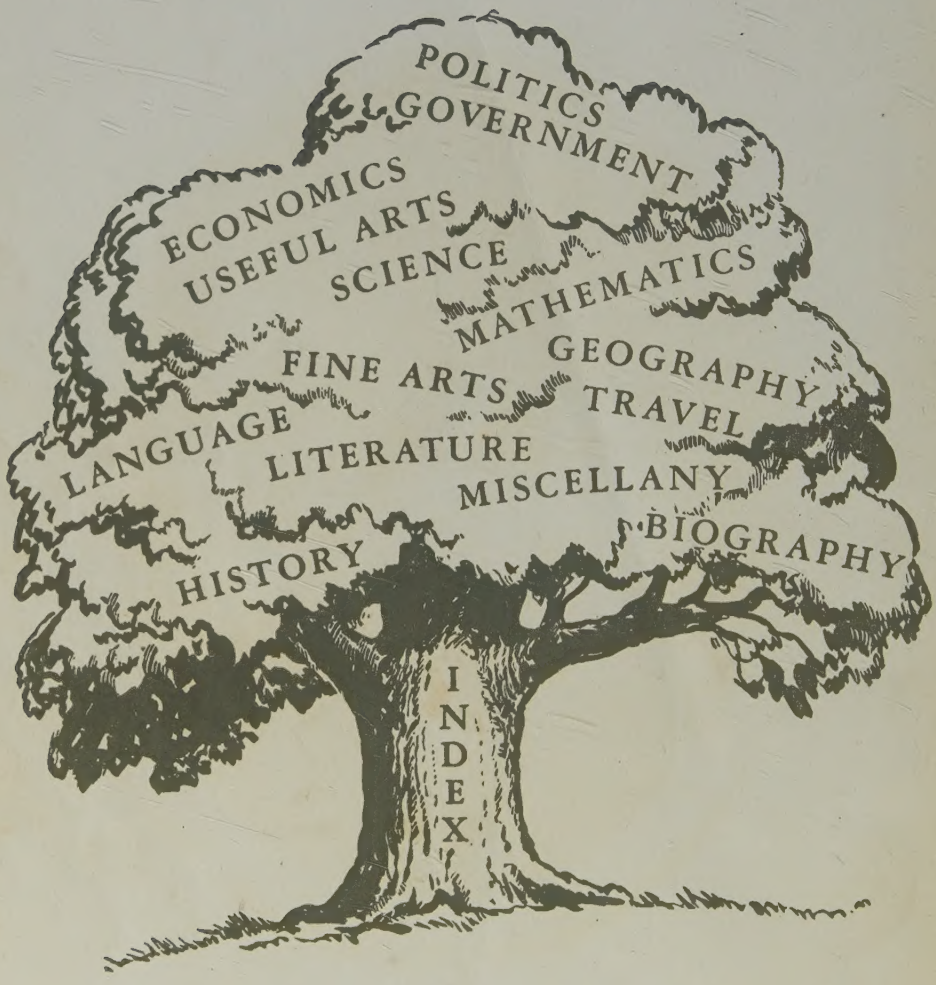
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